

Running on Empty: How Back-to-Backs Impact Pace and the Four Factors of Basketball Success

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Abstract

We investigate how back-to-back games affect National Basketball Association (NBA) team performance using the Four Factors of Basketball Success - effective field goal percentage (eFG%), turnover percentage (TOV%), offensive rebounding percentage (ORB%), and free throw rate (FT/FGA), as well as pace of play. Drawing on game-level data from the 2013-14 through 2023-24 seasons and over 20,000 observations, we use a fixed-effects regression model to estimate the total effect of second-night-back-to-back scheduling on team performance. The results show that back-to-backs significantly reduce offensive efficiency, lower rebounding rates, and slow down pace. Defensively, teams allow higher opponent eFG%, generate fewer turnovers, and give up more defensive rebounds and free throw attempts. These findings suggest that second-night back-to-back scheduling is associated with declines in both effort-based and execution-based metrics, providing new insight into the real costs of NBA scheduling practices. The results matter not only for analysts and teams managing player workloads, but also for league officials seeking to improve player health and game quality.

Categories: Scheduling, Sustainable Human Resource

Keywords: nba back-to-backs, basketball fatigue, basketball performance, basketball pace, scheduling

Introduction

National Basketball Association (NBA) teams are frequently tasked with performing under difficult scheduling conditions, including stretches where they play on back-to-back nights. These condensed schedules raise questions about the physical and mental toll on players, as well as whether teams can maintain the same level of performance without adequate rest between games. In recent years, this conversation has become more visible as teams rest their stars during regular-season games, citing the need for load management (see e.g. (Powell, 2024)). This strategic behavior complicates any analysis of back-to-back effects since performance declines may stem partly from teams resting key players rather than from fatigue alone. Fans, media, and the league itself have debated the implications for player health and for the quality and integrity of competition (Bowman et al., 2022).

This paper examines whether back-to-back games significantly impact team performance, utilizing a more comprehensive set of performance metrics than has been employed in prior research. Rather than focusing on wins or scoring margin, we use the Four Factors of Basketball Success - eFG%, TOV%, ORB%, and FT/FGA - as well as pace factor to capture changes in both offensive and defensive execution. We analyze over a decade of NBA regular-season data (2013-2024) using a fixed-effects regression model that controls for team-specific and season-level differences.

We hypothesize that teams on the second night of a back-to-back will exhibit poorer performance across key areas, particularly in shooting, rebounding, and defensive disruption. The regression results support this view. Teams shoot worse, grab fewer offensive rebounds, and play at a slower pace. On defense, they allow better shooting, force fewer

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turnovers, and give up more free throws. These findings provide an updated and more detailed examination of how condensed scheduling affects specific dimensions of team performance, with implications for league scheduling policy, team roster management, and the broader debate around competitive integrity.

Literature review

Prior work has recognized the potential effects of back-to-backs, rest, and fatigue on performance in basketball, as well as other sports (Scoppa, 2015).

One strand of literature conducts intensive studies on small numbers of players outside of games. Bourdas et al. (Bourdas et al., 2024) examined 38 players from the top Greek national leagues, and found that fatigue significantly reduces shooting accuracy, increases shot release time, and lowers the ball's entry angle into the hoop across all player positions. Cao et al. (Cao et al., 2022) systematically review the effects of mental fatigue (MF) on basketball performance. The review includes studies utilizing various MF-inducing tasks such as Stroop tasks, mental arithmetic, and tactical video analysis. The findings reveal that MF negatively affects technical and cognitive performance, significantly declining free-throw and three-point shooting accuracy.

Another strand of literature takes an approach closer to ours and examines data on prior basketball games directly. Lewis (Lewis, 2018) studied NBA players from 2012 to 2015 and found that increased game load and fatigue are associated with a higher risk of injury. Steenland and Deddens (Steenland and Deddens, 1997) study NBA data from 1987 to 1995 and suggest that a longer interval between games enhances performance, with peak performance achieved after 3 days of rest. Teams playing with more than 1 day of rest scored an additional 1.1 points (home) and 1.6 points (visitor) on average. Yang et al. (Yang et al., 2021) and Esteves et al. (Esteves et al., 2020) examine the effect of "match congestion" on a variety of outcomes in the 2016-17 NBA season. Charest et al. (Charest et al., 2021) note that back-to-backs particularly reduce a team's chance of winning when the second game of the back-to-back is played away from home. The closest study to ours is Hopper (Hopper, 2024), which examines how NBA teams perform in back-to-back games compared to games with at least 1 day of rest using relatively recent data (2014-2021). Results show that teams playing on the second night of a back-to-back underperform, with a mean margin of victory of -1.94 points, compared to 0.39 points for games with rest. However, the literature suggests that at least as of 2010, betting markets have not fully accounted for these effects (Ashman et al., 2010).

A related but distinct strand of literature examines the strategic dimension of rest in professional sports. As back-to-back games have become a focal point of scheduling discussions, teams have increasingly adopted load management practices, selectively resting players to reduce injury risk and preserve performance for higher-leverage games. The NBA's own internal study found that rest significantly reduces soft-tissue injury rates, which justifies this strategy empirically (Powell, 2024). This creates an important identification challenge for studies of back-to-back effects: if teams systematically alter their rosters for the second game of a back-to-back, observed performance declines might reflect weaker players receiving more minutes rather than lingering fatigue from the previous night's game. To our knowledge, no prior study of back-to-back effects has explicitly addressed this distinction.

The Four Factors provide a useful framework for examining fatigue effects because they capture distinct dimensions of basketball performance that differ in their sensitivity to physical and mental fatigue. Drawing on the sports science literature, we can distinguish between metrics that are primarily effort-dependent and those that are primarily execution-dependent.

Effort-dependent metrics reflect a player's physical exertion, positioning, and hustle. Offensive rebounding percentage is a clear example: securing offensive rebounds requires box-out battles, second-effort jumps, and sustained motor activity, all of which are directly compromised by muscular fatigue (Bourdas et al., 2024). Similarly, pace reflects the speed at which teams push the ball and initiate possessions, making it naturally sensitive to diminished energy levels.

Execution-dependent metrics reflect shooting precision and decision-making under pressure. Effective field goal percentage depends on fine motor control, balance, and concentration, each of which degrades with fatigue as the literature on shooting accuracy has documented (Bourdas et al., 2024) (Cao et al., 2022). Turnover percentage and free

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throw rate, by contrast, may be less directly tied to physical fatigue. Ball handling and foul-drawing behavior are more habitual and may be sustained even when players are physically tired, or teams may compensate by simplifying their offense approach.

Based on this framework, we hypothesize that back-to-backs will have the strongest effects on effort-dependent metrics (ORB%, pace) and shooting efficiency (eFG%), with weaker or insignificant effects on turnover percentage and free throw rate. We note that this framework applies regardless of whether the performance channel operates through fatigue or roster composition. If teams rest their most physically capable players on back-to-backs, the replacement players may be even less equipped to sustain the effort-dependent aspects of play, reinforcing rather than undermining the predicted pattern.

We advance on the prior literature in several ways. First, we employ the Four Factors of Basketball Success as dependent variables, providing a more granular view of how back-to-backs affect specific dimensions of team execution rather than aggregate outcomes like point differential or win probability. Second, we use more recent data (through 2024), which is meaningful given the NBA's evolving approach to rest and scheduling, including the implementation of the Player Participation Policy (PPP) ([National Basketball Association, 2023](#)). We note that, like prior studies examining aggregate outcomes, our estimates capture the combined effect of physiological fatigue and any strategic roster adjustments teams make in response to back-to-back scheduling. We discuss the implications of this for interpreting our results in the "Methodology" section.

Research Method

Data

This study uses game-level data from the 2013-14 through 2023-24 NBA regular seasons, compiled from Basketball Reference's advanced team game logs. The dataset includes over 20,000 observations, with each entry representing a single team's performance in a regular-season game. Key variables include the Four Factors of Basketball Success - effective field goal percentage (eFG%), turnover percentage (TOV%), offensive rebounding percentage (ORB%), and free throw rate (FT/FGA) - as well as pace factor (possessions per 48 minutes). Corresponding defensive metrics, such as opponent eFG% and opponent turnover percentage (TOV%), are also included to capture both sides of the ball.

To examine the effect of rest, we constructed a binary indicator for back-to-back games. This variable equals one if the team played on the second night of a back-to-back and zero otherwise. Additional controls include a home game dummy (1 if the team played at home, zero if away), as well as team and season fixed effects to account for unobserved heterogeneity across franchises and evolving league-wide trends.

All data were programmatically scraped using Python to ensure consistency and minimize human error in the collection process (see Menz ([Menz, 2025](#)) for scraping details). The advanced game logs were necessary to obtain team-level metrics for the Four Factors, which are not included in the standard box scores. The final dataset, summarized in Table 1, is clean, complete, and well-structured for panel regression analysis.

Variable Type	Variable	Mean	Std. Dev.	Min	Max
Independent	Back-to-Back	0.190	0.392	0	1
Control	Home Game	0.500	0.500	0	1
Dependent (Offense)	eFG%	0.524	0.067	0.285	0.795
Dependent (Offense)	Turnover %	12.753	3.447	1	29.3
Dependent (Offense)	Offensive Rebounding %	23.397	7.362	0	55.8
Dependent (Offense)	Free Throw Rate (FT/FGA)	0.204	0.076	0	0.65
Dependent (Offense)	Pace	97.463	5.226	77	118.7
Dependent (Defense)	Opponent eFG%	0.524	0.067	0.285	0.795
Dependent (Defense)	Opponent Turnover %	12.753	3.447	1	29.3
Dependent (Defense)	Opponent Defensive Rebound %	76.604	7.362	44.2	100
Dependent (Defense)	Opponent Free Throw Rate (FT/FGA)	0.204	0.076	0	0.65

TABLE 1: Summary Statistics

Note: Data from Basketball Reference. All variables have 26,418 observations.

Methodology

To estimate the impact of back-to-back games on team performance, we employ a series of fixed-effects regressions using panel data from the 2013-14 to 2023-24 NBA seasons. Each regression focuses on one of nine dependent variables: effective field goal percentage (eFG%), turnover percentage (TOV%), offensive rebounding percentage (ORB%), free throw rate (FT/FGA), pace factor, opponent eFG%, opponent TOV%, defensive rebounding percentage (DRB%), and opponent FT/FGA.

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The primary independent variable of interest is a binary indicator for whether a team is playing on the second night of a back-to-back. Kelly (Kelly, 2009) found that back-to-back games appear to be randomly assigned in the NBA. However, we note that there may still be correlation with omitted game-level factors such as travel burden, opponent rest, and strategic roster management. Accordingly, our estimates should be interpreted as reduced-form estimates of the total effect of back-to-back scheduling on team performance, conditional on home status, team fixed effects, and season fixed effects. We also include a home game dummy variable to control for home-court advantage, which is known to affect performance. The home control is particularly important in our case because home teams also tend to have more rest (Entine and Small, 2008). To address unobserved heterogeneity, we include both team fixed effects (to account for differences in talent, coaching, and playing style) and season fixed effects (to capture league-wide trends such as the rise in pace and shooting efficiency over time).

We run separate regressions for each dependent variable to isolate the relationship between rest and performance across different facets of the game. This structure also allows for straightforward interpretation of how back-to-backs affect offense, defense, and pace independently.

The empirical model takes the following general form:

$$Y_{it} = \beta_0 + \beta_1 \text{BackToBack}_{it} + \beta_2 \text{Home}_{it} + \gamma_t + \alpha_i + \epsilon_{it}$$

Where Y_{it} represents one of the performance metrics for team i in game t . BackToBack_{it} is a dummy equal to 1 if the game was the second night of a back-to-back. Home_{it} is a dummy equal to 1 if the team played at home. γ represents season fixed effects, and α_i represents team fixed effects. ϵ_{it} is the error term.

An important consideration in interpreting our estimates is the role of load management. Teams may respond to back-to-back scheduling by resting key players, meaning that observed performance declines may reflect both physiological fatigue among players who do compete and changes in player rotation caused by roster-management decisions. Because we do not observe player-level availability, travel burden, or opponent rest differentials, we do not interpret the coefficient on the back-to-back indicator as the pure causal effect of fatigue alone. Instead, we interpret it as the total reduced-form effect of back-to-back scheduling on team performance, operating through fatigue, roster decisions, and related scheduling channels.

Results And Discussion

Variable	Coefficient	Std. Error	P-Value
Back-to-Back	-0.0047	0.0012	0.001
Home Game	0.0101	0.0012	0.001
Season: 2014	-0.0054	0.0038	0.160
Season: 2015	0.0011	0.0041	0.785
Season: 2016	0.0123	0.0046	0.013
Season: 2017	0.0195	0.0048	0.001
Season: 2018	0.0223	0.0045	0.001
Season: 2019	0.0271	0.0042	0.001
Season: 2020	0.0363	0.0050	0.001
Season: 2021	0.0299	0.0047	0.001
Season: 2022	0.0439	0.0055	0.001
Season: 2023	0.0447	0.0053	0.001
Constant	0.4987	0.0034	0.001

TABLE 2: Effective Field Goal Percentage

Notes: N = 26,418. $R^2 = 0.07$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

The results in Table 2 show a clear and statistically significant decline in effective field goal percentage (eFG%) for teams playing on the second night of a back-to-back. Specifically, back-to-backs are associated with a 0.0047 ($p = 0.000$) drop in eFG%, which corresponds to a 0.90% decrease relative to the average eFG% of 0.5237. While this magnitude may seem small, even minor decreases in shooting efficiency can shift game outcomes throughout a season. This is consistent with our hypothesis that second-night back-to-back scheduling worsens shooting performance, whether through fatigue, roster adjustment, or both. Additionally, teams tend to shoot better at home, as indicated by the positive and significant home game coefficient. The season fixed effects reflect the league-wide trend of increasing offensive efficiency, especially in recent years, which aligns with the rise of pace-and-space offenses and improved three-point shooting across the NBA (Basketball Reference, 2024).

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	-0.0778	0.0556	0.172
Home Game	-0.0973	0.0531	0.077
Season: 2014	-0.2750	0.1749	0.127
Season: 2015	-0.4031	0.1454	0.010
Season: 2016	-0.8349	0.1398	0.000
Season: 2017	-0.5773	0.1440	0.000
Season: 2018	-1.1504	0.1667	0.000
Season: 2019	-0.7629	0.2056	0.001
Season: 2020	-1.1956	0.2096	0.000
Season: 2021	-1.2200	0.1887	0.000
Season: 2022	-1.0599	0.2072	0.000
Season: 2023	-1.4214	0.2611	0.000
Constant	13.6220	0.1146	0.000

TABLE 3: Turnover Percentage

Notes: N = 26,418. $R^2 = 0.02$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

Our results in Table 3 show that unlike eFG%, the coefficient on the back-to-back variable for turnover percentage (TOV%) is negative but not statistically significant ($p = 0.172$). This suggests that while teams may be slightly more careful with the ball on the second night of a back-to-back, the change is not meaningful enough to draw a firm conclusion. The home game variable is also not significant, although it trends in the expected direction, with fewer turnovers at home. The most notable finding from this regression is the sharp and statistically significant decline in turnover rates across seasons, which began around 2015. This suggests broader improvements in offensive execution and ball security league-wide, rather than any specific impact of back-to-back games.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	-0.3461	0.1026	0.002
Home Game	0.7288	0.1077	0.000
Season: 2014	-0.3863	0.3804	0.318
Season: 2015	-1.7204	0.4522	0.001
Season: 2016	-2.2179	0.5995	0.001
Season: 2017	-3.1840	0.5711	0.000
Season: 2018	-2.5998	0.5782	0.000
Season: 2019	-2.9858	0.5600	0.000
Season: 2020	-3.2799	0.5377	0.000
Season: 2021	-2.2750	0.5792	0.000
Season: 2022	-1.5609	0.6003	0.015
Season: 2023	-1.2489	0.5798	0.040
Constant	25.0204	0.3800	0.000

TABLE 4: Offensive Rebounding Percentage

Notes: N = 26,418. $R^2 = 0.02$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

The results in Table 4 indicate that back-to-backs have a statistically significant negative impact on offensive rebounding percentage. Teams grab about 0.35 ($p = 0.002$) fewer offensive boards on the second night of a back-to-back, which represents a 1.5% decline relative to the average ORB% of 23.397%. This suggests that teams on the second night of a back-to-back are less effective on the offensive glass, consistent with reduced energy, weaker lineup availability, or both. The home court variable is positive and significant, which makes sense given that teams tend to be more aggressive and energetic at home. Season fixed effects also show a consistent decline in offensive rebounding rates over time, which aligns with the broader league trend of prioritizing transition defense over crashing the boards ([Basketball Reference, 2024](#)).

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	0.0002	0.0013	0.878
Home Game	0.0074	0.0013	0.000
Season: 2014	-0.0100	0.0038	0.013
Season: 2015	-0.0059	0.0041	0.157
Season: 2016	-0.0064	0.0040	0.116
Season: 2017	-0.0223	0.0053	0.000
Season: 2018	-0.0173	0.0053	0.003
Season: 2019	-0.0145	0.0049	0.006
Season: 2020	-0.0239	0.0060	0.000
Season: 2021	-0.0233	0.0054	0.000
Season: 2022	-0.0071	0.0053	0.193
Season: 2023	-0.0239	0.0053	0.000
Constant	0.2142	0.0037	0.000

TABLE 5: Free Throw Rate (FT/FGA)

Notes: N = 26,418. $R^2 = 0.01$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

Table 5 shows that back-to-backs do not have a significant impact on free throw rate (FT/FGA). The coefficient on the back-to-back variable is close to zero and not statistically significant ($p = 0.878$), meaning teams draw fouls at essentially the same rate regardless of rest. The home game variable, however, is positive and significant, as expected, given the documented home court officiating bias in the NBA (Cardazzi et al., 2024). Overall, changes in FT/FGA are more related to the location of the game and league-wide trends than fatigue from playing on consecutive nights.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	-0.3677	0.0777	0.000
Home Game	-0.0363	0.0529	0.498
Season: 2014	-0.0436	0.3260	0.895
Season: 2015	1.8226	0.4412	0.000
Season: 2016	2.4302	0.4698	0.000
Season: 2017	3.3549	0.4630	0.000
Season: 2018	6.0601	0.5316	0.000
Season: 2019	6.3598	0.6139	0.000
Season: 2020	5.2272	0.5663	0.000
Season: 2021	4.2566	0.4805	0.000
Season: 2022	5.1687	0.5215	0.000
Season: 2023	4.5266	0.5194	0.000
Constant	94.0458	0.3547	0.000

TABLE 6: Pace

Notes: N = 26,418. $R^2 = 0.17$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

The regression results in Table 6 show that pace declines significantly on the second night of a back-to-back. Teams average roughly 0.37 fewer possessions per 48 minutes when playing on no rest ($p = 0.000$), which represents a 0.38% decrease relative to the mean pace of 97.46. This finding supports the idea that teams slow the game down in back-to-backs, either due to physical fatigue or by design to conserve energy. The home court variable is not statistically significant, suggesting that rest, not location, is the more important driver of game tempo. Season fixed effects clearly show the evolution of the NBA's offensive style, with pace increasing substantially each year, especially from 2017 to 2020.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	0.0050	0.0010	0.000
Home Game	-0.0101	0.0010	0.000
Season: 2014	-0.0055	0.0024	0.031
Season: 2015	0.0012	0.0032	0.697
Season: 2016	0.0125	0.0031	0.000
Season: 2017	0.0200	0.0040	0.000
Season: 2018	0.0230	0.0039	0.000
Season: 2019	0.0280	0.0044	0.000
Season: 2020	0.0364	0.0039	0.000
Season: 2021	0.0305	0.0042	0.000
Season: 2022	0.0446	0.0043	0.000
Season: 2023	0.0452	0.0042	0.000
Constant	0.5066	0.0029	0.000

TABLE 7: Opponent Effective Field Goal Percentage

Notes: N = 26,418. $R^2 = 0.07$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

The results in Table 7 show that teams allow significantly higher opponent effective field goal percentages on the second night of a back-to-back. The coefficient is 0.005 ($p = 0.000$), indicating that opponents shoot about 0.5 percentage points better when facing a tired team, or a 0.97% increase relative to the league-average eFG%. This pattern is consistent with weaker defensive execution on the second night of a back-to-back, whether driven by fatigue, roster adjustment, or both. Conversely, the home game variable is negative and significant, meaning teams defend more effectively at home. Season fixed effects again highlight the overall increase in offensive efficiency across the league over the last decade.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	-0.2070	0.0454	0.000
Home Game	0.0688	0.0499	0.178
Season: 2014	-0.2741	0.2129	0.208
Season: 2015	-0.4046	0.2832	0.164
Season: 2016	-0.8386	0.1996	0.000
Season: 2017	-0.5841	0.2360	0.019
Season: 2018	-1.1590	0.2430	0.000
Season: 2019	-0.7734	0.2733	0.008
Season: 2020	-1.1978	0.2243	0.000
Season: 2021	-1.2273	0.2172	0.000
Season: 2022	-1.0683	0.2372	0.000
Season: 2023	-1.4287	0.2247	0.000
Constant	13.5685	0.1544	0.000

TABLE 8: Opponent Turnover Percentage

Notes: N = 26,418. $R^2 = 0.02$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

As seen in Table 8, back-to-back games are associated with a significant decline in opponent turnover percentage. Teams force about 0.21 ($p = 0.000$) percentage points fewer turnovers when playing on no rest, representing a 1.65% drop relative to the average opponent TOV%. This is consistent with reduced defensive activity and pressure on the second night of a back-to-back. Home court does not have a significant influence on forced turnovers. Across the seasons, we also observe a gradual drop in opponent turnover percentages, consistent with the league's shift toward more disciplined and efficient offenses. Overall, these results suggest that teams on the second night of a back-to-back are less disruptive on the defensive end.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	0.3462	0.1026	0.002
Home Game	-0.7289	0.1077	0.000
Season: 2014	0.3864	0.3804	0.318
Season: 2015	1.7206	0.4522	0.001
Season: 2016	2.2182	0.5995	0.001
Season: 2017	3.1839	0.5712	0.000
Season: 2018	2.5999	0.5782	0.000
Season: 2019	2.9855	0.5600	0.000
Season: 2020	3.2798	0.5377	0.000
Season: 2021	2.2746	0.5792	0.000
Season: 2022	1.5606	0.6003	0.015
Season: 2023	1.2488	0.5798	0.040
Constant	74.9807	0.3800	0.000

TABLE 9: Opponent Defensive Rebound Percentage

Notes: N = 26,418. $R^2 = 0.02$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

The regression results in Table 9 show a significant increase in opponent defensive rebounding percentage on the second night of a back-to-back. Specifically, the back-to-back coefficient is 0.35 ($p = 0.002$), suggesting that teams on the second night of a back-to-back are less effective on the offensive glass. This increase amounts to a 0.46% rise relative to the mean of 0.7660. The home court variable is negative and significant, which fits the expected pattern of home teams being more aggressive and successful on the boards. The seasonal trend aligns with what we have seen before: offensive rebounding is becoming less common, while defensive rebounding has improved steadily over time.

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Variable	Coefficient	Std. Error	P-Value
Back-to-Back	0.0026	0.0012	0.044
Home Game	-0.0071	0.0011	0.000
Season: 2014	-0.0100	0.0037	0.012
Season: 2015	-0.0059	0.0043	0.181
Season: 2016	-0.0063	0.0040	0.116
Season: 2017	-0.0222	0.0050	0.000
Season: 2018	-0.0171	0.0046	0.001
Season: 2019	-0.0144	0.0052	0.010
Season: 2020	-0.0239	0.0047	0.000
Season: 2021	-0.0232	0.0054	0.000
Season: 2022	-0.0069	0.0047	0.149
Season: 2023	-0.0238	0.0055	0.000
Constant	0.2210	0.0032	0.000

TABLE 10: Opponent Free Throw Rate (FT/FGA)

Notes: N = 26,418. $R^2 = 0.02$. Table presents the results of a fixed effects regression with robust standard errors clustered by team.

Finally, Table 10 shows that teams on the second night of a back-to-back allow opponents to get to the free throw line at a slightly higher rate. The coefficient on the back-to-back variable is 0.0026 ($p = 0.044$), representing a 1.28% increase relative to the mean of 0.2040. This may reflect slightly slower rotations or defensive lapses consistent with fatigue and/or roster-management effects. Interestingly, the home court variable is negative and significant, suggesting that referees may be more inclined to favor home teams in foul calls. Cardazzi et al. (Cardazzi et al., 2024) note that NBA referees also see their performance degrade as they get fatigued. Several season dummies are also substantial, which may reflect changes in officiating emphasis or offensive styles over the years.

Taken together, the results strongly support the hypothesis that playing on the second night of a back-to-back negatively affects team performance. On the offensive side, teams shoot worse (lower eFG%) and secure fewer offensive rebounds, while also slowing the game down by nearly half a possession per 48 minutes. The turnover percentage and free throw rate did not show significant changes, suggesting that the strongest back-to-back effects are concentrated in shooting and rebounding rather than ball security or foul-drawing behavior.

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Defensively, the effects of back-to-backs are equally notable. Opponents shoot more efficiently, turn the ball over less, and grab more defensive rebounds against teams on the second night of a back-to-back. There is also a small but statistically significant increase in opponent free-throw rate. These findings are consistent with weaker shot contests, less defensive pressure, and reduced physicality on the boards.

Overall, the regression evidence confirms that back-to-backs hurt teams on both ends of the floor. The most consistent impacts are found in shooting efficiency, rebounding, and defensive disruption, which align with what we would expect from cumulative fatigue over a long NBA season.

To illustrate the practical magnitude of these effects, consider the impact of the shooting efficiency results alone. With an average of approximately 88.9 field goal attempts per game in the 2023-24 season ([Basketball Reference, 2024](#)), the 0.47 percentage point decline in eFG% corresponds to roughly 0.82 fewer points scored per game. Combined with the 0.5 percentage point increase in opponent eFG%, teams on the second night of a back-to-back face a shooting-driven swing of approximately 1.7 points per game. In our sample, over 26% of games were decided by five points or fewer, suggesting that back-to-back effects could influence the outcome of these games when considering the full scope of negatively impacted shooting, rebounding, and pace.

These per-game effects carry economic weight precisely because they recur. With a back-to-back indicator mean of 0.19, roughly one in five games in our sample is played on the second night of a back-to-back, which amounts to approximately 15 such games for a typical team across an 82-game season. That shooting-driven swing is therefore a recurring cost rather than an isolated event, and because regular-season results determine playoff seeding, which in turn governs home-court advantage and postseason revenue, its cumulative effect extends well beyond any single contest.

A second and larger channel operates through the quality of the product itself. Our results indicate that back-to-backs erode on-court performance through two mechanisms, physiological fatigue and the roster adjustments teams make in response, and a growing body of sports-economics research shows that this second mechanism is costly. When teams rest star players, attendance, ticket prices, and television viewership all decline. Kaplan et al. ([Kaplan et al., 2019](#)) use secondary-market ticket microdata to show that a star's announced absence lowers the average ticket price for that game by roughly 7-25% (\$9-\$25), generating millions of dollars in fan-welfare losses over the course of a season. Hausman and Leonard ([Hausman and Leonard, 1997](#)) find that NBA television ratings are substantially higher when stars play, valuing a single marquee player's spillover to other franchises in the tens of millions of dollars. The broader superstar externality is well documented: Humphreys and Johnson ([Humphreys and Johnson, 2020](#)) and Berri et al. ([Berri et al., 2004](#)) find that star participation raises both home and away attendance and gate revenue. These findings bear directly on the declining-ratings concern raised at the outset of this paper, since back-to-backs are among the scheduling conditions that most reliably induce the star absences this literature prices.

A third cost falls on player health. The fatigue effects we estimate are consistent with prior evidence that elevated game load raises injury risk (Lewis, 2018). Injuries are themselves expensive, both in games lost from key contributors and in salary paid to unavailable players. Taken together, these channels help explain why the league has treated back-to-back scheduling and load management as a problem worth regulating rather than a matter of team discretion alone. The Player Participation Policy, adopted for the 2023-24 season, requires star players to be available for nationally televised and In-Season Tournament games and limits the resting of multiple stars in the same game ([National Basketball Association, 2023](#)). That the league has been willing to fine teams for resting healthy stars underscores the magnitude of the revenue and competitive-integrity costs at stake, costs that begin with the measurable on-court declines that back-to-backs impose.

For teams, the results support continued investment in load management and recovery protocols while also highlighting which dimensions of performance are most vulnerable. The significant declines in effort-dependent metrics like offensive rebounding and pace suggest that depth and roster construction matter most on the second night of back-to-backs, as these are areas where second-unit players are most frequently called upon to contribute. For the league, they offer empirical backing for recent efforts to reduce back-to-backs and create more balanced scheduling (See Montero-Vallejo

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(Montero-Vallejo, 2020) for one method of eliminating back-to-backs from the NBA schedule). And for fans, the analysis helps explain why teams sometimes do not look like themselves on back-to-backs - it is not always about effort, but about the structure of the schedule.

An important caveat is that our estimates capture the total effect of back-to-back scheduling on team output, encompassing both physiological fatigue and any strategic roster adjustments teams make in response. Without player-level data, we cannot decompose these two channels. Going forward, future research could explore how travel distance, player-specific fatigue, or time zone shifts interact with these performance effects. While this paper did not distinguish between home and travel back-to-backs, prior studies suggest that travel may significantly exacerbate the effects of fatigue (Charest et al., 2021) (Steenland and Deddens, 1997). Future research should incorporate travel distance and time zones to more precisely quantify the compounding effects of fatigue and travel on the overall experience. But even with those variables held constant, this study shows that back-to-backs have real consequences. They slow teams down, wear them down, and ultimately change how the game is played.

Conclusions

This paper set out to examine how playing on the second night of a back-to-back affects NBA team performance. Using over 20,000 game-level observations from the 2013 to 2024 regular seasons and a series of fixed-effects regressions, we found consistent evidence that back-to-backs negatively affect both offensive and defensive outcomes.

On offense, teams on the second night of a back-to-back shoot less efficiently (lower eFG%), grab fewer offensive rebounds, and play at a slower pace. On defense, they allow opponents to shoot more efficiently, force fewer turnovers, and give up more free throw attempts and second-chance opportunities. Turnover percentage and offensive free throw rate did not change significantly, consistent with our conceptual framework's distinction between effort-dependent and execution-dependent metrics. While not every metric changed significantly, the overall pattern is clear: second-night back-to-back scheduling is associated with a measurable decline in team performance across several key areas.

These findings add depth to the existing literature by going beyond the margin of victory to analyze specific performance indicators on both ends of the floor. By doing so, this study offers a more complete understanding of how rest affects gameplay.

These findings also carry implications for several stakeholders. For league officials, the results provide additional empirical support for continued scheduling reform. The NBA has already reduced the frequency of back-to-backs in recent years and implemented the PPP to discourage teams from resting healthy players. Our results suggest that these efforts are well-founded: back-to-backs impose measurable costs on team performance, which in turn affects the quality of the product fans are paying to watch. Potential policy responses include further reducing the overall number of back-to-back games and continuing schedule reforms that increase recovery time between games.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Acquisition, analysis, or interpretation of data: James Bailey, Max Aicardi

Drafting of the manuscript: James Bailey, Max Aicardi

Critical review of the manuscript for important intellectual content: James Bailey, Max Aicardi

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Data Availability Statements

The data and code for this article is publicly available at <https://osf.io/vh7wf/>

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