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The Impact of Back-to-Back Games on NBA Team Performance Across Different Eras

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Abstract. NBA fans often follow the schedule and performance of their favorite players and teams, such as the Boston Celtics and their star player Jayson Tatum. It has been long noticed that even some competitive teams, like the Celtics and the Los Angeles Lakers, may lose their games more often during stretches of consecutive matches. Previous work found that teams were more likely to win after one day of rest than when playing back-to-back games. This raises a natural question: does schedule tightness affect the on-court performance and winning rates of NBA teams? To answer this question, I analyzed official statistics of all NBA teams for the 2024-2025 Season and the 1970-1971 Season. By dividing the games into two groups: back-to-back games, defined as games played on consecutive days with no rest day in between, and non-back-to-back games, defined as games with at least one day of rest before them, I then compared the winning rates of the teams and the quality of their offense and defense under these two scenarios. The results show that the winning rate of most teams in the NBA in back-to-back games was lower than their winning rate in non-back-to-back games. This suggests that short rest periods may negatively affect team performance. Therefore, to promote fairness in competition, NBA scheduling, and in general the scheduling of any sport games, should take the amount of rest between games into consideration.

Keywords: Game congestion, fatigue, Game schedule, Basketball League

1. Introduction

The National Basketball Association (NBA) is one of the top basketball leagues worldwide and attracts hundreds of thousands of players from many regions around the world, such as South Africa, Canada, Serbia. Previous study noted that before the American Basketball Association (ABA) was founded in 1967, the NBA had strong control over the merging with the National Basketball League (NBL) and later the ABA, the NBA expanded to a league of 30 teams, with the number of players in the league staying around 500-600, according to the official NBA league roster database [1, 2]. Because of its high level of competition, the NBA draws many fans from all over the world. With an average attendance of about 20,000 spectators per game, total attendance reached over 87 billion by the beginning of 2025-2026 season, according to NBA official statistics.

Over the decades, the NBA has changed in how it views player health and how the league responds to injuries. In the past, some players were known as "iron men" because they hardly missed

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any games throughout their entire careers. One recent example is Mike Breen and Charles Barkley for his durability of career . However, severe injuries have still been a major bottleneck for the career development of many NBA players. For instance, Derrick Rose, guard of the Chicago Bulls and the youngest MVP in the NBA history, suffered a rupture of the cruciate ligaments that significantly affect his scoring ability and speed afterwards. After investigating the influence of injuries, Harris et al. [3] reported that players with ACL tears had a significantly greater decline in PER than similar players without ACL injuries, and that playing time, points scored, and rebounds also decreased.

Severe injuries are often considered an issue caused by sports congestion. Sports congestion refers to a situation where a team or an athlete is scheduled to play a high volume of competitive matches within a short period of time. Officially it is defined as "a minimum of two successive bouts of match-play, with an inter-match recovery period of < 96 h" [4]. It is often assumed the teams perform worse due to the injuries caused by the large density of games. Hägglund et al. [5] found that teams with lower injury burden and fewer match incidence tended to have higher final league ranking, while teams performed worse with a high injury burden. However, other studies suggest that schedule congestion may not directly increase injury rates. Teramoto et al. [6] reported that the injury rate in back-to-back games was not significantly different from that in games played after one day of rest. They also found no clear evidence that playing many games or many away games within a short period was linked to a higher injury rate. Therefore, the effect of schedule congestion may be more complex than simply causing more injuries. Another possible factor is travel between cities. Supporting this opinion, Nutting et al. [7] found that crossing time zones significantly reduces a visiting team's chance of winning. These results are consistent with the medical literature on circadian rhythms and suggests that travel fatigue may also affect team performance.

Besides those players who suffer serious injuries, others, who may not be officially listed as "needing injury management", may also be greatly impacted by schedule congestion. For instance, the Golden State Warriors, who achieved a record of 73 wins and 9 losses in the 2016 season, lost five of all their nine games after back-to-back matches. Likewise, the Boston Celtics, the 2024 NBA champions, also experienced losses that the head coach linked to "player fatigue." When asked whether fatigue was a factor in the team's loss, he said that depended on how the team approached film study and shootaround in the following days. In these situations, even strong teams with star players could be defeated by the lower-ranked team in the league that does not have star players.

Congestion has been a universal problem in many sports. Many factors can affect player injuries, and among them, a tight game schedule is often considered an important one, supported by several studies. For example, Altmann et al. [8] found that effective playing time influences physical match performance. Many studies have examined the relationship between NBA schedules and the performance of teams or players. Similar questions have also been studied in other sports, such as football. These studies often use statistical or mathematical methods to analyze thow game time,rest time, and schedule tightness affect the performance of teams in their next game. Overall, the findings suggest that both too much and too little rest would have a negative impact on a player's performance in the next game. Esteves et al. [1] reported that shooting efficacy-related statistics helped while Wang et al. [9] described a turning-point pattern which suggests that both insufficient and excessive recovery can affect competitive readiness and performance outcomes in different ways Julian et al. [10] also noted that some studies observed a negative effect of fixture congestion on physical performance measures, such as low- and moderate-intensity running distance covered.

However, most previous studies focus on games within a single season or year and rarely examine the changes in the longer-term tournament schedules. To address this gap, in this work, this

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study analyzes the impact of scheduling on game performance in seasons from different eras of the NBA to reflect the changes in the NBA league schedule. Specifically, I compared the performance of games from NBA season 1970-1971 and season 2024-2025 to investigate whether consecutive games affect team performance and winning rateI collected data from both seasons on game dates, times, scores, and teams. I then visualization and statistical tests to study. The results show that game congestion can have a clear impact on both offensive and defensive performance of the teams.

The findings highlight the importance of having an appropriate schedule that gives enough rest time to players and helps teams maintain stable performance.Therefore, this study in the NBA league schedule over time. By comparing the different schedule arrangements from decades ago and those of the present day, I examine how schedule tightness of schedule affects team performance. In summary, this work investigates whether consecutive games in the NBA have an impact on a team's performance and winning rate across different eras. It helps reflect how the NBA schedule is towards the teams, especially in relation togame quality and player health. The results suggest that the league should reduce the number of back-to-back games as much as possible.

2. Methods

2.1. Data collection and processing

All the game data of the 2024-2025 season and the 1970-1971 season were collected from the NBA official website [11].

The data include names of the teams, the points scored by the two teams in each game, and the date of the game. The original variables provided in this dataset include date, visitor and visitor points, home and home points, and notes on whether the game went into overtime). The home team refers to the team whose stadium the game is held in, whereas the visitor team refers to the team playing in its opponent's stadium. The home game refers to "games played at a team's own facility", whereas the away game refers to "games played at the opposition's facility, subjecting the visiting team to travel and the absence of local crowd support", according to Courneya et al. [12] .

The processing steps for data from both years are the same. The number of teams varies from the 1970-1971 Season to 2024-2025 Season, with only 17 teams shared by both seasons. During the 1970-1971 season, there were no 3-pointers, so it is impossible to compare the 3PT% throughout 1970-1971 Season and the 2024-2025 Season. Because there were no 3-pointers, the scores per game in the 1970-1971 season can be significantly lower than those in the 2024-2025 season. Thus, only the hit rate and the performance of a team relative to the average level of the league are directly comparable between the two seasons.

Take the processing of data for the 2024-2025 season as an example. First, I organized the time and score of each individual game into a separate table and converted the time into a quantitative data format.

Specifically, I am interested in the performance of teams when they are having *back-to-back* games, that is, games that take place just one day after another game, compared to when they have more days between their matches.

Next, I filtered out back-to-back and non-back-to-back games based on the time interval differences and organized them into two separate tables, respectively.

To investigate the impact of having back-to-back games, I further computed three variables: win rate difference, which is the win rate minus the loss rate ofa team; score difference, which is the difference between the points scored by a team while playing non-back-to-back games and the points scored by a team while playing back-to-back games; and opponent score difference, which is

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the difference between the points scored by a team's opponent while playing non-back-to-back games and the points scored by a team's opponent while playing back-to-back games.

2.2. Data analysis

Before comparing statistics between back-to-back and non-back-to-back games, I first visualized the general trends and patterns in the data. This includes the distribution of points across all matches in each year, the correlation between the variables win rate difference, score difference, and opponent score difference for all teams.

Among these data, the first step is to investigate the relationship between the average total score per game of each team and the interval between games (which is the decisive factor for differentiating between back-to-back and non-back-to-back games). Subsequently, the scope of the analysis was expanded to include more variables, such as three-point shooting percentage, the average number of points allowed per game by the team, etc. Finally, I used the difference between the team's average points scored and average points allowed as a quantitative factor to measure team performance and simultaneously consider the impact of the schedule on the team's offense and defense. The average points and rebounds per game of all teams, as well as the league averages, are divided into two categories: consecutive games and non-consecutive games. These are plotted on two separate charts. After completing this process, the same operation was applied to the data from the 1970-1971 season, and the same chart was drawn.

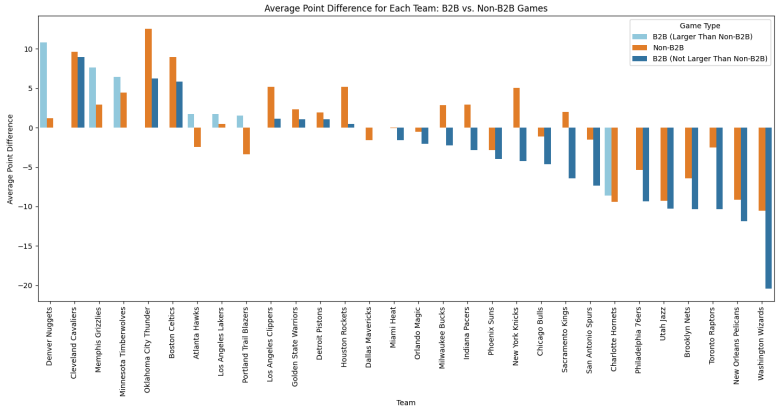

Figure 1. Average point difference for each team: back-to-back vs. non-back-to-back games in 2024-2025 regular season

There are two types of games, back-to-back games and non-back-to-back games, respectively. The average point difference for each type of gamefor each team in this season is shown in the bar chart.

Average point difference is the average value of the points the teams score minus the points the teams' opponents score (the points the teams lose) during 82 regular-season games in both back-to-back games and non-back-to-back games. According to Figure 1, only ten teams score more points than they lose on average in both back-to-back games and non-back-to-back games. Moreover, all ten teams entered the playoffs that season and five of them entered the Western and Eastern semifinals. Thus, they may be outliersbecause of their outstanding team strength. Though their data are not consistent with those of other teams, they score more than they lose in non-back-to-back games than in back-to-back games. Except for these teams, other teams either lose more scores in back-to-back games than they win or lose more scores than they win in back-to-back games rather

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than non-back-to-back games. A conclusion can be derived that during back-to-back games, the difference between the points the teams score and the points the teams lose is smaller and even becomes negative (meaning that the teams lose more points than they score), suggesting a negative influence on the teams' offensive and defensive performance.

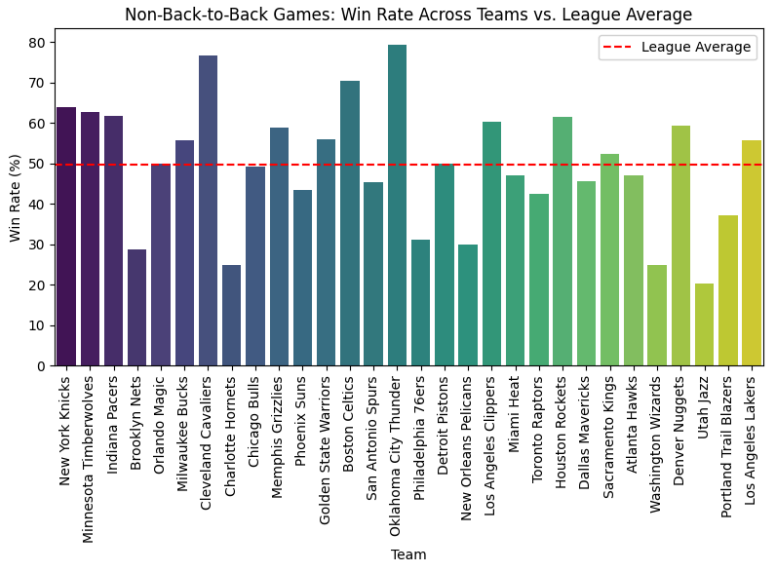

Figure 2. Win rates across teams and the league average in non-back-to-back games in 2024-2025 regular season

It can be seen from Figure 2 that in non-back-to-back games, 14 teams achieved a win rate over 50% while 3 teams almost reached the league average.

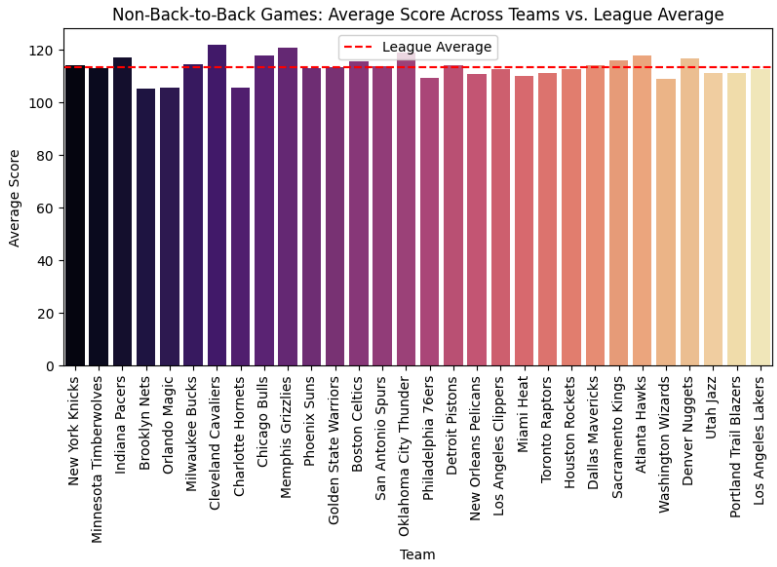

Figure 3. Average score across teams and the league average in non-back-to-back games in 2024-2025 regular season

In Figure 3, the league average score across teams is 113.8 points per game in non-back-to-back games. Thirteen teams reach this level.

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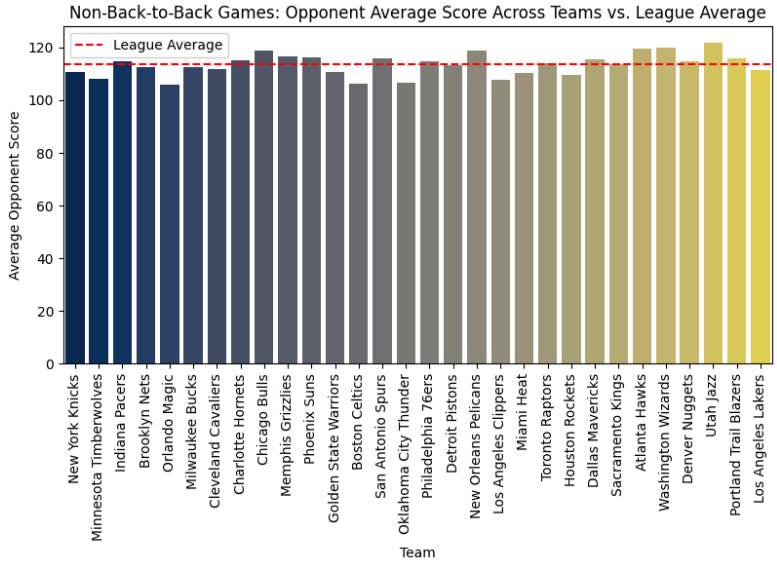

Figure 4. Opponent average score across teams and the league average in the non-back-to-back games in 2024-2025 regular season

Figure 4 shows that the league average opponent score across teams is 113.8 points per game in non-back-to-back games, which is the same as the average score.

Performance from all teams within the 2024-2025 regular season and from teams in the 1970-1971 and 2024-2025 regular season were also compared using both visualization and statistical testing.

2.3. Comparative analysis: Visualization & statistical testing

There are two main types of charts that the comparative analyses are based on. First, side-by-side bar charts grouped by team compare different teams within the same season; Second, side-by-side bar charts grouped by three variables compare teams at home and away.

To test the difference between back-to-back and non-back-to-back performances, I carried out a Mann-Whitney U test on each of the five following pairs of values:

1. The difference in the total points per match earned by the 30 teams for back-to-back games compared to those for non-back-to-back games within the 2024-2025 regular s eason.
2. The difference in the total points per match earned by the 17 teams for back-to-back games compared to those for non-back-to-back games within the 1970-1971 regular season
3. The difference in the total points per match earned by the 30 teams' opponents for back-to-back games compared to those for non-back-to-back games within the 2024-2025 regular season
4. The difference in the total points per match earned by the 17 teams' opponents for back-to-back games compared to those for non-back-to-back games within the 1970-1971 regular season
5. Win rate difference of the 30 teams between home and away games in both 2024-2025 regular season and the 1970-1971 regular season. Win rate difference refers to the ratio of difference between the number of wins and losses to the total number of games

This statistic is designed to test the difference between two independent samples of continuous data, which is exactly our scenario. The test statistic and its p-value show whether the difference between two sets of values are statistically significant. Here, I used a p-value of 0.05 as the threshold.

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3. Results

As a result, a total of twelve figures were generated, namely: the win rate difference for all teams in the 2024-2025 season during back-to-back matches, the win rate difference for all teams in the 2024-2025 season during non-back-to-back matches, the average point difference per game for all teams in the 1970-1971 season during back-to-back matches, the average points difference per game for all teams in the 1970-1971 season during non-back-to-back matches, the average opponent points difference per game for all teams in the 1970-1971 season during back-to-back matches, and the average opponent points difference per game for all teams in the 1970-1971 season during non-back-to-back matches, and vise versa for the 2024-2025 Season.

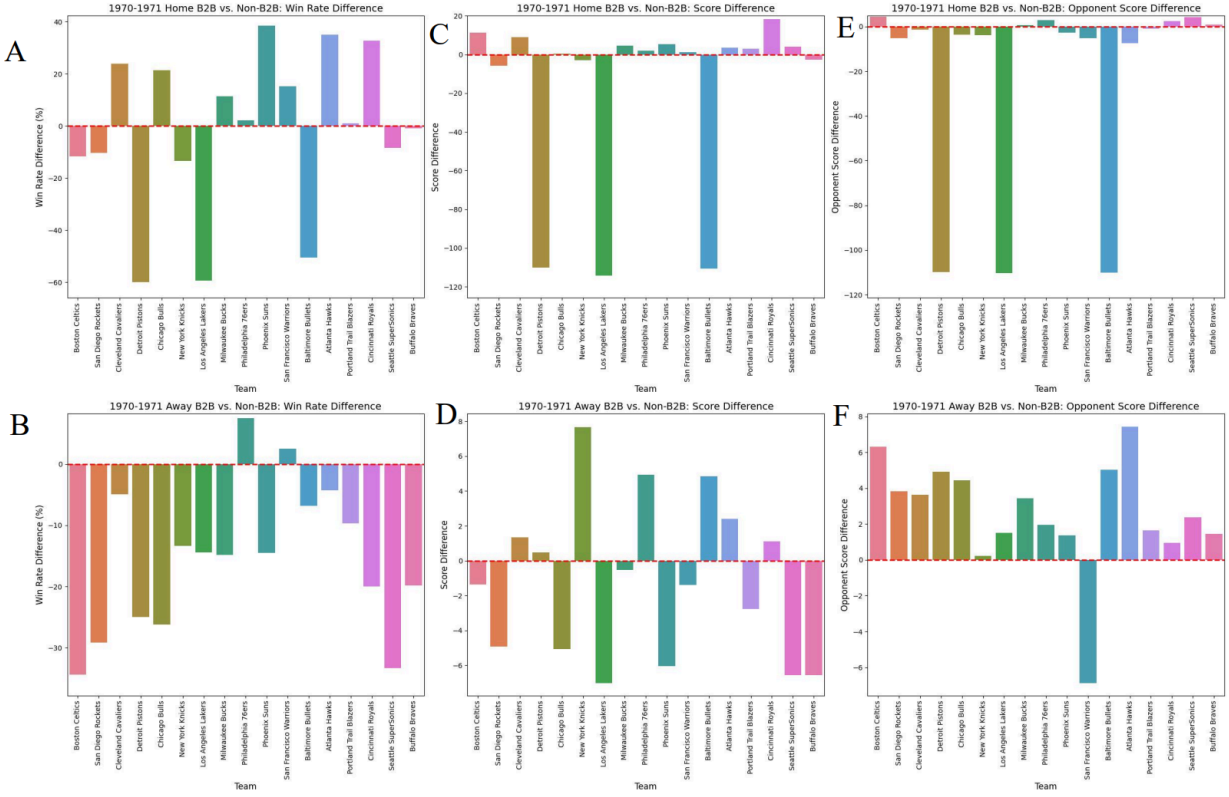

Figure 5. Comparison between games away and at home in the 1970-1971 season

Figure 5B shows that only 2 of all teams in the league in 1970-1971 Season had a positive win rate away in back-to-back games, while Figure 5A shows that more than half of the 17 teams achieve a positive winning rate at home in back-to-back games. Figure 5D shows that more than half of all teams in the league in 1970-1971 Season had a negative score difference away in back-to-back games, while Figure 5C shows that more than half of the 17 teams achieved a positive score difference at home in back-to-back games, three teams with a significant lower score difference. Figure 5E shows that less than half of all teams in the league in 1970-1971 Season had a negative opponent score difference at home in back-to-back games, while Figure 5F shows that only one of the 17 teams achieved a negative opponent score difference away in back-to-back games, with three teams showing a significant lower score difference.

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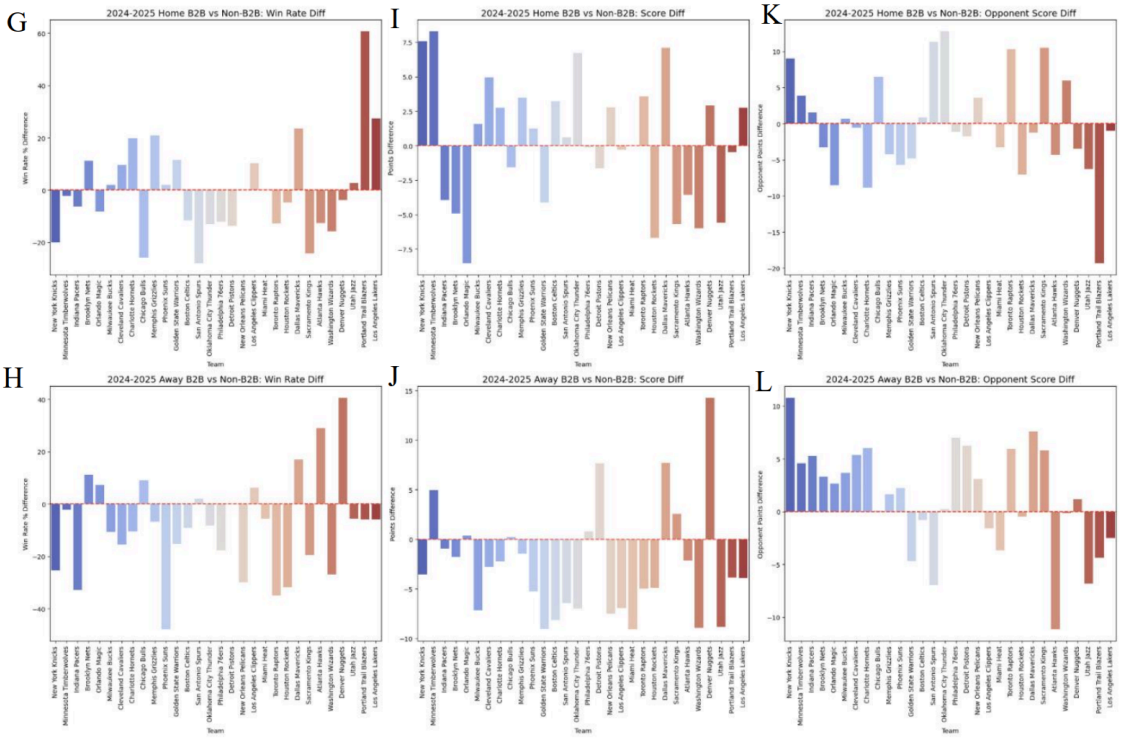

Figure 6. Comparison between games away and at home in the 2024-2025 season

Figure 6H depicts that 8 of the teams in the league in 2024-2025 Season had a positive win rate away in back-to-back games, while Figure 6G depicts that 12 of the 30 teams achieved a positive winning rate at home in back-to-back games. Figure 6J depicts that only 7 teams in the league in 2024-2025 Season had a positive score difference away in back-to-back games, while Figure 6I depicts that half of the 30 teams achieved a positive score difference at home in back-to-back games. Figure 6K depicts that half of all teams in the league in 2024-2025 Season had a negative opponent score difference at home in back-to-back games, while Figure 6L depicts that only 10 of the 30 teams achieved a negative opponent score difference away in back-to-back games, with three teams showing a significant lower score difference.

The Mann-Whitney U test of these groups of values shows p-values below 0.2 and 0.4, indicating that the differences are not statistically significant. This can be explained by the complexity of games, player instability, and other factors such as off-field elements.

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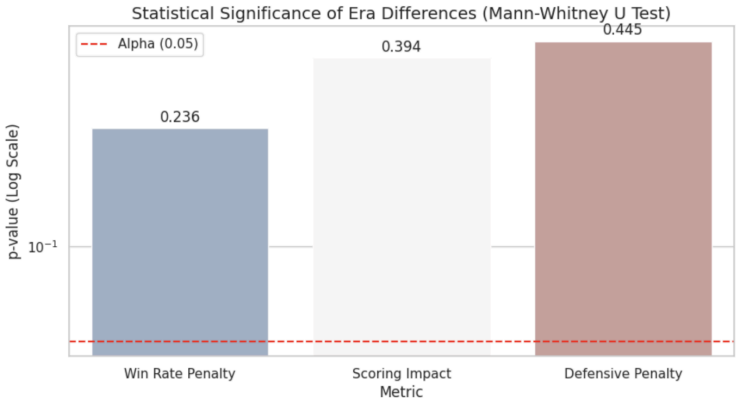

Figure 7. The Mann-Whitney U test

Within one single season, the overall trend was indicated by a large amount of data that the team demonstrated better offensive and defensive performance in non-back-to-back matches, as shown by a larger average total score per game. When comparing the two seasons, the impact of back-to-back matches on the team's offensive and defensive performance was smaller in the 1970-1971 season. However, these conclusions are only valid for the cases where the game interval is between 0 and 2 days.

In the 2024-2025 Regular Season, for 12 teams out of 30, the win rate for back-to-back games at home was lower than that for non-back-to-back games. The number of teams increases drastically to 20 out of 30 when it comes to the teams whose win rate for back-to-back games away is smaller than that for non-back-to-back games. This scenario is even more obvious in the 1970-1971 Regular Season. For 8 teams out of 17, the win rate for back-to-back games at home was lower than that for non-back-to-back games. For 15 teams out of 17, the win rate for back-to-back games away was lower than that for non-back-to-back games.

Back-to-back games can greatly affect the team's performance, especially when they are playing away. Considering the score difference and opponent score difference, back-to-back games have a great effect on the defense of the teams, as revealed by the opponent score difference, since they allow their opponents to score more, possibly because players lack the physical capacity to execute the defense.

However, when data in 2024-2025 Regular Season are considered, win rate difference and score difference per match do not differ much, suggesting that in the more recent Regular Seasons game congestion like back-to-back games has less effect on the teams' performance and is not much more challenging to the team than it was in the 1970-1971 Regular Season, resulting in minimal difference in their performance.

4. Discussion

The comparative analysis results suggest that game congestion has an effect on the teams' offensive and defensive performance. Beyond investigating the effect of the problem of congestion within a single season, this work also explores the extent of game congestion across two different seasons in different eras, marked by the NBA's efforts to problems in 2015-2016, 2017-2018 and 2023-2025. The conclusion demonstrates that the improved schedule has reduced the negative impact on the teams' comprehensive performance.

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The comparison across different time periods suggests an improvement of the reasonableness of the schedule and an overall trend of reducing the burden.

However, there are still some limitations to the analysis. First, only two seasons are considered in the analysis, and while the findings indicate a general trend, the conclusions are not guaranteed to apply to all seasons. Second, in this research, only a few easily quantifiable variables are considered. Some other factors, like the strengths of the teams, the rotations of the star players and player trades, which are hard to measure, are not considered, although they may also all have an impact on the teams' performance, probably offsetting or intensifying the effect of game congestion. Third, the comparative analysis was conducted using basic visualizations and statistical testing, while other analyses, like regression analysis and paired tests, could be performed with more data available; further analyses could provide additional insight into the magnitude and trend of the congestion effect, and are worth studying in the future.

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