

# The Effect of Regular-Season Rest on Playoff Performance Among Players in the National Basketball Association

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**Background:** There has been speculation that rest during the regular season for players in the National Basketball Association (NBA) improves player performance in the postseason.

**Purpose:** To determine whether there is a correlation between the amount of regular-season rest among NBA players and playoff performance and injury risk in the same season.

**Study Design:** Cohort study; Level of evidence, 3.

**Methods:** The Basketball Reference and Pro Sports Transactions archives were searched from the 2005 to 2015 seasons. Data were collected on players who missed fewer than 5 regular-season games because of rest (group A) and 5 to 9 regular-season games because of rest (group B) during each season. Inclusion criteria consisted of players who played a minimum of 20 minutes per game and made the playoffs that season. Players were excluded if they missed  $\geq 10$  games because of rest or suspension or missed  $\geq 20$  games in a season for any reason. Matched pairs were formed between the groups based on the following criteria: position, mean age at the start of the season within 2 years, regular-season minutes per game within 5 minutes, same playoff seeding, and player efficiency rating (PER) within 2 points. The following data from the playoffs were collected and compared between matched pairs at each position (point guard, shooting guard, forward/center): points per game, assists per game, PER, true shooting percentage, blocks, steals, and number of playoff games missed because of injury.

**Results:** A total of 811 players met the inclusion and exclusion criteria (group A:  $n = 744$  players; group B:  $n = 67$  players). Among all eligible players, 27 matched pairs were formed. Within these matched pairs, players in group B missed significantly more regular-season games because of rest than players in group A (6.0 games vs 1.3 games, respectively;  $P < .0001$ ). There were no significant differences between the groups at any position in terms of points per game, assists per game, PER, true shooting percentage, blocks, steals, or number of playoff games missed because of injury.

**Conclusion:** Rest during the NBA regular season does not improve playoff performance or affect the injury risk during the playoffs in the same season.

**Keywords:** National Basketball Association; basketball; injury; rest

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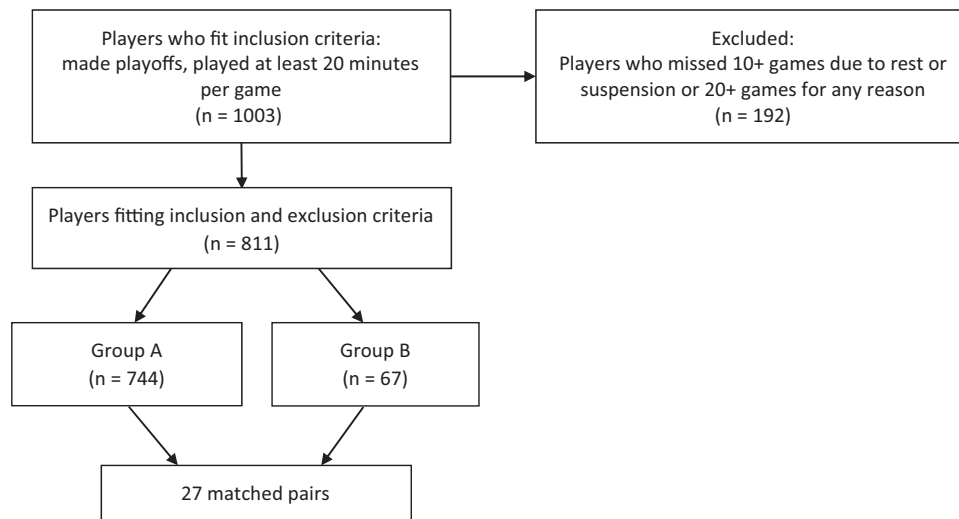
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In recent years, pitch count has become a strong predictor of injury risk among baseball pitchers, with several studies associating a higher pitch count with an increased risk of injury as well as worsened future performance.<sup>1,7,8</sup> Similarly, 2 recent studies sought to determine the effect of the number of carries among football running backs on injury risk and future performance.<sup>2,3</sup> However, there have been no published studies seeking to determine if there exists a similar correlation between the amount of regular-season rest among players in the National Basketball Association (NBA) and playoff performance or injury risk. Recently, there has been significant controversy in the media regarding the now-common practice within the NBA of teams resting players during regular-season games.

The purpose of this study was to determine if there is a correlation between the amount of regular-season rest



**Figure 1.** Selection process. Group A: <5 regular-season games missed because of rest; group B: 5-9 regular-season games missed because of rest.

among NBA players and playoff performance and injury risk in the same season. We hypothesized that players who rested more frequently during the regular season would perform at a higher level in the playoffs and would miss fewer playoff games because of injury when compared to players who rested less frequently or not at all.

## METHODS

A retrospective cohort analysis was performed by searching the Basketball Reference archives (<http://www.basketball-reference.com/>) for NBA players during the 2005-2006 through 2014-2015 regular seasons. Basketball Reference is a credible database that provides NBA player, team, and game statistics, and the data found from this source were cross-checked with the ESPN and Pro Sports Transactions archives (<http://www.prosportstransactions.com/>) to determine their reliability. The following inclusion criteria were applied: players who played a minimum of 20 minutes per game and made the playoffs that season. Players who played on multiple teams during the same regular season, missed  $\geq 10$  games because of rest or suspension, or missed  $\geq 20$  games in a season for any reason were excluded. Games missed because of rest were determined by box scores stating “DNP-CD” (did not play—coach’s decision). Box scores were not always available, in which case the sum of a player’s total number of games played and any games missed because of injury, suspension, or personal reasons was subtracted from the total number of games in a season ( $N = 82$ ) to determine the number of games missed because of rest. When box scores were not available, game and player information was found by searching the Pro Sports Transactions archives for NBA players. New players were added each season based on these criteria. Thus, some players were included multiple times over the study period.

Based on these inclusion and exclusion criteria, 2 groups were formed: players who missed fewer than 5 regular-

season games because of rest (group A) and those who missed 5 to 9 regular-season games because of rest (group B) during each season. This study was exempt from institutional review board approval.

Among all eligible players, matched pairs were formed between players in group A and group B based on the following criteria: position, age at the start of the season within 2 years, regular-season minutes per game with 5 minutes, same playoff seeding (1-8), and player efficiency rating (PER) within 2 points. Player positions were grouped into point guard (PG), shooting guard (SG), and forward/center (FC). The following data were collected and analyzed for each matched pair during the playoffs: number of playoff games missed because of injury, PER, true shooting percentage, points per game, and assists per game. The PER represents a per-minute rating of a player’s performance by taking into account productivity and inefficiency on the court. The true shooting percentage measures a player’s shooting efficiency based on the 2- and 3-point field goal percentage as well as free throw percentage. In addition to the statistics collected for all matched pairs, steals were also collected for all PGs and SGs, and blocks were recorded for all FCs.

## Statistical Analysis

The Student *t* test was used to compare age between all eligible players in group A and group B. Matched-pair *t* tests were used to compare playoff statistics between the groups.

## RESULTS

A total of 811 NBA players fit the inclusion and exclusion criteria, including 744 players in group A and 67 players in group B (Figure 1). Players in group B were significantly older than players in group A (28.8 years vs 27.2 years, respectively;  $P = .006$ ).

TABLE 1  
Player Demographics<sup>a</sup>

	Group A (n = 27)	Group B (n = 27)	P Value
Age at start of season, y	27.89 ± 2.92	27.81 ± 3.54	.80
Minutes per game	31.98 ± 6.97	31.18 ± 9.97	.66
Position, PG/SG/FC, n	6/10/11	6/10/11	>.99
No. of regular-season games missed because of rest	1.33 ± 1.49	6.04 ± 1.37	<.0001

<sup>a</sup>Data are reported as mean ± SD unless otherwise specified. FC, forward/center; PG, point guard; SG, shooting guard.

TABLE 2  
Playoff Performance Among All Players<sup>a</sup>

	Group A (n = 27)	Group B (n = 27)	P Value
Points per game	12.75 ± 6.69	14.04 ± 7.49	.28
Assists per game	3.23 ± 2.78	2.86 ± 1.74	.39
Player efficiency rating	14.07 ± 7.22	15.50 ± 6.41	.29
True shooting percentage	0.51 ± 0.10	0.51 ± 0.12	.97
No. of playoff games missed because of injury	0.11 ± 0.42	0.19 ± 0.56	.60

<sup>a</sup>Data are reported as mean ± SD.

TABLE 3  
Playoff Performance Among Point Guards<sup>a</sup>

	Group A (n = 6)	Group B (n = 6)	P Value
Points per game	16.23 ± 8.03	19.35 ± 8.19	.40
Assists per game	6.75 ± 2.53	4.88 ± 1.05	.17
Player efficiency rating	17.45 ± 10.60	18.72 ± 4.10	.77
True shooting percentage	0.52 ± 0.11	0.54 ± 0.05	.72
Steals per game	1.15 ± 0.69	1.22 ± 0.63	.84
No. of playoff games missed because of injury	0.17 ± 0.41	0.33 ± 0.82	.70

<sup>a</sup>Data are reported as mean ± SD.

Twenty-seven matched pairs were then formed based on the matching criteria mentioned above. No significant differences were found between the groups in terms of age at the start of the season of interest or minutes played per game (Table 1). As expected, a significant difference ( $P < .0001$ ) was found between the groups in terms of the number of regular-season games missed because of rest (Table 1).

Among all players in the matched pairs, no significant differences were found between the groups with regard to playoff performance or games missed because of injury (Table 2). Furthermore, within each position (PG, SG, FC), there were no significant differences between the groups in terms of any playoff statistics or number of playoff games missed because of injury (Tables 3-5). There were no other differences between the groups that we would consider clinically significant.

TABLE 4  
Playoff Performance Among Shooting Guards<sup>a</sup>

	Group A (n = 10)	Group B (n = 10)	P Value
Points per game	12.58 ± 7.11	12.85 ± 7.37	.89
Assists per game	2.32 ± 1.92	2.34 ± 1.58	.96
Player efficiency rating	12.36 ± 6.77	14.06 ± 5.90	.36
True shooting percentage	0.50 ± 0.12	0.53 ± 0.07	.31
Steals per game	0.86 ± 0.44	0.87 ± 0.58	.95
No. of playoff games missed because of injury	0.20 ± 0.63	0.20 ± 0.63	>.99

<sup>a</sup>Data are reported as mean ± SD.

TABLE 5  
Playoff Performance Among Forwards/Centers<sup>a</sup>

	Group A (n = 11)	Group B (n = 11)	P Value
Points per game	11.00 ± 5.29	12.22 ± 6.42	.45
Assists per game	2.15 ± 2.00	2.22 ± 1.37	.92
Player efficiency rating	13.79 ± 5.31	15.06 ± 7.65	.54
True shooting percentage	0.52 ± 0.07	0.47 ± 0.16	.36
Blocks per game	0.78 ± 0.75	0.92 ± 0.81	.52
No. of playoff games missed because of injury	0.00 ± 0.00	0.09 ± 0.30	.34

<sup>a</sup>Data are reported as mean ± SD.

TABLE 6  
Missed Playing Time During Playoffs  
Because of Injury<sup>a</sup>

	Group A (n = 27)	Group B (n = 27)	Total (N = 54)
Players who missed 0 games	25 (93)	24 (89)	49 (91)
Players who missed ≥1 games	2 (7)	3 (11)	5 (9)

<sup>a</sup>Data are reported as n (%). No difference was found between the groups ( $P = .64$ ).

When categorizing playoff games missed because of injury as a dichotomous variable (0 games vs ≥1 games), no significant difference was found between the groups ( $P = .64$ ) (Table 6). Five total injuries occurred in the playoffs that resulted in missed playing time (Table 7).

## DISCUSSION

In recent years, several studies have found pitch count to be a strong predictor of the injury risk among baseball pitchers.<sup>1,7,8</sup> Additionally, 2 recent studies have sought to determine the effect of the number of carries among football running backs and future performance and injury risk.<sup>2,3</sup> Based on these previous investigations, we hypothesized that NBA players who rest more frequently during the

TABLE 7  
Injuries Resulting in Missed Playing Time  
During Playoffs<sup>a</sup>

	Group A (n = 27)	Group B (n = 27)	P Value
Concussion	0 (0)	1 (4)	.31
Ankle sprain	1 (4)	1 (4)	>.99
Hip contusion	0 (0)	1 (4)	.31
Groin strain	1 (4)	0 (0)	.31

<sup>a</sup>Data are reported as n (%). % represents the percentage of all players within that group who missed playing time during the playoffs as a result of that injury.

regular season would perform at a higher level in the playoffs and would miss fewer playoff games because of injury when compared to players with less regular-season rest. However, the results of this study suggest that players who rest more often during the regular season do not perform at a higher level or miss fewer games because of injury in the playoffs, as there were no significant differences found in any statistical category overall or within any position.

Podlog et al<sup>4</sup> analyzed injuries in the NBA from 1986 to 2005 and found that injuries and illnesses among players increased continually over time ( $P < .0001$ ) and were therefore a major reason why player health had a significant impact on team operations and why there had been a trend of resting players for full games throughout the regular season. Despite this evidence, the results of the present study show no significant difference in playoff performance or injury risk between players in group A and group B. This finding can be explained by a few scenarios.

While players in group B rested for significantly more regular-season games than players in group A, no player examined in this study missed more than 9 games because of rest. The effect of resting fewer than 5 games versus 5 to 9 games may not noticeably influence overall fatigue levels and the injury risk, considering that players from both groups played a large number of games during the regular season. Five games missed because of rest was selected as the cutoff between the 2 groups, as it has been observed that players who intentionally miss games in the regular season for rest miss somewhere between 5 and 9 games. Thus, the 2 groups were formed to compare players who appear to strategically rest for 5 to 9 games with those who missed fewer than 5 games in a season. Players who missed  $\geq 10$  games because of rest during the regular season were excluded, as most of these players were not playing simply because of lineup configuration rather than for true rest. In addition, regular-season games missed because of rest occurred throughout the season, and therefore, games missed early in the season were less likely to affect player health and performance in the playoffs when compared to games missed because of rest toward the end of the regular season. Within the 27 matched pairs analyzed in this study, 9% of players missed at least 1 game because of injury during the playoffs. Injuries sustained included 1 concussion, 1 groin strain, 2 ankle sprains, and 1 hip contusion.

Teramoto et al<sup>6</sup> examined NBA game injuries in relation to game schedules and found that 65.4% of players who

were injured played 3 games in the 5 days leading up to the injury. In another study, Steenland and Deddens<sup>5</sup> analyzed 8610 NBA games from 1987 to 1994 and found that performance (2- and 3-point field goal percentage, free throw percentage, and points per game) among players increased with additional time between games, with peak team performance (wins, margin of victory) occurring with 3 days between games. While player performance is improved immediately after resting, rest has not been shown to affect performance later in the regular season or in the playoffs. Based on the results of the present study, regular-season rest does not appear to affect playoff performance or injury risk. It must be considered, however, that because these groups performed at a similar level in the playoffs, the increased amount of regular-season rest for players in group B was necessary to perform at a level equal to that of players in group A. In other words, the extra amount of rest for players in group B may reflect a good coaching decision, as these players may have needed more rest in the regular season to perform at a high level in the playoffs. Regardless, it is possible that resting for a moderate number of regular-season games each season has a direct effect on career longevity, and future studies should seek to determine if this effect exists.

The strengths of this study include the large number of NBA players analyzed over an 11-season span and the strict inclusion, exclusion, and matching criteria used in an effort to minimize confounding factors. The limitations of this study should also be noted. First, this was a retrospective study design. The results of this study are dependent on the accuracy of the data found in the NBA game summaries that were analyzed. Based on the inclusion criteria, particular players were included multiple times over the study period and therefore could have potentially biased the results of this study based on individual injury risks or performance abilities. In addition, many of the statistics analyzed in this study do not take into account the quality of the opponent. However, players were matched based on playoff seeding to minimize this potential confounder.

The small sample size of the matched pairs represents another limitation. We understand that when there is a small sample size, a nonstatistically significant difference can sometimes, in fact, be clinically significant. However, in our study, because the playoff statistics between the groups were so similar, we did not feel inclined to perform a power analysis. This study also did not take into consideration the point in the regular season at which players rested, the specific reason each player was resting, or alternative resting strategies such as reduced minutes in games leading up to the playoffs rather than full games missed because of rest. Furthermore, although instances of suspension, injuries, and personal reasons were listed as reasons why players missed games, it was not possible to determine the exact reason why any given player was choosing to rest. Consequently, it is possible that games listed as missed because of "rest" or "coach's decision" were in reality missed for an undisclosed suspension or to manage a minor injury or illness. Finally, and perhaps most important, player performance is subject to multiple sport-specific confounding factors, which limit the conclusions that can be drawn from

this study. These include opponent performance, teammate performance, offensive philosophy, and home-court advantage.

## CONCLUSION

Although multiple potential confounding factors exist and may limit the results of this study, it should not be assumed that NBA players who rest more frequently during the regular season will perform at a higher level or be at a reduced risk of injury in the playoffs during that same season.

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