

# Predicting whether the Los Angeles Lakers will have enough wins to guarantee them a spot in the 2022 – 2023 NBA Playoffs.

## Purpose of the Project

The purpose of this project is to predict whether the Los Angeles Lakers will have enough wins to guarantee them a spot in the Playoffs for the 2022 – 2023 season by analyzing the current team's NRTg (net rating). This will allow the team to determine if changes are needed so that they will be guaranteed a spot in the Playoffs. Although this project looks specifically at the Los Angeles Lakers and in the 2022 – 2023 season, this model can be implemented to any of the other 29 teams in the NBA (National Basketball Association) and for future seasons.

## About the Project

The NBA can be defined as having 2 distinguished periods throughout a season. The first, is the regular season which consists of 30 teams that play 82 games, and the second, a postseason tournament to determine the league champion called the Playoffs. Prior to the 2020 – 2021 season, teams that finished within the top 8 seeds in their respective conference, the East and the West, played in the Playoffs. However, with the introduction of the play-in tournament<sup>1</sup>, the top 6 teams from each conference are now guaranteed a spot in the Playoffs while teams that finished the season between 7th and 10th place compete for the final 2 spots. This means that only 6 teams from each conference are guaranteed a spot in the Playoffs. Therefore, this analysis will look at the statistics of an NBA team to determine whether a team will achieve enough wins to finish the season within the top 6 places from each conference, guaranteeing a team a spot in the Playoffs.

This analysis will look specifically at the Los Angeles Lakers.

\*Throughout this report, the terms “NRTg,” “ORTg,” and “DRtg” refer to the overall team's NRTg, team's ORtg, and team's DRtg, not to the statistics of individual players.

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<sup>1</sup> The play-ins, a preliminary tournament that determines the final two playoff seeds in the Eastern Conference and Western Conference, was introduced in the 2020 – 2021 season.

## Key Questions

1. How many wins does the Los Angeles Lakers need in the regular season to be guaranteed a spot in the Playoffs?
2. How can the Los Angeles Lakers achieve 55 wins in the regular season?
3. How can the NRtg (net rating) be calculated?
4. Will the Los Angeles Lakers achieve enough wins to guarantee them a spot in the Playoffs?
5. What can the Los Angeles Lakers do to improve their regular season record to be guaranteed a spot in the Playoffs?

## Key Insights

1. The Los Angeles Lakers should have a goal of winning 55 games by the end of the season to finish within the top 6 of their conference, guaranteeing a spot in the Playoffs for the 2022 – 2023 season.
2. The Los Angeles Lakers need to have a NRtg of around 6.3 to win approximately 55 games by the end of the season.
3. The NRtg (net rating) is the difference between the ORtg (offensive rating) and DRtg (defensive rating). So, by finding the variables that highly correlate with the ORtg and the DRtg, the NRtg can be predicted. The TS% (true shooting percentage) and PS/G (points scored per game) highly correlate with the ORtg. The O\_eFG% (opponent field goal percentage) and PA/G (points allowed per game) highly correlate with the DRtg.
4. No, the Los Angeles Lakers will not have enough wins to be guaranteed a spot in the Playoffs for the 2022– 2023 season. The Los Angeles Lakers, with a NRtg of -1.7, is predicted to win 35 games by the end of the 2022 – 2023 NBA season. The Los Angeles Lakers will not have enough wins to be guaranteed a spot in the Playoffs for the 2022– 2023 season.
5. The Los Angeles Lakers should look to change the rotations of their current roster or bring in key players that will have a positive impact in order to improve the NRtg and as a result win more games to be guaranteed a spot in the Playoffs.

## About the Data

The data contains season statistics for the 30 teams in the NBA (National Basketball Association) from the seasons that represent the Modern Era<sup>2</sup>, years 2013 – 2022. The data that represents the 2023 season was used after the statistical model was created to predict the number of wins the Los Angeles Lakers will have by the end of this current 2022 – 2023 season. From the data sources, I used the tables labeled “Conference Standings,” “Per Game Stats,” and “Advanced Stats.” I combined the data sources into 3 different tables in Excel that contained information regarding the teams’ standings at the end of the season, advanced team statistics, and per game statistics, using the data sources below. In R, the 3 tables were combined to create one large dataframe with a total of 58 columns.

#### **Data Sources:**

[https://www.basketball-reference.com/leagues/NBA\\_2023.html](https://www.basketball-reference.com/leagues/NBA_2023.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2022.html](https://www.basketball-reference.com/leagues/NBA_2022.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2021.html](https://www.basketball-reference.com/leagues/NBA_2021.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2020.html](https://www.basketball-reference.com/leagues/NBA_2020.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2019.html](https://www.basketball-reference.com/leagues/NBA_2019.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2018.html](https://www.basketball-reference.com/leagues/NBA_2018.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2017.html](https://www.basketball-reference.com/leagues/NBA_2017.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2016.html](https://www.basketball-reference.com/leagues/NBA_2016.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2015.html](https://www.basketball-reference.com/leagues/NBA_2015.html)  
[https://www.basketball-reference.com/leagues/NBA\\_2014.html](https://www.basketball-reference.com/leagues/NBA_2014.html)

#### **Tools Used:**

I used R Studio to create the statistical models using these packages:

1. tidyverse (dplyr, ggplot2)
2. ggpubr

## **In Depth Analysis**

### **1. How many wins does the Los Angeles Lakers need in the regular season to be guaranteed a spot in the Playoffs?**

To determine how many wins the Los Angeles Lakers need in the regular season to be guaranteed a spot in the Playoffs, the average percentage of games a team in the Western Conference that finishes in the top 6 places wins was calculated.

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<sup>2</sup> 2013 to present, a period characterized with more efficient shot selections by rewarding three-point shots compared to the two-point shots

(<https://content.iospress.com/articles/journal-of-sports-analytics/jsa200525>)

Since there are 2 conferences, the East and the West, the teams were split into their respective conferences and 2 new data frames that contained all the data from teams that finished within the top 6 in previous seasons were created. The column with the total number of wins wasn't used because there were 2 seasons (2019 – 2020 and 2020 – 2021) that had less games due to COVID-19.

So, the percentage of games that teams that finish within the top 6 places in the Western Conference win was calculated by dividing the total wins by the total games for each team from the 2013 – 2022 seasons.

$$\text{Win Percentage} = (\text{Total Wins} / \text{Total Games}) \times 100$$

Then, the average of the win percentages from all 54 teams (9 seasons x 6 teams) was calculated.

$$\text{Average Win Percentage} = (\text{Total Win Percentage} / 54)$$

Teams that finish within the top 6 places in Western Conference win, on average, 66.4% of their games.

Then, multiplying the average win percentage for the Western Conference by the total number of games that will be played in the 2022 – 2023 regular season, 82 games, the total number of wins necessary to finish within the top 6 can be calculated.

$$\text{Total Wins} = \text{Average Western Conference Win Percentage} \times 82$$

$$\text{Total Wins} = 0.664 \times 82$$

$$\text{Total Wins} = 55$$

The Los Angeles Lakers should have a goal of winning 55 games by the end of the season to finish within the top 6 of their conference, guaranteeing a spot in the Playoffs for the 2022 – 2023 season.

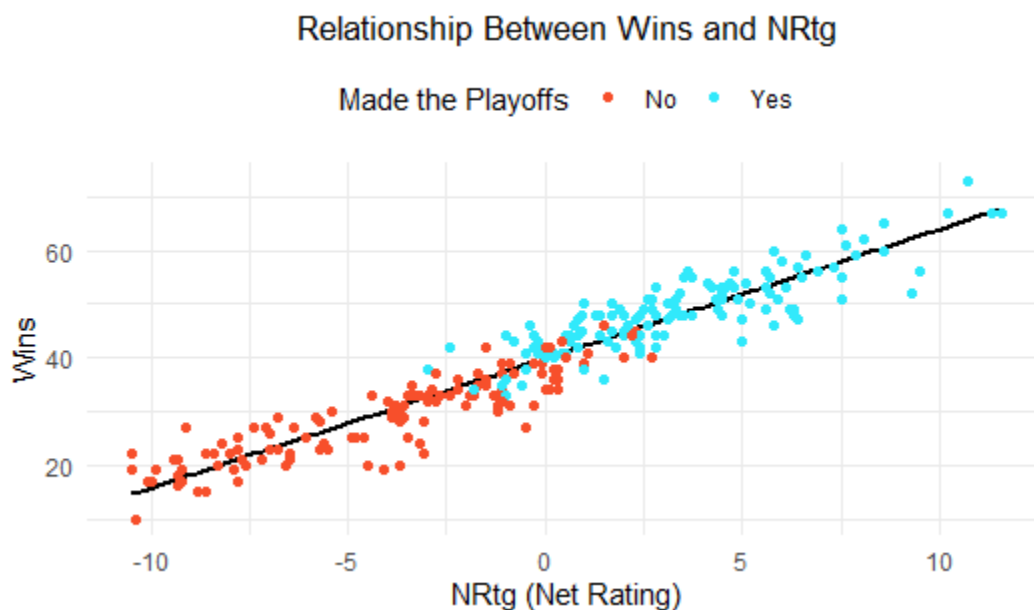
## **2. How can the Los Angeles Lakers win 55 games in the regular season?**

The Los Angeles Lakers need to win roughly 55 games in the regular season to be guaranteed a spot in the Playoffs. So, how does the team win games?

The team needs to score more points than allowed each game. Therefore, the statistic that can be used to determine whether or not the Los Angeles Lakers will win games need to be found.

This was done by performing a Pearson correlation test between wins and 46 other variables that represent the offensive statistics and defensive statistics from all 30 teams in the association, across 9 seasons. From these calculations, the NRtg (net rating) has the highest correlation with 0.95. The NRtg is the difference in the score per 100 possessions as a combination of 5 players. It will display the quality of play and the quality of the team.

A linear regression model will tell us the NRtg the Los Angeles Lakers need in order to win 55 games in the regular season; therefore, securing a spot in the Playoffs.



Call:

```
lm(formula = W ~ NRtg, data = df)
```

Residuals:

Min	1Q	Median	3Q	Max
-11.6338	-2.3582	0.1805	2.6591	9.0763

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	39.83787	0.23705	168.06	<2e-16 ***
NRtg	2.40815	0.04943	48.72	<2e-16 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.895 on 268 degrees of freedom

Multiple R-squared: 0.8986, Adjusted R-squared: 0.8982  
F-statistic: 2374 on 1 and 268 DF, p-value: < 2.2e-16

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From the graph we see that teams with a positive NRtg are more likely to win, as a result making the Playoffs.

The linear regression model shows that the results are highly significant.

Our regression equation to calculate the number of wins is:

$$\text{Wins} = 39.83787 + 2.40815(\text{NRtg})$$

The Los Angeles Lakers need to average 55 wins during the regular season. So, the formula to finding the minimum net rating is:

$$\begin{aligned} 55 &= 39.83787 + 2.40815(\text{NRtg}) \\ \text{NRtg} &= 6.296173 \end{aligned}$$

The Los Angeles Lakers need to have a team NRtg of around 6.3 to win approximately 55 games by the end of the season.

### 3. How can the NRtg (net rating) be calculated?

The NRtg is the difference between the ORtg (offensive rating) and the DRtg (defensive rating).

$$\text{NRtg} = \text{ORtg} - \text{DRtg}$$

Since the NRtg is a point differential per 100 possessions, all teams' statistics are based on the same number of possessions creating an equal playing field. Therefore, the NRtg allows a respective team to have a general comparison of their team's performance to other teams. A team will have a positive NRtg if the team won more games than lost.

So, How does a team achieve a positive NRtg?

A team will need a high ORtg and a low DRtg.

To determine which variables have a statistical relationship with the ORtg, another Pearson correlation test was performed, comparing the ORtg from all 30 teams, across 9 seasons, to 46 different variables that represent the offensive and defensive statistics. The same was done for the DRtg.

Variables highly correlated to the ORtg:

- TS% has a positive correlation of 0.903844287
  - TS% = a measure of shooting efficiency that takes into account 2-pointers, 3-pointers and free throws
- eFG% has a positive correlation of 0.879423785
  - eFG% = Statistics adjusted for the fact that a 3-point field goal is worth one more point than a 2-point field goal percentage

Variables highly correlated to the DRtg:

- OeFG% has a positive correlation of 0.91730576
  - OeFG% = Opponent's statistics adjusted for the fact that a 3-point field goal is worth one more point than a 2-point field goal percentage
- PA/G% has a positive correlation of 0.86309331
  - PA/G% = Opponent's points per game

### ORTg (Offensive Rating) Calculation

First, the variables that correlate with the ORtg were fitted into a multivariate regression model to understand how these variables combined affect the ORtg of a team.

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Call:

lm(formula = ORtg ~ TS. + eFG., data = df1)

Residuals:

Min	1Q	Median	3Q	Max
-4.5668	-1.1866	-0.1145	1.1928	5.8777

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	12.390	3.121	3.970	9.25e-05 ***
TS.	195.288	24.274	8.045	2.83e-14 ***
eFG.	-22.341	22.608	-0.988	0.324

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.72 on 267 degrees of freedom  
 Multiple R-squared: 0.8176, Adjusted R-squared: 0.8162  
 F-statistic: 598.4 on 2 and 267 DF, p-value: < 2.2e-16

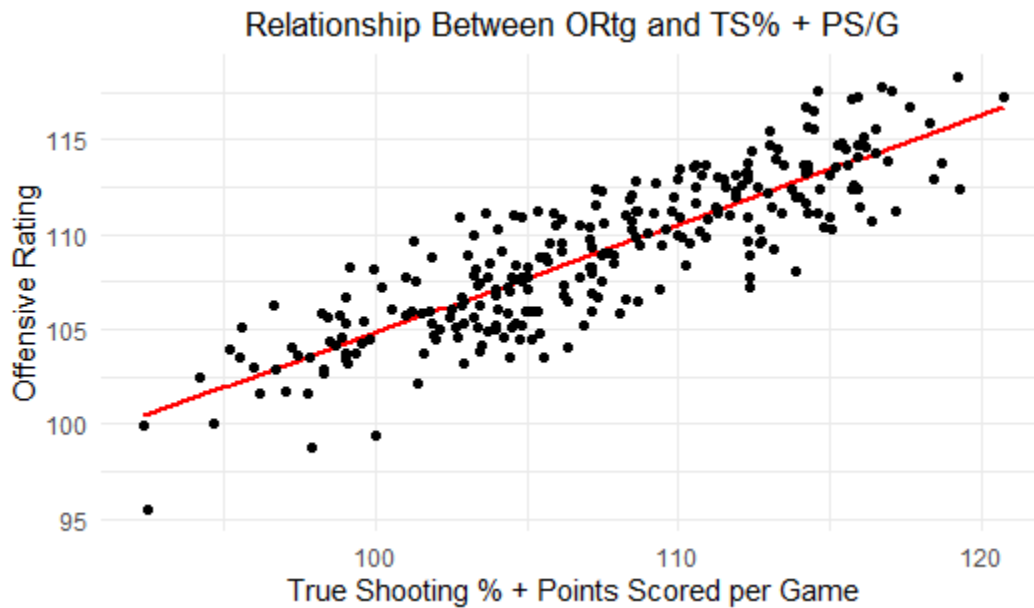
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From the regression model, we see that the eFG% is not significant, meaning that there is no statistical relationship between the eFG% and ORtg.

Therefore, another multivariate regression model was created by substituting the eFG% with the PS/G (points scored per game), the next highest correlation to ORtg.

PS/G has a positive correlation of 0.858321231.

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Call:

```
lm(formula = ORtg ~ TS. + PS.G, data = df1)
```

Residuals:

Min	1Q	Median	3Q	Max
-4.3440	-1.0509	-0.0255	1.0124	4.5629

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	19.41223	2.56342	7.573	5.98e-13 ***
TS.	117.25455	8.04738	14.571	< 2e-16 ***
PS.G	0.23086	0.02836	8.140	1.51e-14 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.542 on 267 degrees of freedom

Multiple R-squared: 0.8533, Adjusted R-squared: 0.8522

F-statistic: 776.7 on 2 and 267 DF, p-value: < 2.2e-16

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From the model, we see that both variables are significant, and teams with a higher TS% and PS/G will have a higher ORtg.

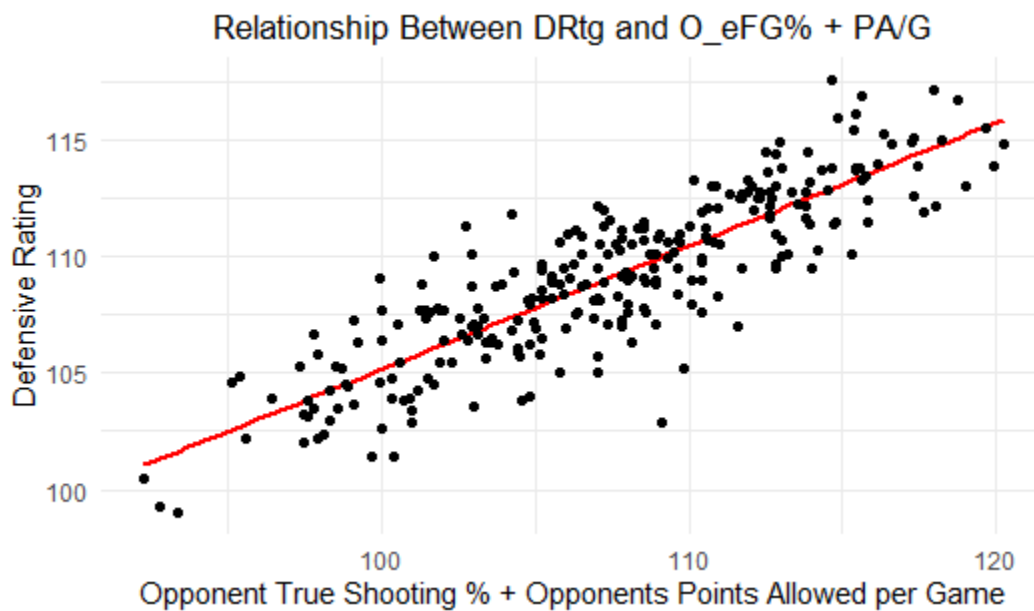
$$\text{ORtg} = 19.41223 + 117.25455(\text{TS}\%) + 0.23086(\text{PS/G})$$

This formula will be used to determine the Los Angeles Lakers's ORtg.



## DRtg Calculation

Next, another multivariate regression model was created to understand the relationship between the O\_eFG% and PA/G to the DRtg of a team.



Call:

```
lm(formula = DRtg ~ O_eFG. + PA.G, data = df1)
```

Residuals:

Min	1Q	Median	3Q	Max
-3.5615	-0.7996	-0.0682	0.8688	3.1836

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	28.47503	1.95587	14.56	<2e-16 ***
O_eFG.	112.27513	6.46080	17.38	<2e-16 ***
PA.G	0.21032	0.02259	9.31	<2e-16 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.243 on 267 degrees of freedom

Multiple R-squared: 0.8803, Adjusted R-squared: 0.8794

F-statistic: 981.9 on 2 and 267 DF, p-value: < 2.2e-16

From the model, we see that both variables are significant, and teams with a higher O\_eFG% and PA/G will have a higher ORtg.

$$DRtg = 28.47503 + 112.27513(O\_eFG\%) + 0.21032(PA/G)$$

This formula will be used to determine the Los Angeles Lakers's DRtg.

Now that we know which variables can be used to calculate the ORtg and DRtg, the NRtg for the Los Angeles Lakers can be calculated; therefore, predicting whether they will finish the regular season with enough wins to guarantee the team with a spot in the Playoffs.

#### 4. Will the Los Angeles Lakers achieve enough wins to guarantee them a spot in the Playoffs?

The Los Angeles Lakers's NRtg can be calculated, which will allow us to predict how many wins they will have by the end of the season, using these 2 formulas:

1.  $ORtg = 19.41223 + 117.25455(TS\%) + 0.23086(PS/G)$
2.  $DRtg = 28.47503 + 112.27513(O\_eFG\%) + 0.21032(PA/G)$

The current season's NRtg is necessary to predict the total number of wins the team will achieve.

Statistics from the current (2022 – 2023) season:

ORtg predictors:

$$TS\% = 0.557$$

$$PS/G = 116.9$$

DRtg predictors:

$$O\_eFG\% = 0.536$$

$$PA/G = 117.9$$

$$NRtg = ORtg - DRtg$$

$$NRtg = [19.41223 + 117.25455(TS\%) + 0.23086(PS/G)] - [28.47503 + 112.27513(O\_eFG\%) + 0.21032(PA/G)]$$

$$NRtg = [19.41223 + 117.25455(0.557) + 0.23086(116.9)] - [28.47503 + 112.27513(0.536) + 0.21032(117.9)]$$

$$NRtg = -1.740679$$

Now that the NRtg is calculated, the number of wins a team will have by the end of the season can also be predicted by using the first regression model:

$$\text{Wins} = 39.83787 + 2.40815(\text{NRtg})$$

$$\text{Wins} = 39.83787 + 2.40815(-1.740679)$$

$$\text{Wins} = 35.64605$$

The Los Angeles Lakers, with a NRtg of -1.7, is predicted to win 35 games by the end of the 2022 – 2023 NBA season. The Los Angeles Lakers will not have enough wins to be guaranteed a spot in the Playoffs for the 2022– 2023 season.

## **5. What can the Los Angeles Lakers do to improve their regular season record to be guaranteed a spot in the Playoffs?**

The Los Angeles Lakers currently have an NRtg of -1.740679, which is short from the estimated NRtg of 6.3 needed to be guaranteed a spot in the Playoffs. Since the NRtg equals the ORtg subtracted by the DRtg, they should look to find methods to increase their ORtg or lower their DRtg. Their current ORtg is 111.7105 and DRtg is 113.4512. This can be done by changing the rotations of their current roster or by bringing in key players that will have a positive impact in order to improve the NRtg and as a result win more games to be guaranteed a spot in the Playoffs.