

Abstract

This paper explores the differences between the NBA and WNBA using different visualizations to demonstrate these differences. I utilized tableau, python, and R to create the visualizations.

Introduction

One of the most notable sports in America, basketball, which has been played for over a century, has produced some of the USA's most eminent personalities and brought in millions of viewers. This sport has garnered significant attention at various levels, from high school basketball to college basketball, the prestigious National Basketball Association (NBA) and Women's National Basketball Association (WNBA). However, there seems to be a surfacing theme of disparity between genders in the professional leagues. Even though these two leagues play the same sport, there is very little in common when it comes to certain factors.

Background

It is no secret that the WNBA is much less popular than the NBA. Viewership and interest are what contributes to a league being successful. Figure 1 below shows the average number of TV viewers (in thousands) for a regular season NBA game in seasons 2020 and 2021. There were roughly 1.6 million people watching the games in the 2020 season and that dropped to an average of about 1.3 million viewers in 2021. Figure 2 below shows the average number of TV viewers (in thousands) for a regular season WNBA game in seasons 2020 and 2021. While the trend in viewers for WNBA games is rising, it's still roughly averaging 1 million fewer viewers than the NBA games so it has a long way to go to catch up to NBA viewership.

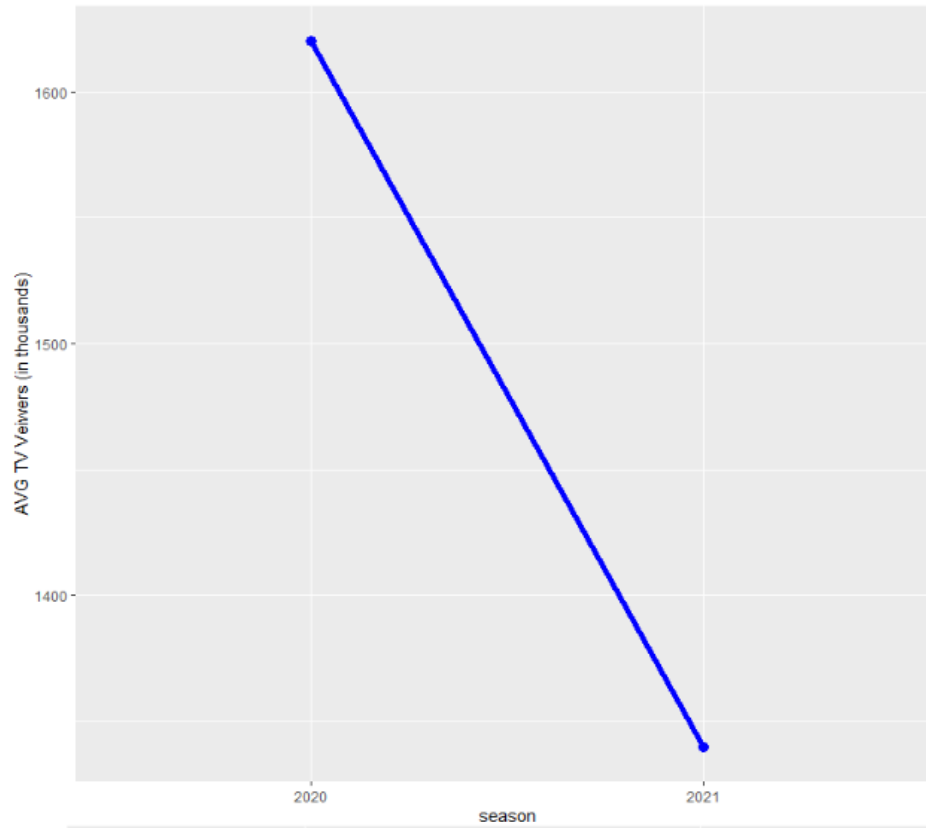


FIGURE 1

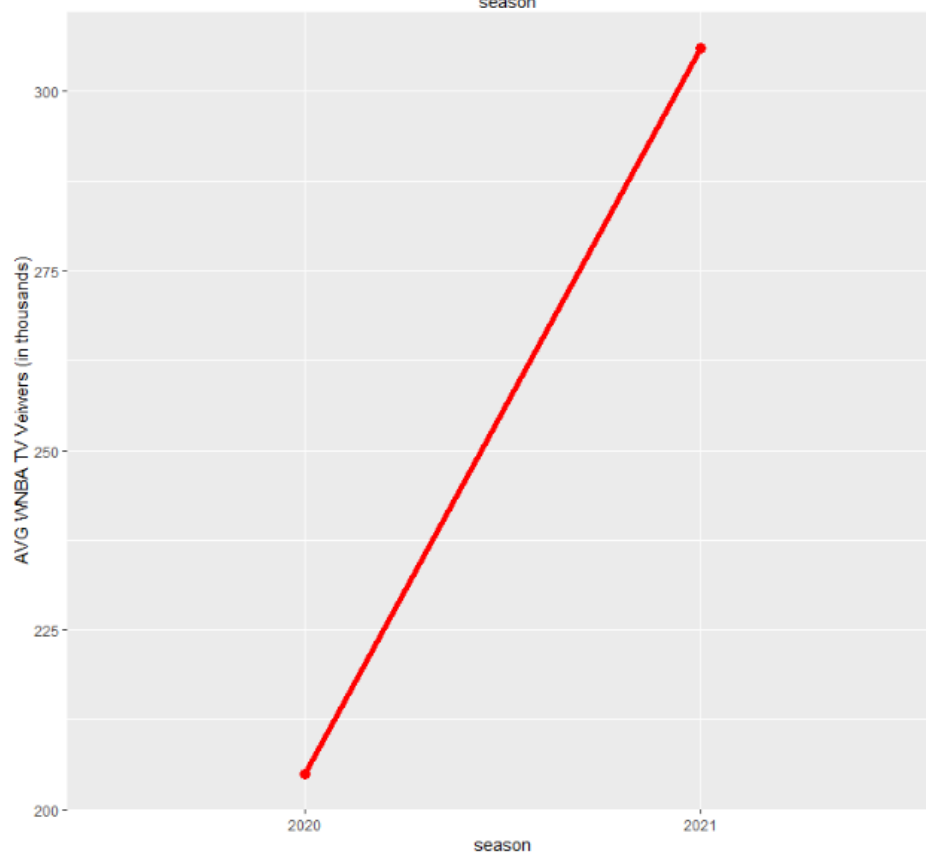


FIGURE 2

Viewers and attendance at the games is important in order to generate money for the league. In 2021, the NBA's average attendance is 17,760, whereas the WNBA's only 6,535. The money that the league can generate from viewers and attendance is an important factor in determining the salary of the players. Figure 3 below compares how much each professional sport league is paying their players relative to the amount of money they make. We can notice that as a league makes more revenue (dark blue), it can pay its players more money (dark red). According to the plot, it appears that based on the overall revenue that the WNBA generates the players are paid a "fair" compensation although it is significantly smaller than the compensation of NBA players.

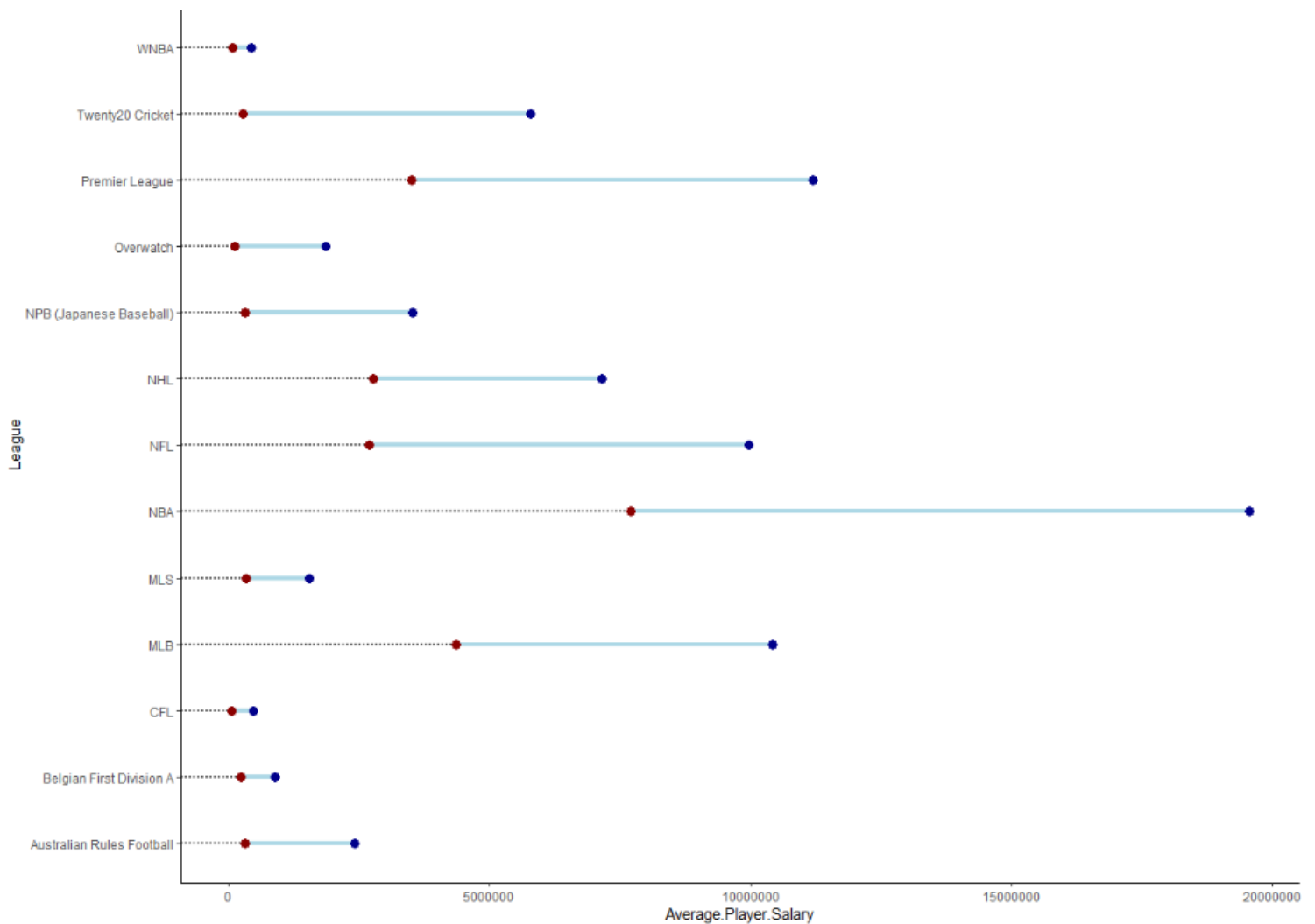


FIGURE 3

From the background information above, we can confirm that the WNBA is significantly less popular than the NBA. Are there factors for the play that make WNBA less desirable to view?

Approach

My approach was to analyze player data in each league to see how the NBA players play differently than the WNBA players. The dataset I found contains player statistics contains data on each player who has been part of an NBA or WNBA teams' roster from 1997-2021. It captures demographic variables such as age and height as well as biographical details like the team played for and position. In addition, it has basic box score statistics such as games played, average number of points, rebounds, assists, etc. However, when reviewing this data it's important to note that the length of gametime differs in each league. In the NBA, the games are played in 4 quarters of 12 minutes each totaling to 48 minutes. In the WNBA, the games are played in 4 quarters of 10 minutes each totaling to 40 minutes.

To start, I created a correlation matrix in python to see which factors of play affect each other. This is shown Figure 4 on the page below. A takeaway from Figure 4 is that height has the strongest correlation for offensive rebounds, defensive rebounds, and blocks. This means that the tallest players can accelerate in these categories. Height has the smallest correlation for 3-point field goals, 3-point attempts, and assists.

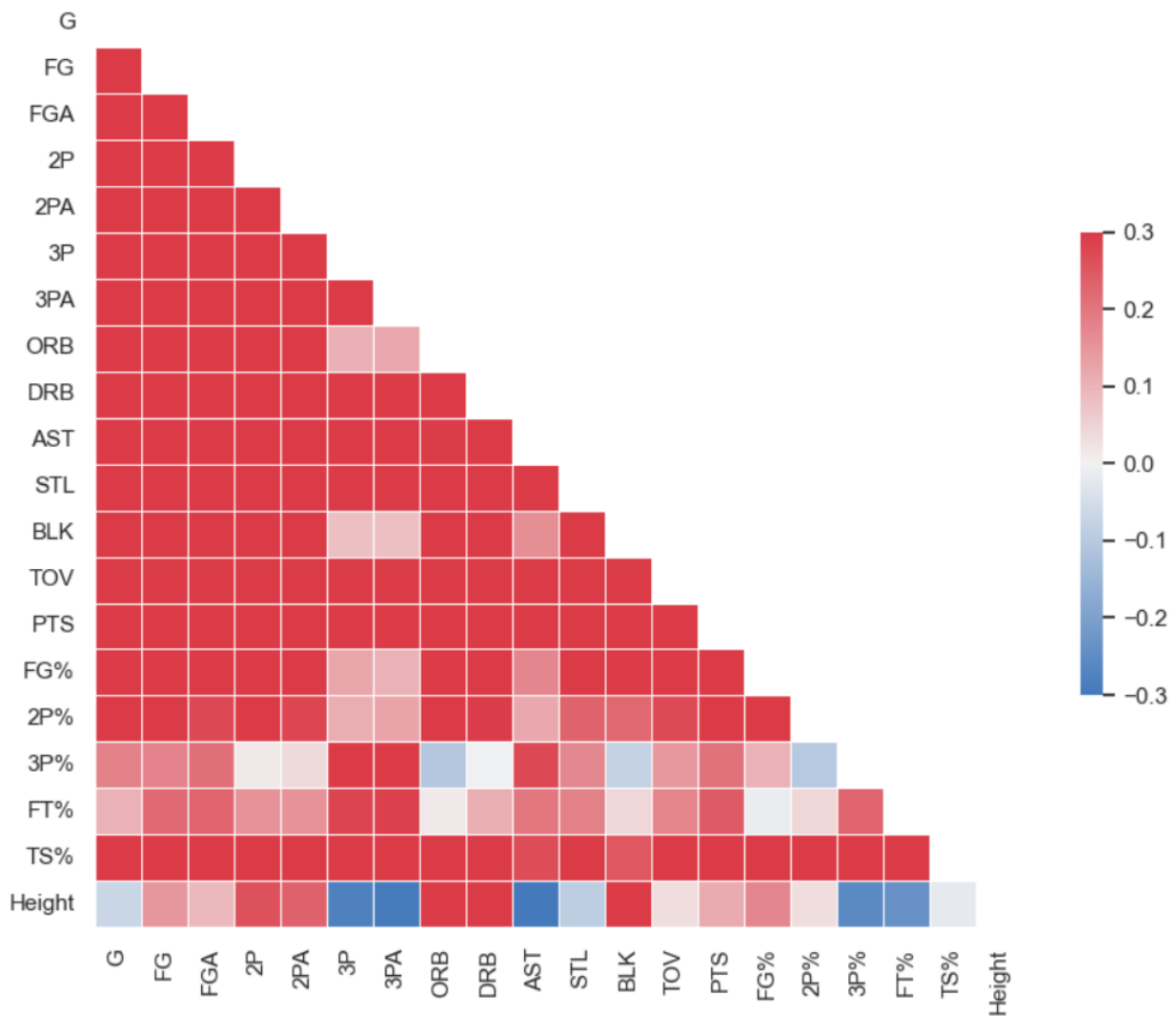


FIGURE 4

Age -- Player's age **G** -- Games **FG** -- Field Goals **FGA** -- Field Goal Attempts **2P** -- 2-Point Field Goals **2PA** -- 2-Point Field Goal Attempts **3P** -- 3-Point Field Goals **3PA** -- 3-Point Field Goal Attempts **ORB** -- Offensive Rebounds **DRB** -- Defensive Rebounds **AST** -- Assists **STL** -- Steals **BLK** -- Blocks **TOV** -- Turnovers **PTS** -- Points **FG%** -- Field Goal Percentage **2P%** -- 2-Point Field Goal Percentage **3P%** -- 3-Point Field Goal Percentage **FT%** -- Free Throw Percentage **TS%** -- **True Shooting Percentage** A measure of shooting efficiency that takes into account 2-point field goals, 3-point field goals, and free throws.

Now I want to look at the height comparison for NBA players compared to WNBA players. This can be seen in Figure 5 below. Throughout each season, the WNBA players are consistently shorter than the NBA. This makes sense, given as the average male is about 7% taller than the average female. However, height can really affect the performance of a basketball player.

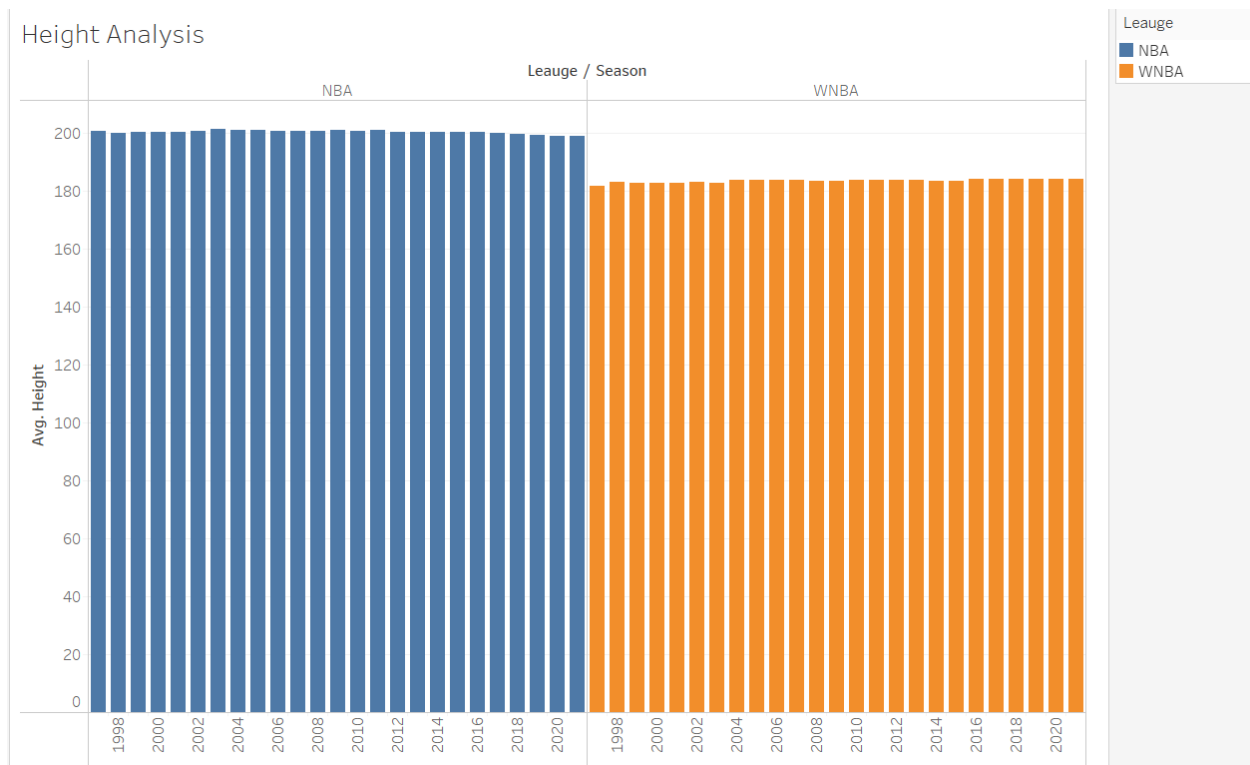


FIGURE 5

As we've seen in Figure 1 that height can affect rebounds, looking Figure 6 below we can confirm that the NBA players are averaging much more offensive and defensive rebounds per season than the players in the WNBA. Defensive rebounds (DRB) a player is averaging per season are shown on the left and offensive rebounds (ORB) a player is averaging per season are shown on the right. As expected, players across both leagues get many more defensive rebounds than offensive rebounds. This is due to the defending team being in a better position to recover the missed shots.

Rebounds Per Season

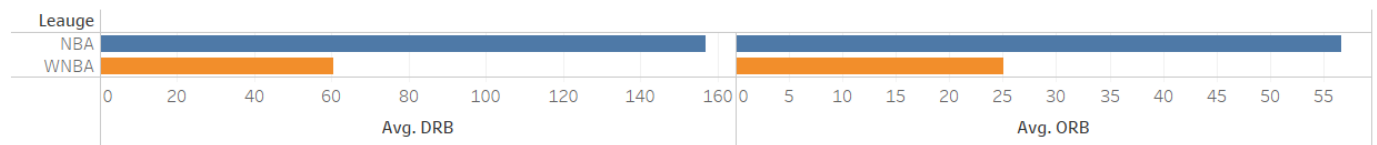


FIGURE 6

From Figure 1, it was also noted that the shorter players can still excel at 3-point field goals and assists.

According to a research paper published by René Böheim, Christoph Freudenthaler, Mario Lackner, women systematically make fewer risky choices than men. This also applies to the game of basketball.

Typically, a 3-point shot is considered riskier than a 2-point shot as it is more difficult to make. Looking at Figure 7 below, the graph is comparing the 3-point attempts in the leagues over the seasons, the NBA players are making quite a lot more 3 point shot attempts than players in the WNBA.

3-Point Attempts

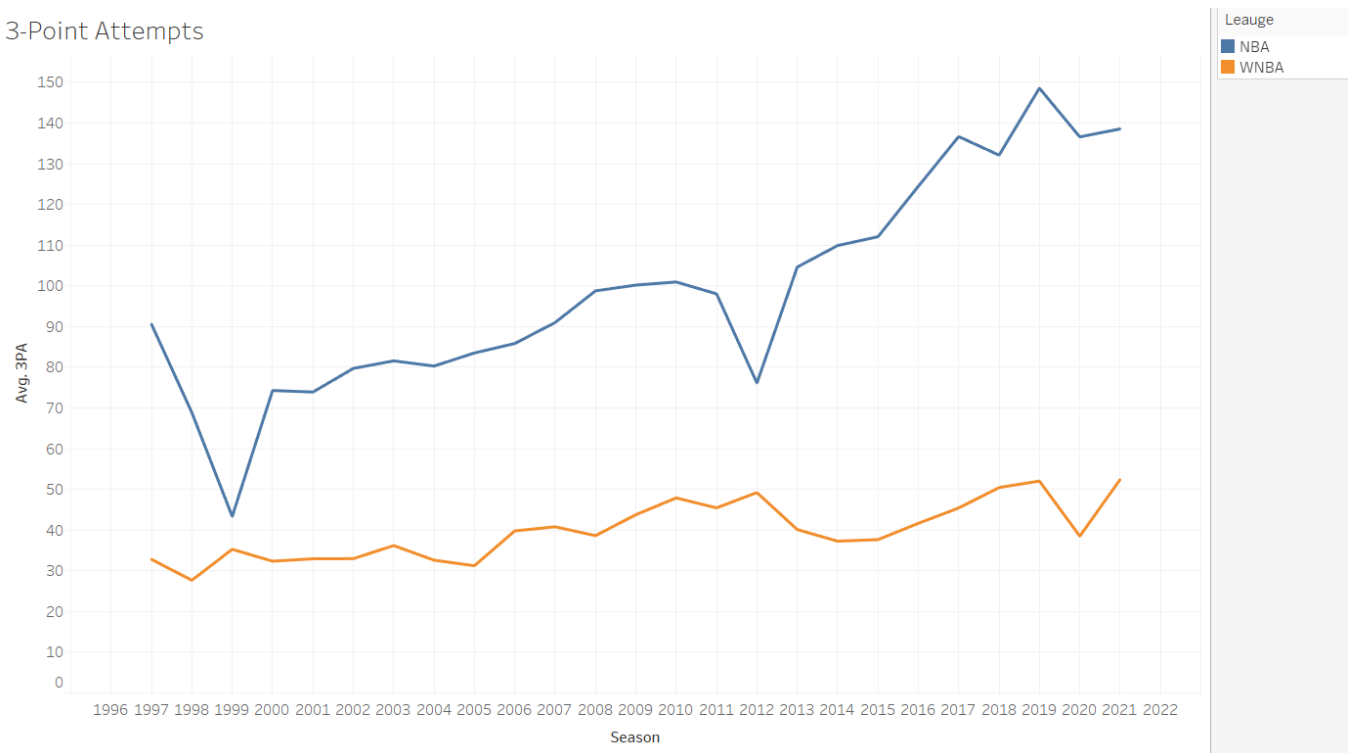


FIGURE 7

Overall, it's beneficial to be an effective shooter from any point. Are players in the NBA more effective at shooting than players in the WNBA? Taking a look at Figure 8 below, the shooting efficiency is very similar in both leagues. The NBA slightly outperforms the NBA at the shooting percentages in every category, but not enough to where it makes a huge difference.

Shooting Efficiency

League	Avg. 2P%	Avg. 3P%	Avg. FT%	Avg. eFG%	Avg. TS%
NBA	0.4654	0.2820	0.7260	0.4755	0.5121
WNBA	0.4258	0.2787	0.7426	0.4399	0.4854

FIGURE 8

Now let's look at the top scorers for each of the leagues. This is shown in Figures 9 and 10 below. The top WNBA scorers are averaging about 20 points per game. The top scorers in the NBA are averaging closer to 30 points per game. While this could be the NBA players outperforming the WNBA players, this could also be due to the fact that the WNBA games are 8 minutes shorter.

Top WNBA Scorers

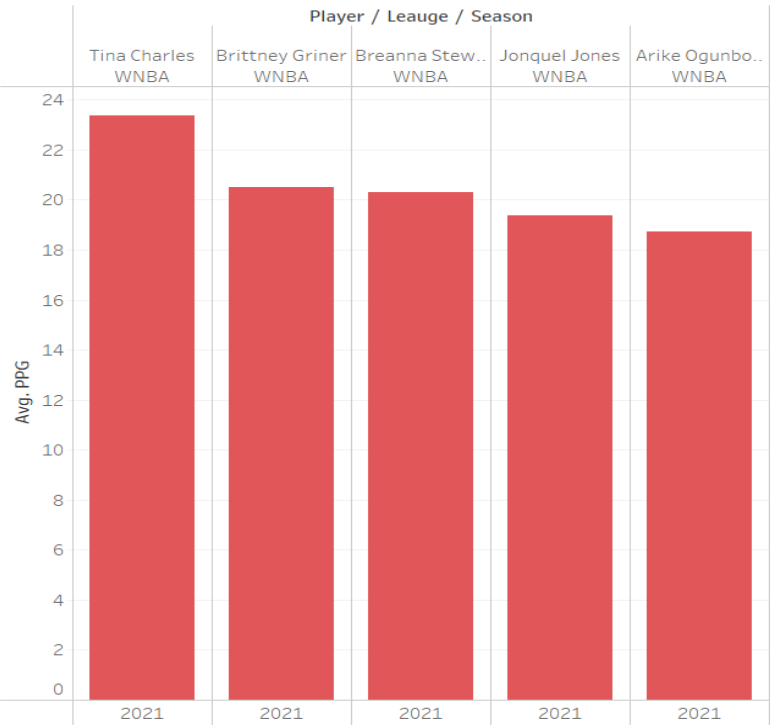


FIGURE 9

Top NBA Scorers

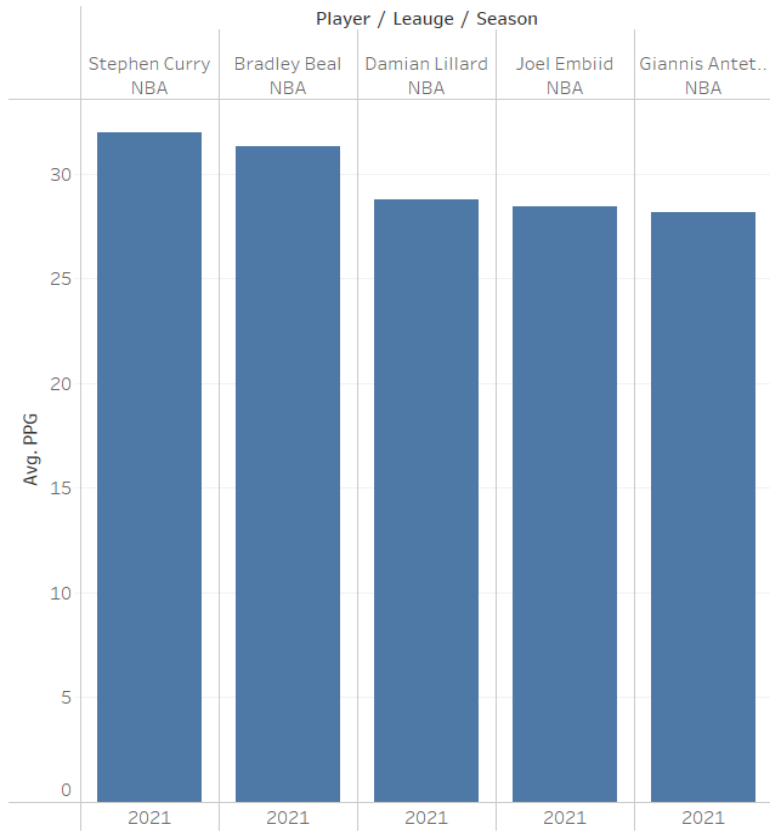


FIGURE 10

Results

While the performance data suggests that the average NBA player slightly outperforms the average WNBA player, it seems that it comes down to the fact that the majority of sports fans simply don't crave women's professional basketball.

Conclusion

Ultimately, the growth of the WNBA comes down to the viewership and interest. Comparing the growth overtime, it appears that the WNBA will never be as popular as the NBA due to the viewership. While the viewership is in fact growing, it has a long way to go to catch up to the NBA. Even if the WNBA players performed at the same level as the NBA players, I don't believe that the viewership would be the same.

Sources

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