Super Bowl Hangover

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Introduction

When two American football leagues called the "AFL" and the "NFL" merged in 1966, a new championship game was created that featured one team from each conference, and was later given the name "the Super Bowl". The first Super Bowl took place in 1967, and the game continues to be held every year in January or February.

Each season there are teams that improve, decline, or roughly perform the same as the season before. One common trend that spectators have noticed is the impact that losing the Super Bowl has on a team. It is reasonable to assume that the team who lost the Super Bowl will continue to perform well the next season, since they finished 2nd in a league of more than 20 teams. However, history shows that the team who lost the Super Bowl often notices a significant decline in performance the following season. This trend became known as the "Super Bowl Hangover".

This project will explore the performance of each Super Bowl losing team by comparing ceratin stats (regular season win percentage, division win percentage, playoff wins, etc.) from their Super Bowl season to the following season. It will also provide answers to the following questions:

- **What classifies a Super Bowl Hangover?**
- **How common are Super Bowl Hangovers?**
- **What factors affect the likelihood of Super Bowl Hangovers?**
- **Which teams experienced the worst Super Bowl Hangovers?**
- **Have any teams avoided a Super Bowl Hangover?**

All statistics used in this project were obtained from Pro Football Reference (www.pro-football-reference.com).

Obstacles in Data Collection

Since the Super Bowl is played in either January or February, there is a cutoff between the year the regular season is played and the year the Super Bowl is played. For example, the Tampa Bay Buccaneers won the Super Bowl in 2021, but when looking at their season stats, it is considered the 2020 regular season. This can cause confusion because in any given year, there are two different seasons someone might be referring to.

Since 1966, the NFL has made several modifications to the number of teams in the league, the size of divisions, the teams in each division, and the amount of games played each season. For example, before 1979, the regular season consisted of 14 games, then it expanded to 16 games. This slightly altered the data being collected.

A player strike reduced the 1982 season from a 16-game schedule to an abbreviated 9-game schedule.

What Classifies a Super Bowl Hangover?

In general, there is no exact criteria to determine a Super Bowl Hangover, since it is a loosely used term. Typically, the main contributing factors of a Super Bowl Hangover are a lower regular season win percentage (RSW) and less playoff wins. For the purpose of this project, we will determine the criteria for a Super Bowl Hangover as follows:

- The team won the Super Bowl the previous year
- The team's regular season win percentage decreased the following season
- The team either missed the playoffs, or made the playoffs and lost in the wild card round (first round)

After defining the conditions for a Super Bowl Hangover, we can begin filtering through the data with these parameters. The table below shows average changes from the Super Bowl season to the following season for three categories of data.

	RS_Wins	Division_Wins	RSW	DW
All	-2.24	-1.28	-14.29	-18.80
Hangover	-4.95	-2.86	-31.45	-41.28
Non_Hangover	-0.52	-0.27	-3.36	-4.49

All: Data for all Super Bowl seasons
Hangover: Data only including hangover seasons
Non_Hangover: Data excluding hangover seasons

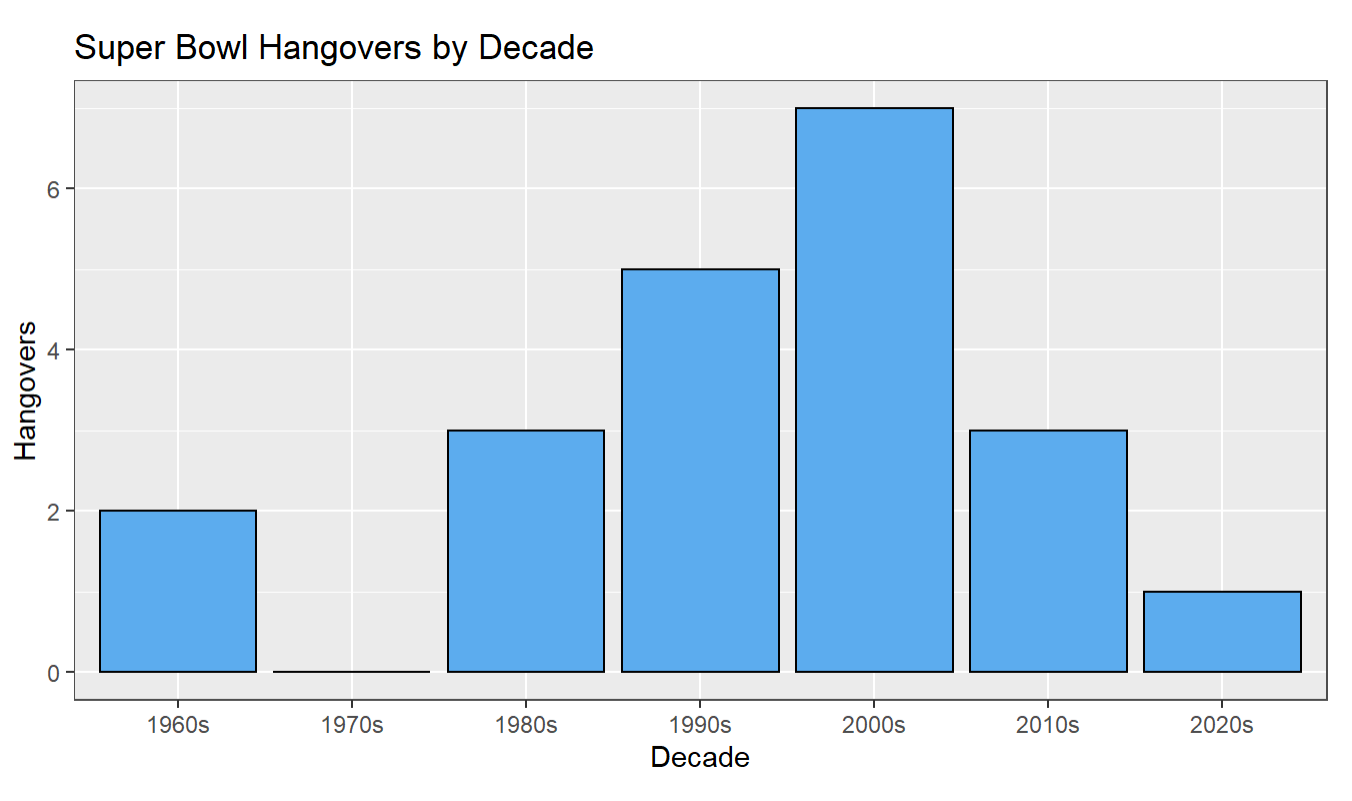
RS_Wins: Average change in number of regular season wins
Division_Wins: Average change in number of division wins
RSW: Average change in regular season win percentage
DW: Average change in division win percentage

The table reinforces our argument that teams generally notice a decline in performance following a Super Bowl loss. As expected, the hangover seasons show the most extreme performance declines. I found it interesting that all observations in the table, regardless of being a hangover season, showed a decrease. Even if teams avoid a Super Bowl hangover, it is very difficult to maintain the performance of a Super Bowl season.

How Common are Super Bowl Hangovers?

The concept of a "Super Bowl Curse" or "Super Bowl Hangover" has been used at least as early as 1992, when the Washington Post used the term in a publication. Although the term only became popular the last few decades, the data suggests these "hangovers" have existed since the Super Bowl began in 1967.

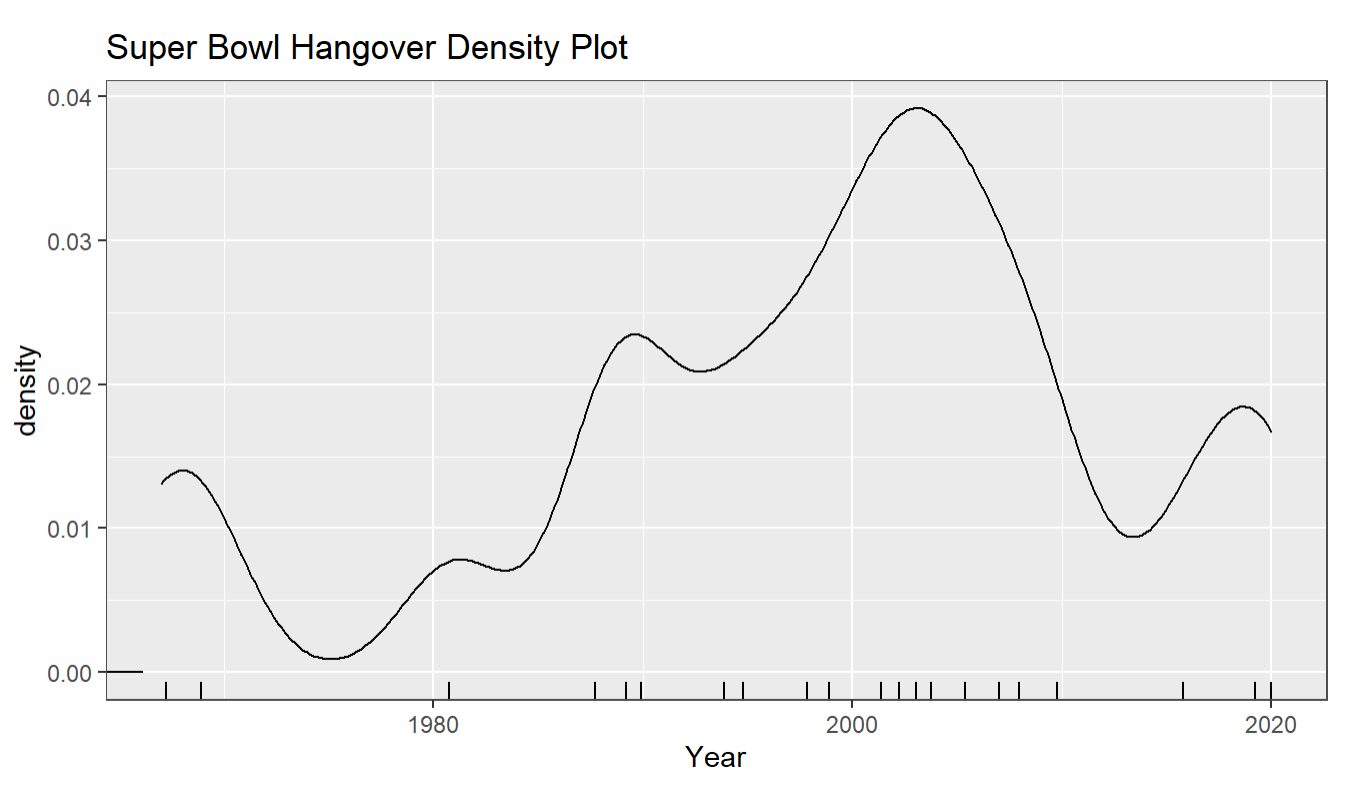
One way to categorize the data is by separating the hangovers into decades. Keep in mind there were only 3 Super Bowls played in the 1960s, and only 1 has been played so far in the 2020s (we are not including the most recent Super Bowl from 2021, because the follwing season has not been played yet).



The bar chart above provides a clear breakdown of each decade's amount of Super Bowl Hangovers. Perhaps the most suprising part of this chart is that no Super Bowl Hangovers took place in the 1970s. This is partially caused by solid performances the following year, but is mainly due to the Wild Card Round not being introduced until 1978. This means that before 1978, any team that made the playoffs but lost their first playoff game was still immune to a hangover, since they reached the divisional playoff round.

After a decade without Super Bowl Hangovers, the trend began to accelerate. The amount of hangovers increased for three straight decades, reaching a peak of 7 hangovers in the 2000s. Soon after this rapid increase we noticed a decline. Since the year 2008, there have only been 4 Super Bowl Hangovers.

Similarly, I found it useful to generate a density plot with a jittered rug plot addition. This provides a smooth curve showing the frequency of hangovers, with small notches in the x-axis signifying each hangover.



As expected, the lowest amount of hangovers is in the 1970s, which is followed by a rapid increase until the 2010s.

Another way to visualize the frequency of Super Bowl Hangovers is with a strip plot. Each point represents a hangover, and the plot shows all seasons since 1967. The plot below is produced with interactive tooltips that allow you to mouse over the points to view more information.

Strip plots are an effective way to reveal gaps and outliers in the data. In this case, we notice a large blank space in the 1970s, and a large cluster of points in the 2000s.

Our criteria for a Super Bowl Hangover determined that out of the first 54 Super bowls, 21 teams experienced a hangover, a rate of about 38.8%.

What Factors Affect the Likelihood of Super Bowl Hangovers?

Losing the Super Bowl is a significant blow to any football team's morale. Coming within one game of the ultimate prize just to fall short is very disappointing. Psychological effects can contribute to a hangover, but there is much more involved in these performance declines.

1) Draft Order

Each year the NFL Draft allows teams to select college football players to join their team. The order in which teams select is based on their success the previous season. If your team won the Super Bowl, you will have the last selection. If your team had the worst record in the league, you get the first choice. For teams that reached the Super Bowl and lost, they find themselves in a lose-lose scenario. Not only did they fall short of a championship, but their team's success negatively impacts their position in the draft.

2) Division

Depending on which teams are in your division, you could have an easy or difficult path to the playoffs. The team with the best record in each division automatically makes the playoffs, which adds to the imporance of divisional games. Take a look at the tables below showing the impact of divisional opponents.

2020 AFC North

	Wins	Losses	Ties	Percentage	Playoffs?
Pittsburgh	12	4	0	0.75	Yes
Baltimore	11	5	0	0.688	Yes
Cleveland	11	5	0	0.688	Yes
Cincinnati	4	11	1	0.25	No

2020 NFC East

	Wins	Losses	Ties	Percentage	Playoffs?
Washington	7	9	0	0.438	Yes
NewYorkGiants	6	10	0	0.375	No
Dallas	6	10	0	0.375	No
Philadelphia	4	11	1	0.25	No

Notice that the first table (2020 AFC North) featured 3 playoff teams, each having 11+ regular season wins. The second table (2020 NFC East) contains four teams with losing records, and presents a much easier path to the playoffs. If your team plays in a competitive division like the AFC North, you will be much more likely to have a Super Bowl Hangover, since other teams are competing for playoff spots.

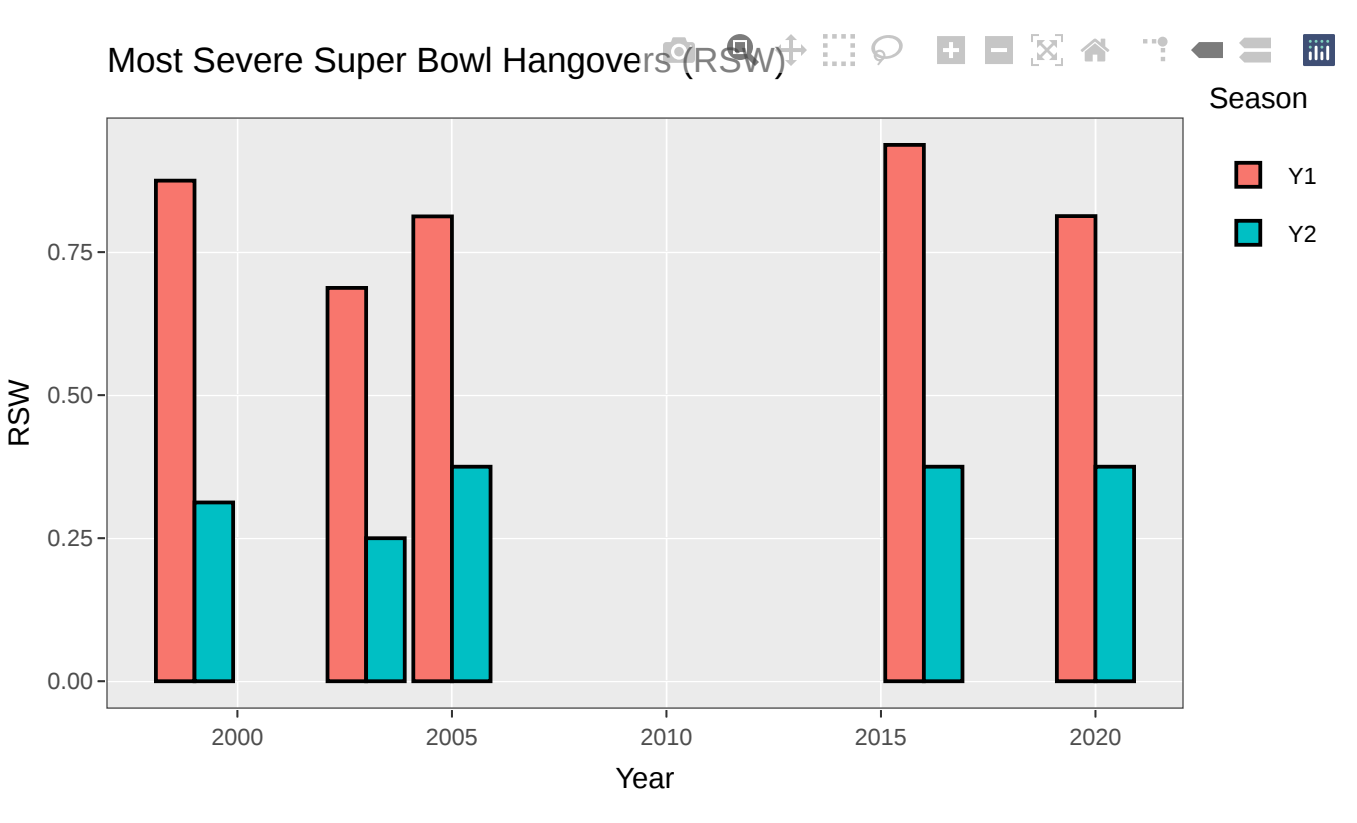
3) Player Contracts

The NFL sets a salary cap for each season, which limits the amount each team can spend on players. Players that were recently drafted generally cost less, since they are playing on a rookie contract. Some of the more established players may have larger contract sizes, which affects their team's spending. Every offseason teams have to make the difficult decision to re-sign, release, or trade certain players. If several of the best players have expiring contracts in the same year, it is rare that a team has enough room to bring them all back. This leads to players leaving, and rosters changing, which can have large impact on team performance.

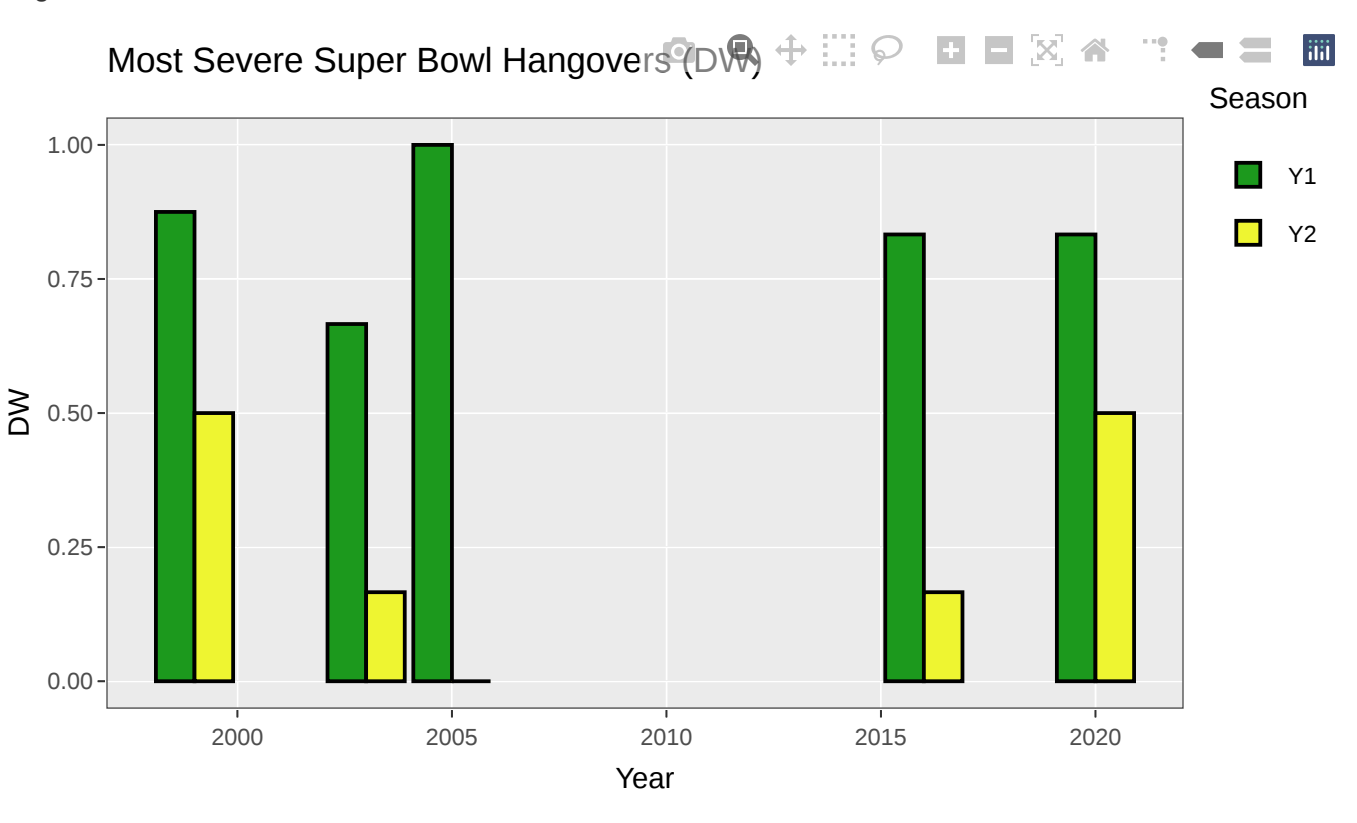
Which Teams Experienced the Worst Super Bowl Hangovers?

When measuring the severity of a Super Bowl Hangover, I chose two factors to look at: Regular Season Win Percentage (RSW) and Division Win Percentage (DW). In any given NFL season, a team will play against their divisional opponents multiple times. However, divisional games account for less than half of the total games in a season.

The 5 most severe hangovers experienced a RSW decrease of at least 40% and a DW decrease of at least 30%. Using side-by-side bar charts, we can display the difference in win percentage from each team's Super Bowl season (Y1) to their hangover season (Y2). You can mouse over the bars for more information.



We notice a consistent decrease in RSW from Y1 to Y2 in each instance. There are not any easily recognizable outliers in this chart. The two largest RSW decreases were 56.3%, which occurred in both 1999 and 2016.

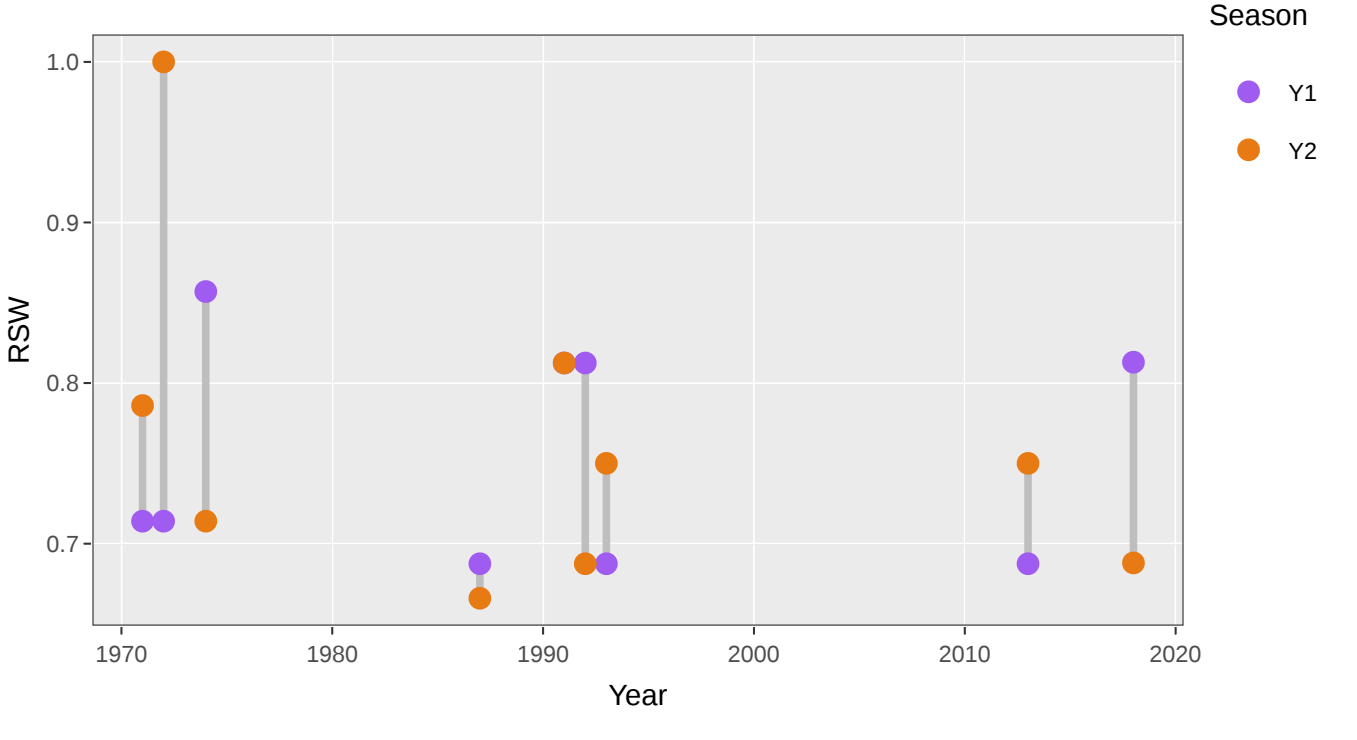


In the DW plot we notice more decreases, but there is a major outlier in 2005. The Philadelphia Eagles went from a 100% DW to a 0% DW, which is the largest decrease possible. This is the only example of a hangover with a 100% decrease in either DW or RSW since the Super Bowl began in 1967.

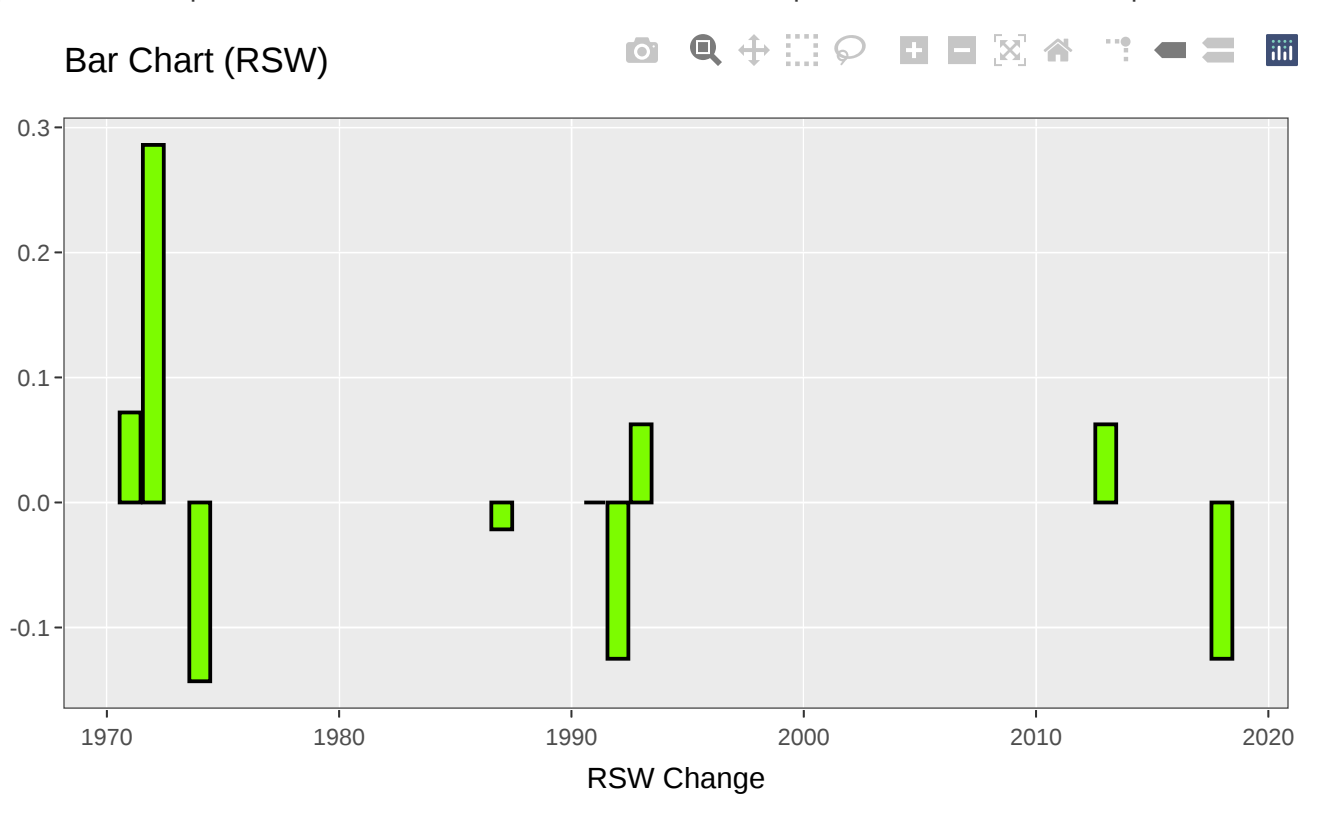
Have any Teams Avoided a Super Bowl Hangover?

The figures shown earlier prove how difficult it is to replicate the strong performance of a Super Bowl season. However, there are examples of teams that maintained or even improved on their success. The first way to classify avoiding a Super Bowl Hangover is by looking at the teams who won multiple playoff games the following year. After filtering the data for teams with 2 or more playoff wins in the following season, we can produce different plots to display their success.

Hangovers Avoided (2+ Playoff Wins)



Dumbbell charts are an effective way to show changes between two data points. The chart above shows a variety of RSW increases and decreases, including an instance for 1991-1992 in which a team kept their exact same win percentage from the prior season. One of the most impressive accomplishments is shown in 1972 when the Miami Dolphins rebounded from a Super Bowl loss to achieve a perfect season.



One feature that helps show the variance of positive and negative values is creating a bar chart that includes negative values on the y-axis. This figure provides another view of RSW changes for teams that won multiple playoff games the year following a Super Bowl loss.

Winning multiple playoff games after a previous Super Bowl loss is a great accomplishment, but the best way to avoid a Super Bowl Hangover is to win the Super Bowl the next year. Only three teams in the Super Bowl era have done this, and they are listed in the table below.

Hangovers Avoided (Won Super Bowl Next Year)

	RS_Wins	Division_Wins	RSW	DW
1971 Dallas Cowboys	1	2	7.2	25.0
1972 Miami Dolphins (+)	4	3	28.6	37.5
2018 New England Patriots	-2	0	-12.5	0.0

Positive numbers indicate an increase, negative numbers indicate a decrease.

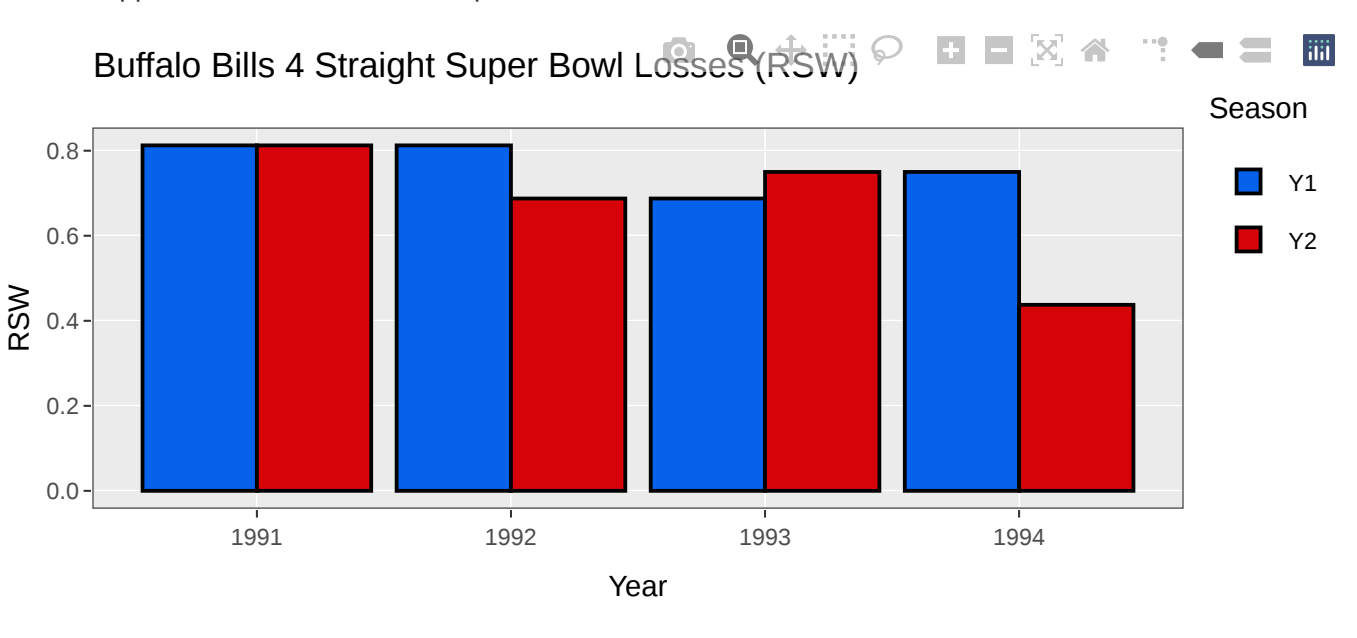
RS_Wins: Change in number of regular season wins
Division_Wins: Change in number of division wins
RSW: Change in regular season win percentage
DW: Change in division win percentage
(+): Only perfect season in NFL history (14-0 regular season, 3-0 playoffs)

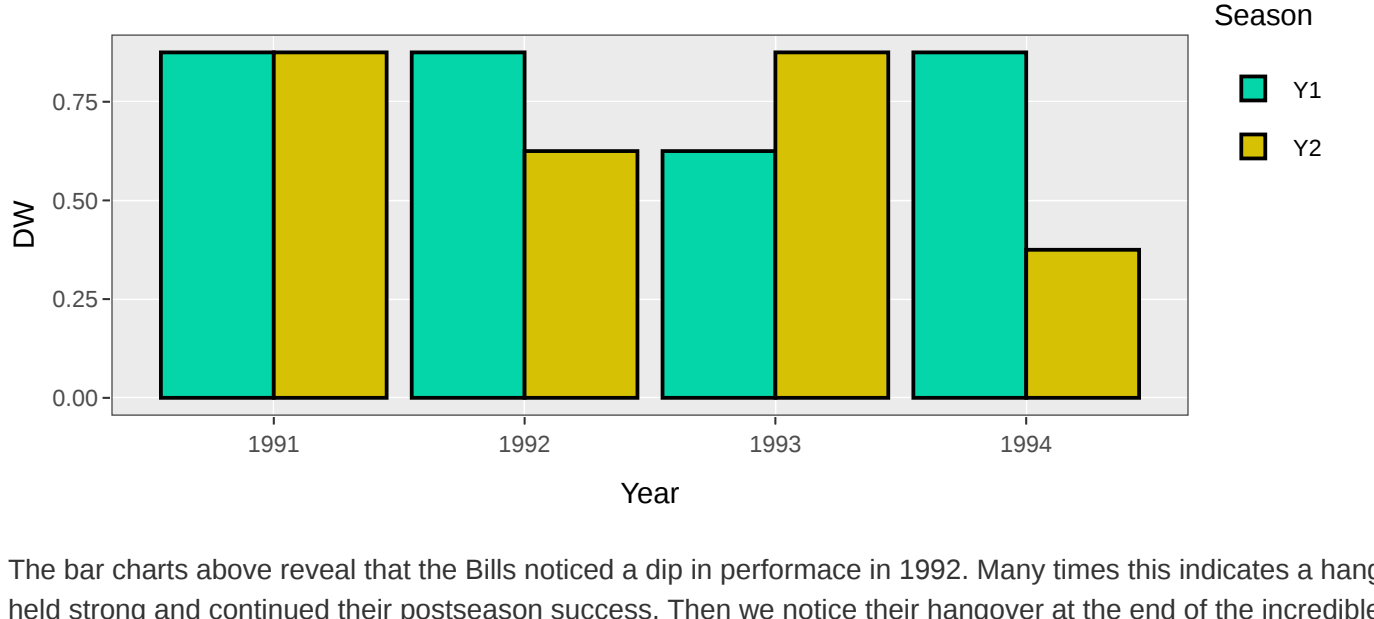
Surprisingly, most of the teams above were able to increase their RSW and DW the year after their super bowl loss. The first two instances occurred in consecutive years, then there was a 46 year gap until the next observation. These teams were able to overcome their Super Bowl loss, and are the rare exception to the Super Bowl Hangover.

1991-1994 Buffalo Bills

One of the most unique four year stretches in NFL history took place in the early 1990s, when the Buffalo Bills reached four consecutive Super Bowls and lost them all. Although they were not able to break through for a championship win, their consistency year after year is worth admiring. The Bills had four opportunities for a Super Bowl Hangover, and managed to avoid the first three. Unfortunately they suffered a hangover in 1994, and have not returned to the Super Bowl since.

The side-by-side bar charts below demonstrate three years of resiliance from the Bills, followed by their hangover in 1994. Buffalo remains the only team to appear in four consecutive Super Bowls.





The bar charts above reveal that the Bills noticed a dip in performace in 1992. Many times this indicates a hangover the following year, but Buffalo held strong and continued their postseason success. Then we notice their hangover at the end of the incredible four year run.

Conclusion

The ability to collect, filter, and present data in useful ways is a very valuable skill to learn. Using the tools provided by R programming language, I arranged the data in ways that give a clear breakdown to both dedicated NFL fans and people unaware of the league. Through the use of various packages and optimizations, my project gives insight to the term "Super Bowl Hangover" and tests how credible this trend is.

After looking at the data from different perspectives, we found that most teams struggle to repeat the success they had in their Super Bowl season. Although just 21 of 54 teams had a Super Bowl Hangover (38.8% of teams based on our criteria), there were 40 of 54 teams that had a lower regular season win percentage the following season (74.1% of teams). Of course there are exceptions to this theory, most notably the 1970s decade and the 1991-1994 Bills, but overall, these hangovers have been a legitimate trend since the Super Bowl began. I learned plenty about the NFL while creating this project, and will be keeping an eye on the Kansas City Chiefs next season to see if they become the next victim of the Super Bowl Hangover.