Bryant University

HONORS THESIS

The Biggest Loser: How Tanking in Professional Sports Impacts Fan Perception

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ABSTRACT

Professional sports teams are adored nationwide for their talents and the pride they bring to their city for their efforts. However, not all teams take this responsibility seriously and will lose on purpose, or tank, to gain a higher draft pick in the future. Although the long-term goals of tanking are to help the organization, many people take issue with athletes not putting in their best efforts in every game. Teams in both the NBA and NFL are guilty of tanking to gain better draft picks but not all have found success in this process. This leads to important questions such as: “Does fan response dictate the decision to tank?”, “Does tanking affect revenue of teams?”, and “Is there any statistical evidence to show that tanking will result in future success for these teams?”. By taking a statistical approach, teams can weigh the potential outcomes of tanking, and if it is something they should consider late in the season. Tanking is a major issue across all sports, and it is important to understand the social as well as statistical outcomes of tanking a season.

INTRODUCTION

Tanking in professional sports is not a new concept. The first well-documented case of tanking was the 1983-1984 Houston Rockets. They finished last in the NBA that season after a rough start, which allowed them to draft Hakeem Olajuwon, one of the greatest centers the NBA has ever seen. The NBA and NFL are the greatest culprits of tanking, with fans rallying behind the idea shouting saying such as: "Tank for Tua!" and "Suck for Luck!" in the NFL and "Trust the Process!" in the NBA. However, not every fan agrees with these decisions to tank, even if there are promises of success for future seasons. Teams tank when they realize that they cannot win a championship or make the playoffs in the current season, so they want to have a better draft pick to rebuild their teams. In most professional sports organizations, teams have some variation of a reverse order draft pick so that teams that do not do as well have the opportunity to draft better talent. Fans have an allegiance to their team and have expectations that their team is there to try their best and compete at a high level. This study was conducted with the goal to try to understand how tanking affects the fans and if this result is significant enough for teams to consider. The revenue and attention that fans bring to a team cannot be ignored, and if fans decide to end support for their team because the team tanks, this loss of support cannot be ignored by the organization.

LITERATURE REVIEW

Why and How to Tank

To start the discussion of tanking, I began my literature review looking at why teams tank and how poorly a team must finish to potentially reap the benefits of tanking. Starting with the NBA, I found many articles from *The Journal of Sports Economics.* The first article I found is titled "Tournament Incentives, League Policy, and NBA Team Performance Revisited" by Joseph Price. From this article, I learned that teams are more likely to tank at the end of the season when there is a high probability, they will finish last. While this article only evaluates teams up to 2007, the practice of tanking still exists in the same form today. This article was relatively straightforward in their reasoning for why teams tank, but it is important to

understand that even with a more in-depth analysis of players and teams, tanking at its core is a way for teams to get better draft picks and rebuild their team.

The second NBA article from The Journal of Sports Economics I referenced is titled "Does It Pay to Build Through the Draft in the National Basketball Association?". This article looks to answer the important question: is it better to tank and draft talent or focus more on player development and trades? After reading this article, I learned that the draft picks do not matter as much as the draft pickers. The owners and general managers play a great role in the success of a team's tank because they are actually choosing the draft picks. Some GMs might believe that they know best when choosing potential team members, but these athletes may not perform as expected or face injuries.

Another article I used from *The Journal of Sports Economics* is titled, "Corruption in College Basketball? Evidence of Tanking in Postseason Conference Tournaments." Although this article focuses more on college basketball, the concept of tanking here is the same. Many college coaches become professional coaches and many college basketball players will play professionally, therefore these ideas of tanking at the college level extend to the NBA. This article explains the idea of fitness saving, or "load management", which is when an NBA team chooses to rest their star player in easy win games, back-to-back games, or end of season games. This is used for star players who are more injury prone in an attempt to keep these athletes healthy for the postseason, or in the case of tanking, keep them healthy for a future season. Load management is a commonly cited reason in the NBA for resting a player, therefore, a tanking team could easily use this as an excuse to rest their best players and tank the season. The NBA has very few rules against load management outside of the rule that if the game is being nationally televised, the best players need to be playing unless there is a clear injury (Bernstein). A tanking team's game would likely not be nationally televised; therefore, this rule is very easy for teams to get around. This idea of load management is not just common to the NBA; it can be found at the college level as well, which perpetuates these ideas. The athletes that move on to the NBA may bring these ideas of tanking to the big leagues. They might request more time off for load management or play down when their

team is out of playoff contention because these were ideas taught to them in college basketball.

Draft and Lottery in the NBA and NFL

One of the ways the NBA and NFL have tried to discourage tanking is that these leagues will change the draft rules. The NBA has recently implemented a lottery system instead of a reverse-order draft, so that teams are not guaranteed the best draft picks so there is less incentive to tank. This change in the draft system came as a result of consistent tanking in the NBA since, before this change, the team that came in last was guaranteed the first pick, the team that came second to last got the second pick, and so on under the winner of the championship picked last in the first round. With the original system, there was greater incentive to tank because a team was guaranteed a certain draft pick. With the new lottery system, a team that performed worse is more likely to get a higher draft pick, but no draft pick is guaranteed. This creates less incentive to tank because not only would the team have a worse record and upset their fans, but they may also not get a high draft pick to help them perform better in future years.

Even though the NBA has adapted draft changes to try to prevent tanking the NFL has not made such changes despite tanking being just as severe of a problem. The NFL still operates in a reverse order draft pick with the last place team picking first and the Super Bowl Champion picking last. One factor that can change the expected draft order is that teams in both the NBA and NFL are allowed to trade draft picks. This can both help and hurt tanking issues in the NBA and NFL since tanking teams can trade away top talent for draft picks, but they also may decide not to tank and use their draft picks to trade for talent.

New Emphasis on Sports Analytics

In general, there has been increased concerns about the emphasis on analytics in sports. Many fans want to keep the game more “traditional” and have coaches rely less on new statistics. The decision to tank falls under this focus on statistics as coaches and managers might see more statistical benefits from having a losing season and rebuilding than trying to have a winning season. In my conversations with Professor Lamere, we discussed these potential

ethical issues with sports becoming so heavily based on analytics that it takes out the human aspect of the sport. If sports decisions are based purely on statistics, it results in players being treated as pawns rather than human beings. This also can take fan enjoyment out of the game because decisions are made by using numbers rather than letting the talented athletes play the game. Removing the human aspect is not the only potential issue; there are issues with having such a large sum of data on the players in general. One article I found on this topic is titled, "Big data in sport analytics: applications and risks" in which the author discusses potential privacy issues with big data in sports. This article talks more specifically on track and cycling athletes, but the concern in the article applies to all sports: having a large amount of personal data on the athletes' health and injuries can be dangerous since the data can be leaked creating a major ethical issue. If there was a data leak it could also create unfair advantages for opponents because they would know private health information and injury status. For example, if data on a football player's injury status is released, opponents may learn that an injury is not healing as fast and may target that part of the player when going for a tackle. This creates a dangerous game for all athletes involved if there are not strict rules and security for data collection. Although this does not directly apply to tanking, it does highlight that increasing data collection can have major risks involved.

Another important article I found about risks in sports is titled "The Application of Risk Management in Sports". This article is important in my research because it discusses the physical and mental effects sports can have on a player. From one perspective, this article is in favor of tanking because it recognizes the dangers of always playing at a stop level and acknowledges that "load management" (resting best players in easy win games as explained earlier in the literature review) can be very beneficial to a players mental and physical health, but it can also be abused as a way to help teams tank. From a different perspective, this article is against tanking because mentally, tanking can take a toll on players because fans react negatively and there are potential repercussions from the league for their actions. Players may feel pressure from their organizations to not play at their best ability, which can add stress to meet certain expectations.

Recent Taking Cases

In talking about tanking in professional sports, one of the most notorious cases of tanking is the Philadelphia 76ers and "The Process". The 76ers and their plan showcases both the benefits and the disadvantages of tanking. For the 76ers, their fans rallied behind the tanking plan, and they developed the phrase, "trust the process". However, over seven years later, the 76ers have yet to make the NBA finals and live up to their expectations through their tanking plan. The 76ers also show the dangers of relying on draft picks since one of their keys first round draft picks, Markelle Fultz, was injured and never played for the 76ers. During the 2021-2022 season, the Sixers have since traded away one of the stars of "The Process", Ben Simmons, for James Harden. The 2021-2022 season is not over yet so it is unsure the fate of the 76ers, but it is clear that when the city of Philadelphia started to "trust the process" back in 2015, they did not think it would take this long to potentially bring a championship back home.

The Sixers are not even the only Philadelphia team that is guilty of tanking in the 21st century. The first NFL source discusses the most recent issue of tanking in football: the 2020 Philadelphia Eagles. At the end of their last regular season game, the Eagles took out the starting quarterback and other key players to lose the game, which will consequently give them a higher draft pick. Many fans of both the Eagles and other teams were upset by this clear case of tanking. The NFL contends that everyone on the field and their coaches must be giving the game their best effort, which the Eagles did not. This reaction is much different than the NBA fans' reactions, especially in Philadelphia. The NBA and 76ers fans appeared to be frustrated with tanking at first but could see long term benefits with their optimistic "trust the process", but Eagles fans did not react the same way because of the Eagles GM, Howie Roseman, and his poor drafting history. This shows the divisive nature of tanking that the same fans may have different reactions to the teams in their cities tanking.

Tanking has also played a major role in the recent lawsuit against the NFL. Former Dolphins' head coach Brian Flores is suing the NFL for racism in their hiring process, and in this lawsuit, Flores cites that he was incentivized to lose. The wonder of the Dolphins, Steven

Ross, offered Flores $100,000 for every loss that season, and Flores was scolded by the general manager for success late in the season. Flores was the coach during the Dolphins "Tank for Tua" phase. Tua Tagovailoa was one of the stars of the 2019 draft class but suffered an injury that put his football career in jeopardy. Since Flores did not take the incentive to lose games late in the season, the Dolphins had the 5th pick in the draft instead of the 1st. The first pick of the draft was the Bengals who picked Joe Burrow and went to the Superbowl a few years later, whereas the Dolphins were over .500, but were not playoff contenders. This shows the delicate nature of tanking: the Dolphins tanked enough to think they had a great draft pick, but Flores was not willing to compromise his integrity or the integrity of the team for four picks higher. However, given the performance of Burrow vs. Tagovailoa in the last two seasons, there are obvious differences in performance.

Revenue and Fan Sentiment

I will be looking at a variety of metrics for my thesis; the first major category is looking at fans' responses to tanking. The first resources that I found for this topic are attendance records for the NFL and NBA for the last 20 years. These sources are helpful in determining fan reaction to tanking. For example, the Philadelphia 76ers were among the lowest ranked in attendance in 2016, placing 28th out of 30th. However, by 2019 they had the highest average attendance in the league that year due to newfound success after their tanking period. Similarly, I have been able to find the NBA's announcements regarding jersey sales for teams as well as revenue numbers in the NFL in the last few years. These values will paint a broader picture of fan support after multiple seasons of tanking. I discovered an article detailing various sponsorships for the NFL, which will help give a perspective on whether tanking has an impact on viewership and the league as a whole. From the article, it appears that despite regular tanking in the NFL, teams continue to make billions off sponsorships, showcasing that corporations are not concerned with any potential backlash from tanking. This is important to my research because it shows that despite the league efforts to decrease tanking, companies are not discouraging this behavior, therefore teams may feel as if they can tank without repercussions from sponsors. From these articles, it is evident that fans react to tanking severely in the short run. In the long run, they support the team's decisions to tank while attendance, revenue, and merchandise sales increase. This article shows some

preliminary fan response to tanking, and my survey's relationship with this data is further explained below.

METHODOLOGY

When researching the topic, one of the key metrics to consider was fan sentiment about tanking. Although tanking has been around for years and many teams have attempted to create a championship team in this process, not all fans may agree with this desire to tank. This led to the creation of a survey to measure fan sentiment. This survey was focused on the NBA and NFL tanking and fan opinions. I wanted to investigate if fans would watch these teams tank, buy tickets for these teams, or buy merchandise. Other factors that went into this survey were the region, gender, age, and favorite sports team, which were the last questions asked. The survey was distributed on Qualtrics and had 17 different questions regarding tanking knowledge, tanking opinions, and demographics. I sent this survey to family and friends as well as posting on social media. After extensively cleaning the data, the survey resulted in 84 complete surveys to be used for analysis.

To start the survey, I wanted to get a better understanding of the respondents' familiarity with tanking. The first two questions I asked were:

- Are you familiar with the concept of "tanking" in professional sports?
- Tanking is defined as "the practice of intentionally fielding non-competitive teams to take advantage of league rules that benefit losing teams". Do you know of any professional sports teams who have "tanked"?

Respondents could answer yes, no, or maybe. Tanking is a common phrase used in sports, but not everyone would be familiar with it so I wanted to provide a definition for respondents to reference if this was their first time hearing the concept or did not realize that this practice had a name.

The next three questions continued to ask about what respondents knew about tanking:

- What NFL or NBA teams do you know of that have tanked?

- Have you ever heard of a case of tanking outside of the NFL or NBA?
- If so, what teams have you heard of that have tanked?

They could fill in specific teams for the first and third question and yes, no, or maybe for the second question. The next grouping of questions was to further gauge fan perception of tanking. These questions included:

- Does a team tanking impact your perception of that team?
- Do you support NFL teams tanking?
- Do you support NBA teams tanking?
- Do you support any teams tanking?
- What is your favorite professional sports team?

The first question has choices: Tanking makes me significantly dislike the team, tanking makes me somewhat dislike the team, no impact on my view of the team, tanking makes me somewhat like the team more, and tanking makes me significantly like the team more. The next three questions had answer choices: Never, maybe, but only if it is my favorite team, maybe, but only if it is a team I do not support, yes, but only if it is my favorite team, yes, but only if it is a team I do not support, and always. The last question asked in this section was a fill in for fans to include their favorite team. As mentioned in the literature review above, Philadelphia sports teams are notorious for tanking cases so I wanted to determined if fans of Philadelphia sports were more lenient about tanking compared to fans of other sports team.

The next group of questions were on a sliding scale of 0-10 with 0 being extremely unlikely, 5 is neutral, and 10 is extremely likely. These scale questions were asked in two groups: the first group applied to the NFL and the second applied to the NBA. The questions included:

- Buy tickets to a NFL game?
- Buy tickets for a NFL team that has previously tanked?
- Buy tickets for a NFL team that is currently tanking?
- Buy merchandise for a NFL team?
- Buy merchandise for a NFL team that has tanked?

- Watch a NFL game on TV?
- Watch a NFL game on TV if one of the teams are tanking?
- Stop supporting your favorite NFL team because they tanked?
- Start supporting a NFL team because they tanked?
- Play fantasy football?
- Play fantasy football if NFL teams are tanking?

These exact same questions were asked about NBA and basketball teams.

When analyzing the data, the first steps I took were to run different one-way analysis of variances, ANOVAs, to see if certain tanking categories could be used to pick the age. A one-way ANOVA is used to compare means of two independent groups using the F-Distribution. When using an ANOVA, the null hypothesis is that the means are equal, and if the result is significant, the means are unequal. I also ran MANOVAs, which are multiple ANOVAs, or ANOVAs with more than one dependent variables. MANOVAs require there to be at least five responses per category, so for some of the tests, I could not use all 84 responses since some categories did not have enough responses. Typically, .05 is used as a significance level for these tests. The significance level is defined as how likely you would be incorrect to assume a statistically significant relationship. For .05, this means that you would have a 5% chance of concluding that there is a difference between means when there is actually no true significant difference. However, .05 is just an arbitrary number, and statisticians can use a variety of significance levels. For this thesis, I used the Bonferroni correction to determine my significance level. The Bonferroni correction is used when performing multiple tests on the same data set as I did for this project. When performing many tests on the same data set, it is hard to assume one level of significance for all tests. As a result, the Bonferroni correction lowers the significance level to minimize the risk of a spurious significant result. To calculate the new significance level, you take the original significance value and divide it by the number of tests. For my results, I performed 103 tests, so by taking .05 divided by 103, the significance level I used for my analysis was .000485. By using this as my significance level, I can limit the risk of assuming a significant difference between the means when there was no

true significance. All the ANOVAs and MANOVAs were run in RStudio. Complete outputs with p-values can be found in Appendix A.

Data Issues

Despite my best attempts to spread the survey to as many participants as I could, I did struggle to get a variety of data, specifically for the regions. I struggled to get participants from all over the country, and there were two clear regions represented in my results: New England and the Mid-Atlantic regions. This led to some potential relationships between tanking opinions and favorite teams since most people from the Mid-Atlantic would be familiar with the 76ers tanking story and would respond to familiarity with tanking and may be more supportive of tanking. This is one of the key reasons that in the survey, I considered favorite sports teams as an important variable for analysis. I also had some issues with cleaning the data because Qualtrics would automatically submit a survey after a week, so many initial survey responses were invalid because they were incomplete. For my analysis, I needed five responses in each category to run proper tests, and which I did not always have for every category as I explain in my results below. However, I do believe that there was enough data to reach useful conclusions for the purposes of this thesis.

RESULTS

Age

When thinking about the results of this study, age was one of the main variables that I was interested in looking for significant relationships. I had 84 respondents, with a little over half in the 18-30 age group. This breakdown was important because I was hypothesizing that older generations may feel a different way about tanking compared to younger generations, and I had some variability in the ages with respondents ranging from 18 to 78.

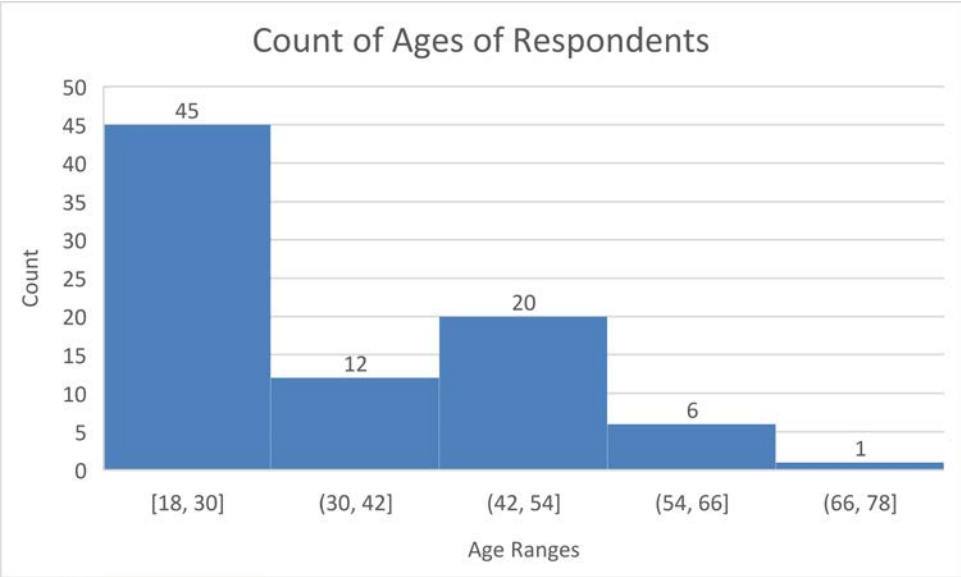

Figure 1: Histogram that shows the age range from the survey results. More than half the respondents fell into the 18-30 age category.

I started with age and ran eight different ANOVAs to look for any significance between tanking opinions and age. I had hypothesized that older fans of sports would be less tolerant of tanking than younger fans since older fans may have more traditional views of the sport. For these tests, I looked for a significance difference in the means of tanking support and familiarity with tanking based on age. I initially ran ANOVAs on the individual ages, but none of these ANOVAs produced significant results.

Since running tests on the individual ages did not produce significant results, I next looked at two age categories: college age and out of college. I grouped 18-23 year old respondents as college age and those older than 23 were considered out of college. Based on this breakdown, 45% of my respondents were in college and 55% were out of college. Since I was now using two groups, I began my MANOVA analysis. To my surprise, grouping ages by category did not produce significant results. I looked at difference between the mean likelihood to support teams, buy merchandise, buy tickets, and watch games for both the NBA and NFL when teams are tanking versus not tanking. Figure 2 is a boxplot showing the median likelihood that respondents would buy NBA merchandise in general and buy NBA merchandise if teams are

tanking. The p-value of this MANOVA was .5801, which was not a significant result since it was well above the .000485 significance level set by the Bonferroni correction. When reading the boxplots such as the boxplot in Figure 2, the line within the box represents the median. The box represents the middle 50% of the data, with the tails representing the other 50%. Dots on these plots represent outliers in the data. These boxplots show the difference between the means as well as the variability in the responses. The x-axis of the boxplots are the different dependent variables, and the scale on the y-axis is the likelihood of respondents to buy tickets, watch games, support teams, or as in Figure 2, buy merchandise for NBA teams.

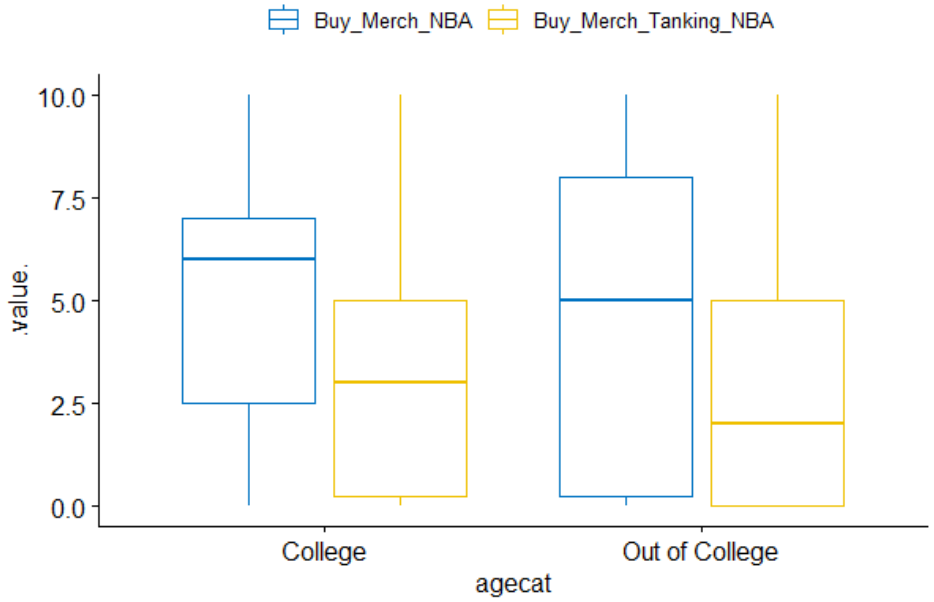

Figure 2: This boxplot shows the relationship between different age categories and their likelihood to buy NBA merchandise in general and if the teams are tanking. This MANOVA did not produce significant results with a p-value of .5801. Both those in and out of college have similar mean likelihoods of buying NBA tickets for teams playing at their full capacity and lower, but similar means, of buying tickets for NBA teams that are tanking.

Age also ties in closely with region as the sports history in the two main regions represented could influence the responses. For the New England region, Boston sports has had more success in recent years, largely due to Tom Brady and the Patriots, starting around 2001. Therefore, college age New England sports fans and have only known success, whereas older New England fans have had more ups and downs watching their teams. For fans from the

Mid-Atlantic region, Philadelphia and even some New York teams (with the exception of the Yankees), have had a lot fewer championships and less consistency. I grouped age category and region to look for any significant differences between the means for these groups. This created four groups: Mid-Atlantic college students, New England college students, Mid-Atlantic out of college, and New England out of college. Despite hypothesizing that region and age would have a significant difference on tanking opinions, the results showed differently. I performed the same MANOVAs as I did for the age categories, and similarly, there were no significant results. Figure 3 below depicts the relationship between region and age category and the likelihood that respondents would stop supporting teams if they tanked. For this relationship, a lower value means that the respondent was not likely to stop support, or they would still support teams if they tanked. The low median values show that in general, fans would still support teams even of they tank. There is a lot more variability in the results for support of NFL compared to NBA. This shows that fans may be less tolerant of tanking in the NFL compared to the NBA. This MANOVA resulted in a p-value of .5414, which means that the relationship is not significant. In Figure 3, most of the respondents would continue to support teams even if they tank, although there is some variability for the NFL.

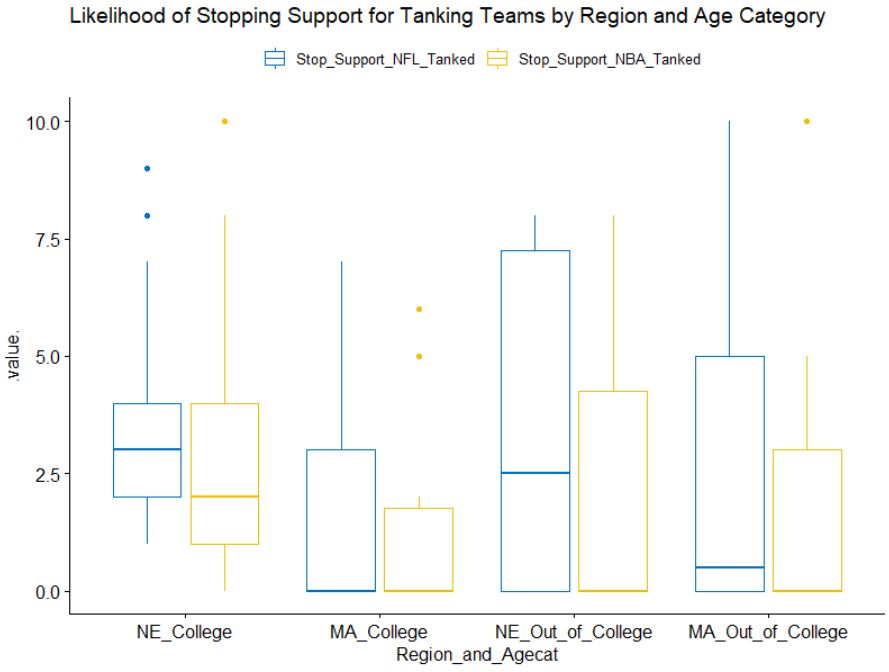

Figure 3: Boxplot depicting the relationship between the region and age categories and the likelihood that the respondents would stop supporting NFL and NBA teams if they tanked.

This MANOVA did not produce significant results with a p-value of .5414. There were no significance differences between the means.

Although there were no significant differences between means for any of the ANOVAs MANOVAS run for individual ages and grouped ages, these results are very important. When thinking about fan perception of tanking, I had assumed that older fans would have a greater problem with tanking. Although tanking is not a new phenomenon, older fans tend to prefer a more traditional game, a game without statistics telling teams to tank. I also had expected that region combined with age would produce significant results given the history of sports in the regions. However, even adding region to the age data did not have significant results. These results from my survey did not corroborate these usual assumptions, which was a different conclusion than I expected.

Gender

Since age did not produce noteworthy results, I looked for any differences in means for gender. Of the 84 respondents, over ⅔ identified as male, 29% identified as female, and 1% identified as non-binary.

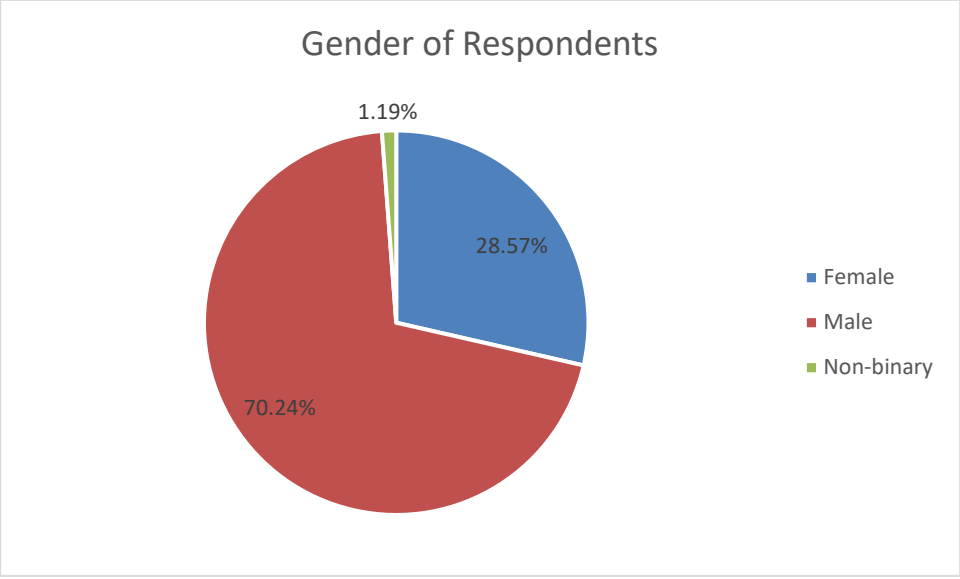

Figure 4: Pie Chart showing the different percentages of gender the respondents identified as. The majority of respondents identified as male, and female and non-binary respondents made up approximately 30% of the respondents.

For this part of the analysis, I used MANOVAs. As mentioned above, for a MANOVA to be viable, there must be at least five responses in a category, so I could only use the responses for male and female since only one respondent identified as nonbinary. My first MANOVA looked to see if there was a difference between watching NBA and watching NFL based on gender. This was just to get a general understanding of the data and if my survey respondents had certain preferences about watching sports that could impact other results. If certain genders watched one sport more than another, it could impact their tanking opinions of that sport. However, there were no differences between the means for watching NBA and watching NFL.

Next, I wanted to look at ticket buying habits based on gender. There were no differences between means when looking at NFL tickets, but there is a significant difference between means when looking at NBA tickets. Figure 5 below shows that on average, women are much less likely to buy tickets if a team had previously tanked compared to men. Both men and women are less likely to buy tickets for teams that are currently tanking, which shows that people are not likely to buy tickets for a team that they know is going to lose. The p-value from this MANOVA was 0.0001071which indicates that there is a significant difference between means.

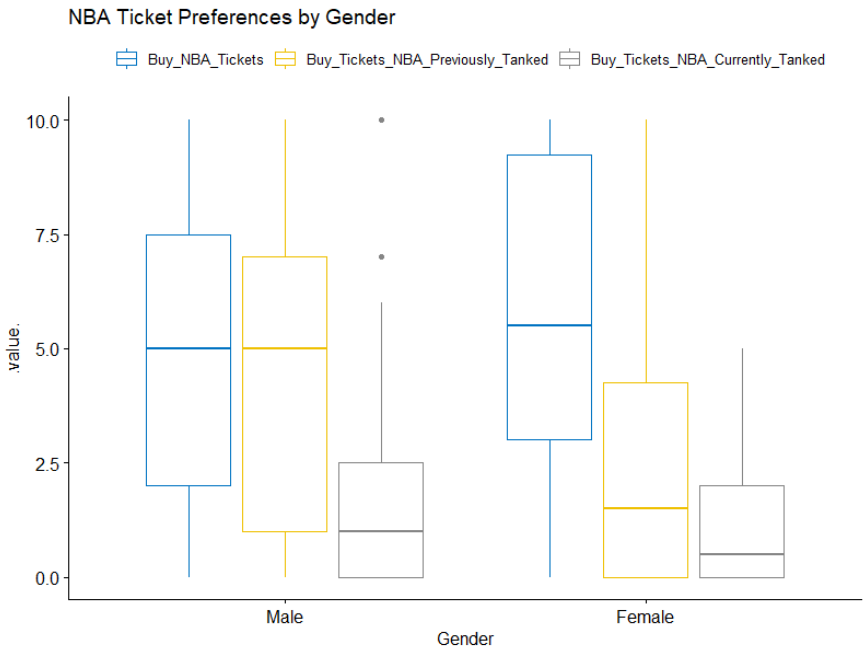

Figure 5: NBA Ticket Preferences based on Gender. There is a statistically significant difference between the means with a p-value of 0.0001071, This is evident in the difference between men and women for opinions on buying tickets when a team has previously tanked as women are less likely to buy tickets if a team has previously tanked. In general, there is a decrease for both men in women in the likelihood that they buy tickets if the teams are currently tanking.

Next, I looked for any significant differences for buying merchandise for NFL and NBA teams in general and tanking NFL and NBA teams. These MANOVAs showed that there is no statistically significant difference between the means when looking at buying NFL and NBA merch by gender. After looking at merchandise preferences, I next looked at watch preferences comparing watching NFL and NBA regularly and when a team is tanking. Neither NFL nor NBA produced significant results. From there, the next step was to run two MANOVAs using gender and if fans were inclined to start or stop supporting NFL and NBA teams if they were to tank. When looking if fans would start supporting teams because they tanked, there were no significant differences in the means based on gender. The results were also not significant when investigating if fans would stop supporting teams if they tanked.

The final set of MANOVAs I ran for just gender looked into playing fantasy football and fantasy basketball. When I looked at fantasy football, there were significant differences between the means. This MANOVA produced a p-value of 0.000253. These results were largely driven by the fact that in general, men are more likely to play fantasy sports, however, the figure below shows that even if a football team is tanking, men will keep playing fantasy football as shown by the very small decrease from play fantasy football and play fantasy football tanking for men in Figure 6. There were no significant differences when looking at fantasy basketball, and this could be partially driven by the fact that fantasy basketball is not as popular as fantasy football.

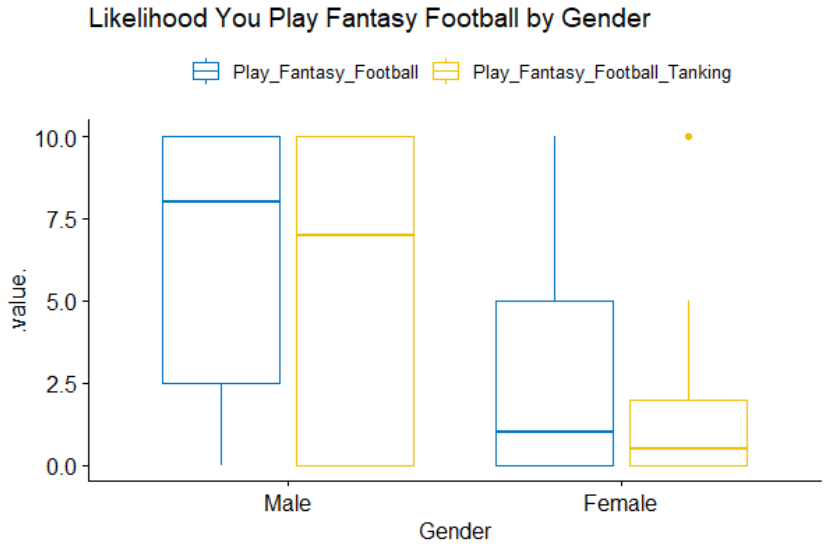

Figure 6: Boxplot of fantasy football characteristics based on gender. This MANOVA produced a significant p-value of .000253. On average, men are more likely to play fantasy football regardless of teams tanking, and women are not likely to play fantasy football.

Since looking at fantasy preferences by gender produced such statistically significant results, I decided to combine gender and fantasy football preferences. This created four groups: female and play fantasy, female and do not play fantasy, male and play fantasy, and male and do not play fantasy. If the respondent had a likelihood of five of less, I considered them non-fantasy players and those greater than five I considered fantasy players. I wanted to investigate fantasy football further because of the nature of fantasy football. When playing fantasy

football, there is often a monetary commitment as well as a time commitment as individuals research NFL players and keep up to date with their performances to build the best team possible. If individuals are willing to put money and time in to play fantasy, they are likely big football fans, and I was curious if these superfans felt strongly one way or another about tanking. I ran the same MANOVAs as I did for the basic gender data and found two statistically significant results. The first MANOVA looked at likelihood of buying NBA tickets if teams are tanking. This produced a p-value of .0004124. Looking at Figure 7 below, fans that do not play fantasy football are more offended by tanking than those who play fantasy football. Those who play fantasy and are sport superfans may see more value in tanking than those who do not play fantasy. However, even those who do play fantasy are unlikely to buy tickets to a game where the team is tanking.

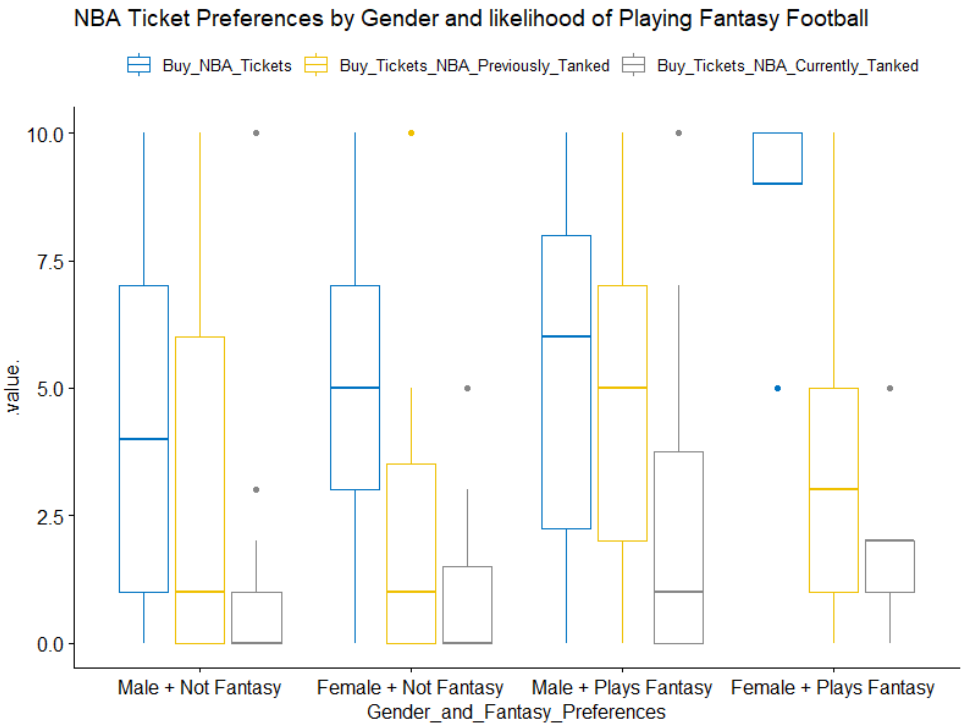

Figure 7: Boxplot showing the likelihood of buying NBA tickets by gender and fantasy football preferences. There is a significant difference between the means as those who do not play fantasy are highly unlikely to buy tickets to an NBA game if they teams are currently tanking or have previously tanked.

The last MANOVA I completed for gender and fantasy football looked at the likelihood of watching NFL games if teams are tanking or not. This MANOVA produced a significant p-value of 0.0003798. The boxplot in Figure 8 shows that most respondents were unlikely to watch a fantasy football game if the teams were tanking. However, males who play fantasy football were neutral on watching NFL games if teams are tanking. The most dramatic difference in means is for females who play fantasy football as those respondents were highly likely to watch an NFL game in general, but if the teams are tanking, there was a significant decrease in likelihood of watching an NFL game.

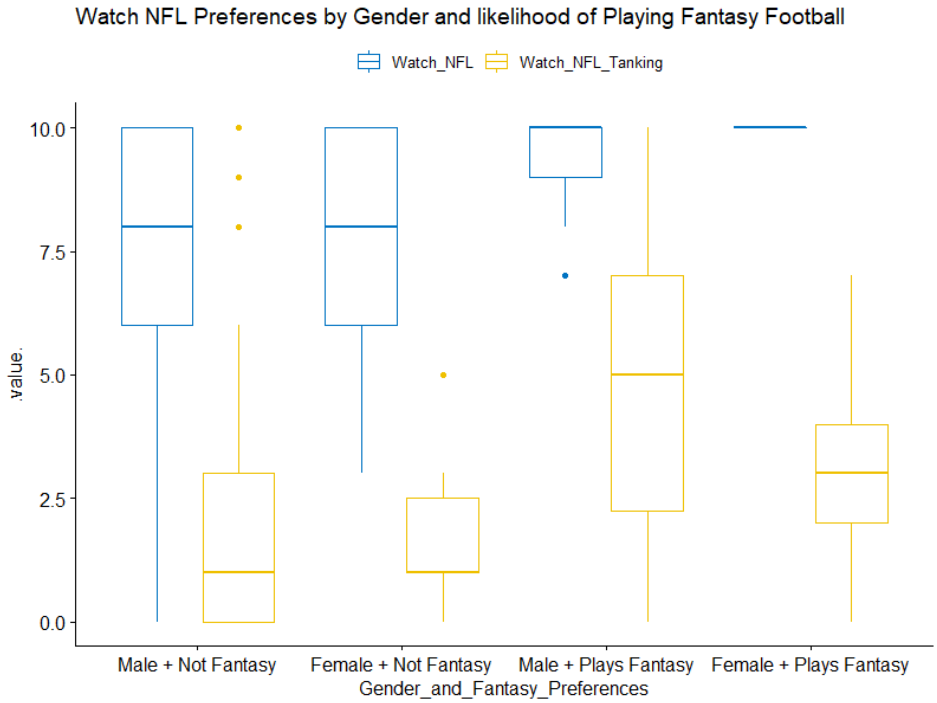

Figure 8: Boxplot of the likelihood respondents watch NFL games in general and when teams are tanking based on gender and if they play fantasy football. This MANOVA produced a statistically significant p-value of .0003798. Most of the respondents were likely to watch an NFL game, but fans are less likely to watch an NFL game if the teams are tanking.

Region

Next, I looked at region of the survey respondents since as shown in the literature review above, teams such as the Philadelphia 76ers and Eagles are guilty of tanking and their regional fan base may have different opinions. From the survey responses, two clear regions

were represented the most: the Mid-Atlantic region and the New England region. This is largely due to my family being from Pennsylvania and my classmates being from New England. Figure 9 below shows the breakdown of the region responses. About 60% of responses were from the Mid-Atlantic region with 50 respondents being from this area, 38% of respondents from New England, and there was one respondent from outside the US and one from the West Coast region. Although I did my best to share this survey on as many platforms as possible, collecting a significant amount of data points from across the country or internationally was going to be a potential issue for me based on where my family and peers are predominantly from. As mentioned above when talking about gender, there must be at least five responses in each category for a MANOVA to be used, so the results below will only include data from the Mid-Atlantic and New England regions.

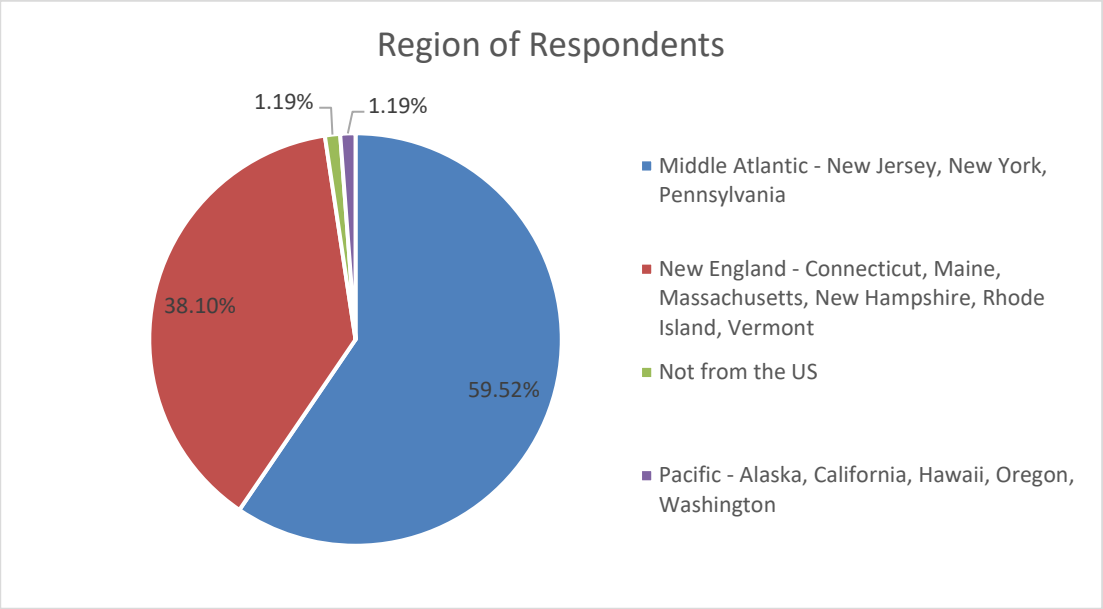

Figure 9: Percentage of each region of the respondents. The majority of the respondents were from the Mid-Atlantic region.

For the region data, I took a very similar approach to the different MANOVAs as I did with gender. I first looked at if there were any difference in watching the NBA and NFL between the regions and did not find significant differences between the means. I next looked at ticket habits for NFL and NBA when teams were not tanking, currently tanking, and had previously

tanked. For regional data, there were no significant results of ticket preferences by region. Next, I looked at the merchandise preferences for the NFL and NBA based on region and found no significant differences between the means. I then looked at the preferences for watching NFL and NBA games when the teams are tanking. There was no significant differences between the means when looking at NFL or NBA data, but there is a significant difference between the means for NBA data. Next, I looked at regional data for fantasy football and fantasy basketball when teams are tanking and when teams are not tanking. There were no significant results for fantasy sports data. For the last two MANOVA I looked at if fans would start or stop supporting these NFL and NBA teams if they tanked. For the first MANOVA, I looked at the data for fans starting to support a team for tanking. This analysis did not produce a significant difference between means. Looking at the MANOVA for stopping support of a team for tanking there were also no significant differences in the means.

Since none of the regional MANOVAs produced significant results, I decided to group regional data and the likelihood that respondents watch NBA games. I used this combination because fantasy basketball is not as popular, so using the likelihood that they watch games was more accurate. This again created four groups: Mid-Atlantic and watch NBA, Mid-Atlantic and not watch NBA, New England and watch NBA, and New England and not watch NBA. If respondents reported a five or lower on likelihood of watching NBA games, I considered them not likely to watch games, and if they were greater than five, they were considered likely to watch NBA games. I could not group region and watch NFL because so many of the respondents watch NFL games that I did not have five respondents who would fall into “not watch NFL” to satisfy the constraints of the MANOVA.

I ran the same tests I did for the base region data, but when combined with watching NBA, two MANOVAs had significant results. The first significant difference between means occurred for buying NBA tickets. This MANOVA produced a p-value of 1.438e-06, which is well below even the significance level set by the Bonferroni correction. Figure 10 shows the difference between the means as those who do not watch NBA from both New England and Mid-Atlantic regions are unlikely to buy NBA tickets regardless of tanking. Those from the

Mid-Atlantic region are more likely to buy NBA tickets than those from New England, although fans from both regions are less likely to buy tickets if a team has previously tanked, and they are highly unlikely to buy tickets if a team is currently tanking.

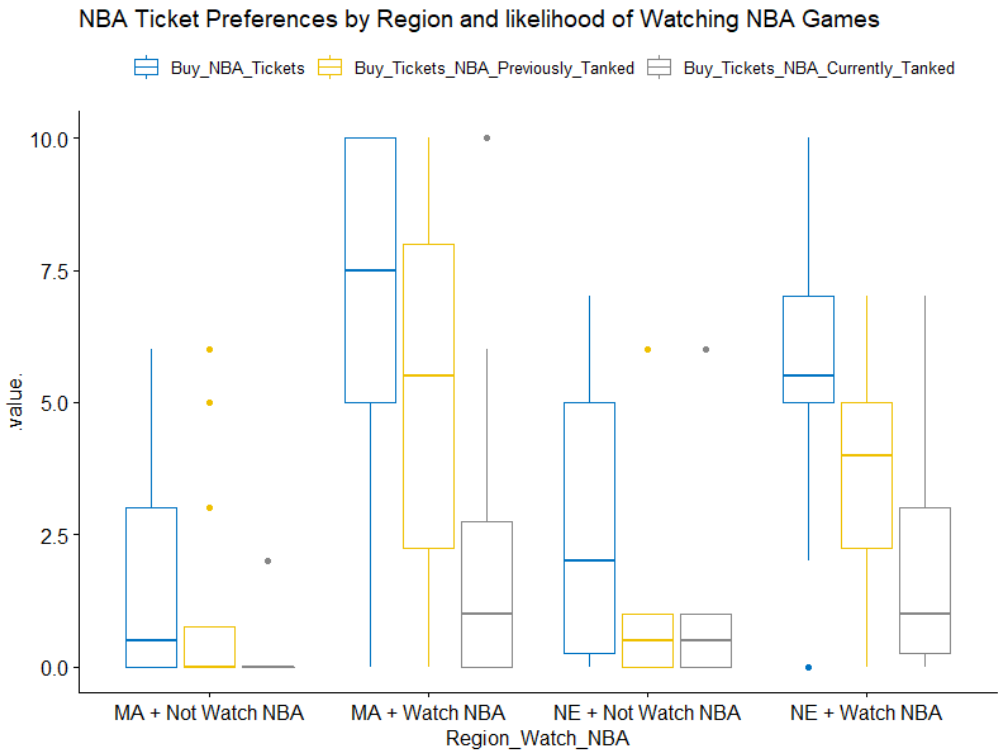

Figure 10: Boxplot showing the results of looking at NBA ticket preferences by region and likelihood that respondents watch NBA games. This produced a statistically significant difference between means as shown by the much lower likelihood of buying tickets if the respondents do not watch the NBA, as well as the decreased likelihood of buying tickets when a team is tanking. The MANOVA for this data produced a p-value of $1.438e^{-06}$, a statistically significant result.

The other statistically significant difference in means for region and watching NBA categories was the result of a MANOVA using likelihood to buy NBA merch when teams are tanking and not tanking. The MANOVA produced a p-value of $8.81e^{-07}$, which is again well under the significance level set by the Bonferroni correction. In Figure 11 below, there is a clear difference in means for those who watch NBA and those who do not. Those who do not watch NBA are highly unlikely to buy NBA merchandise, especially compared to those who do

watch the NBA. For those who watch NBA games, fans from the Mid-Atlantic region are more likely to buy merchandise in general, but have a large decrease in likelihood of buying merchandise if the team is tanking. New England fans who watch the NBA are more likely to buy merchandise if NBA teams are tanking than Mid-Atlantic fans, which was different than my hypothesis. There is a lot more variability in the Mid-Atlantic data, but purely looking at the medians, New England fans are more likely to buy merchandise for tanking fans than Mid-Atlantic fans. I had predicted that since Mid-Atlantic fans had a history with the Philadelphia 76ers tanking period, they would still buy merchandise regardless of tanking. These results showed a difference in means, but with New England more likely to buy merchandise for tanking teams which was the opposite of what I had expected.

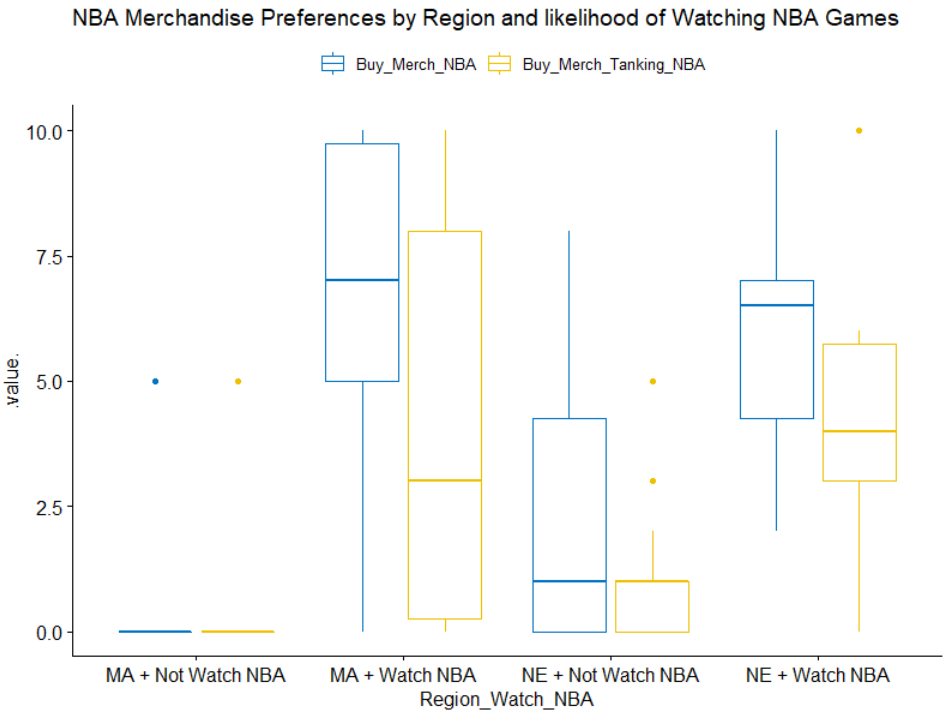

Figure 11: Boxplot of the relationship between region and watching NBA and the likelihood respondents buy NBA merchandise when teams are tanking. There was a statistically significant difference between the means as the MANOVA produced a p-value of $8.81e^{-07}$. Those who do not watch the NBA are unlikely to buy merchandise, and those from New England do not have a great difference in likelihood of buying tickets when teams are tanking versus not tanking.

Favorite Team/Sports

The last variables I looked at were favorite team and favorite sport of that team. Favorite team's sport was a variable I created based on the respondent's favorite team, for example if they said that their favorite team was the Boston Bruins, their favorite team's sport is hockey. When I had created this survey, I was interested in responses from Philadelphia 76ers fans since they are notorious for their tanking. However, only seven respondents said their favorite team is the 76ers, so I added in the favorite team variable so I could do a better analysis of the data. Twenty-four respondents were Philadelphia Eagles fans and the Eagles have tanked in the recent years, but their tanking was not as obvious as the 76ers. To get a better understanding of the data, I looked first at the individual favorite teams. There were 24 different teams represented covering the five major sports: baseball, basketball, football, hockey, and soccer. Figure 12 below shows the top favorite teams with the most popular seven being the Philadelphia Eagles, New England Patriots, Philadelphia 76ers, Philadelphia Phillies, Boston Celtics, Philadelphia Flyers, and New York Giants. These results further emphasize the regional data since these teams all fall within the Mid-Atlantic and New England regions.

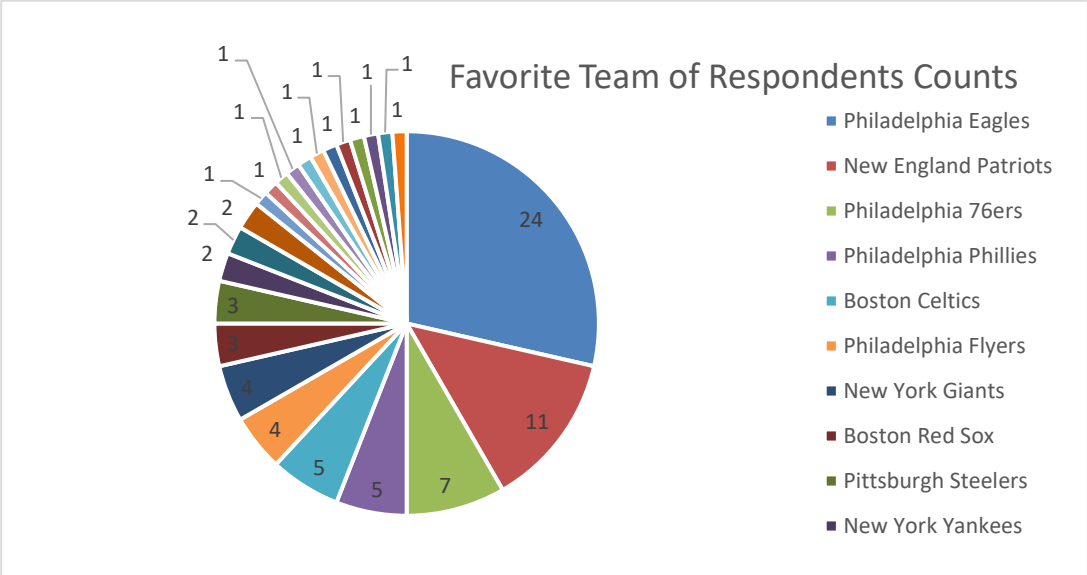

Figure 12: Favorite team counts from total data. The results are in line with the regional data since the most popular sports teams are from the New England and Mid Atlantic regions.

I next looked at how the favorite team data broke out by sport. Figure 13 shows that football was the clearly the most popular sport. Unfortunately, with only three responses for soccer, I cannot use the soccer data for the MANOVA.

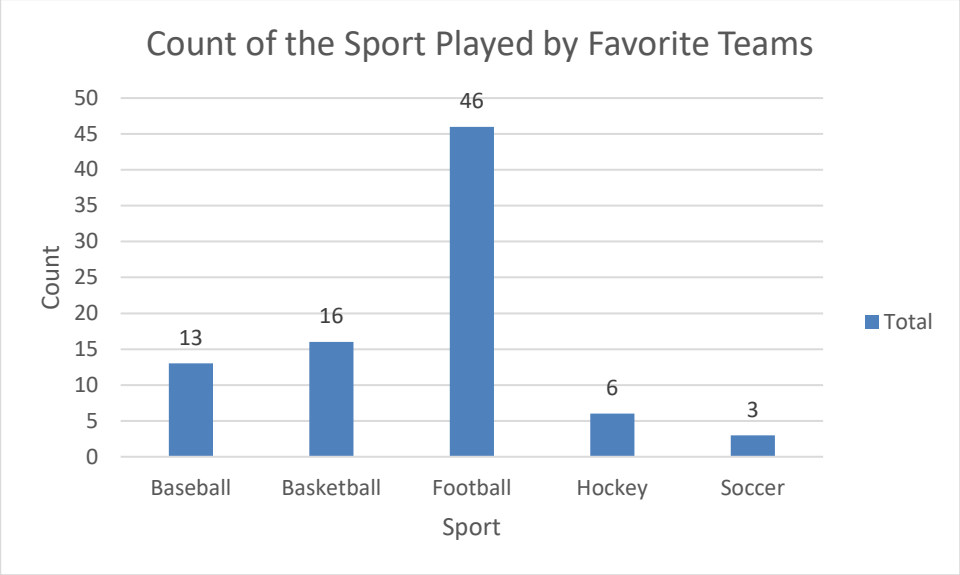

Figure 13: Histogram showing the counts of the sport played by respondent's favorite team. Football was the most popular sport amongst the favorite teams of the respondents.

After looking at the data, I began to run MANOVAs with the sport played by favorite teams. I started the same process I did for gender and region and started with watch data. I recognized that there will be some obvious correlations for these results since someone whose favorite team is a basketball team would likely watch basketball regardless of a team's tanking habits. Since there was a possibility of these correlations, I wanted to make sure that I had completed an in-depth analysis for favorite sport data. I started the same way as I did the other variables: I looked at likelihood of watching NFL or NBA games. This MANOVA did not produce a significant difference in means. I continued to analyze this variable the way I did other variables. I looked at the NFL and NBA ticket preferences based on the sport of the favorite team, and neither produced significant results.

Next, I looked at merchandise trends for both the NFL and NBA. There was no statistically significant difference in the means for NFL merchandise based on favorite team sport, but there was a significant difference for NBA data. As this MANOVAs show, I was correct in hypothesizing that there would be some relationship between favorite team's sport and these tanking questions. This MANOVA had a p-value of $9.748e^{-05}$, a statistically significant value. Figure 14 highlights this difference as those who are not basketball fans are much less likely to buy NBA merchandise for a tanking team. Basketball fans are likely to buy NBA merchandise regardless of tanking, but baseball and hockey fans in particular are highly unlikely to buy NBA merchandise for a tanking team. This highlights the risk of tanking as NBA teams could lose the casual fan. Fans might cheer for any team that's from their city, such as someone from Boston might not watch baseball, but if they were asked their favorite team, they would say the Boston Red Sox since it is their city's team. This is the casual fan that tanking isolates. Someone who is not a superfan of a tanking team is highly unlikely to buy merchandise of that team, which can put a major strain on a team's revenue.

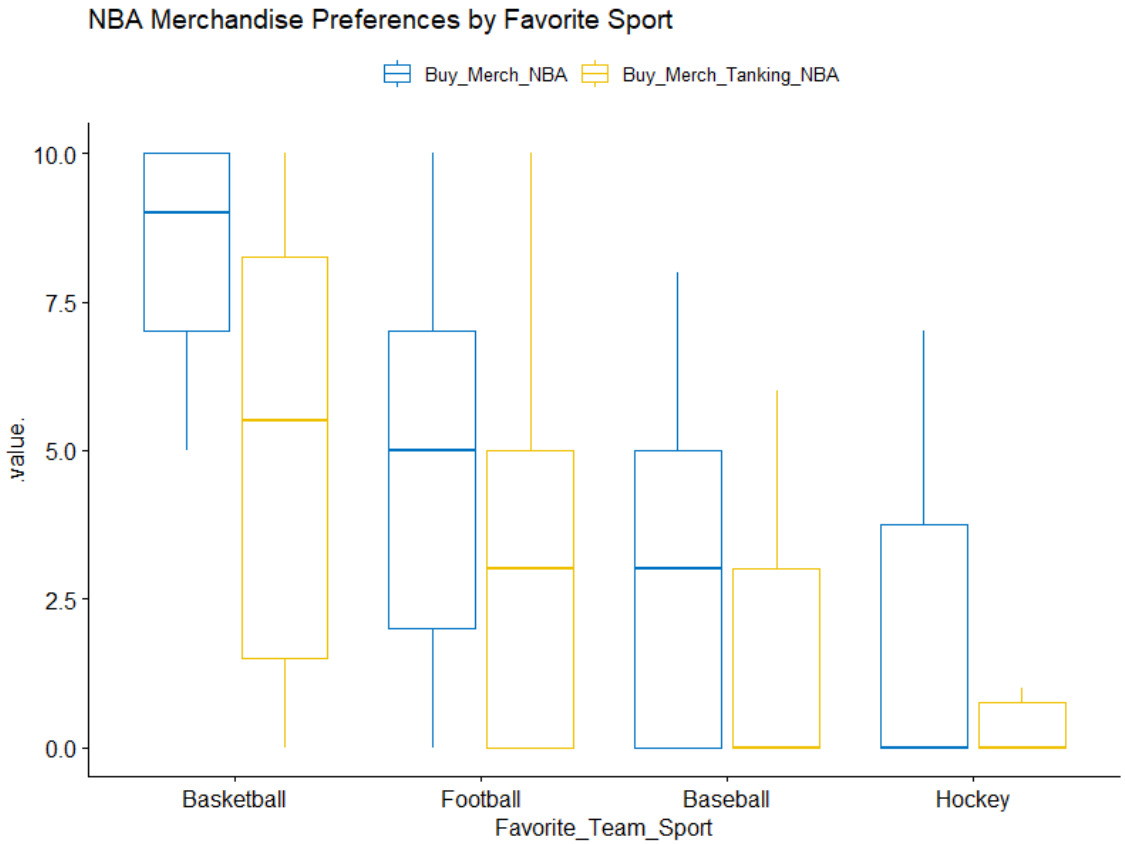

Figure 14: Boxplot that shows that relationship between the sport of the respondent's favorite team and their likelihood to buy NBA merchandise when teams are tanking and not tanking. This MANOVA produced a significant p-value of $9.748e^{-05}$, which indicates a difference in means for these variables. Those whose favorite team is not a basketball team are not likely to buy NBA merchandise if teams are tanking, which can greatly hurt the revenue of the tanking teams.

Next, I looked at watch data for the NFL and NBA in general and when a team is tanking. For the both the NFL and the NBA, there was no significant difference between the means. As with the other variables, my next step was to look at fantasy sport preferences when NFL and NBA teams are tanking. Neither MANOVA for fantasy football nor fantasy basketball produced statistically significant results. The final MANOVAs I ran looked at started supporting teams if they tanked and stopping supporting teams if they tanked. Neither of these MANOVAs produced significantly different means.

CONCLUSIONS

After taking into account the literature review and results from the survey, the ultimate question is: does tanking impact fan perception of teams? From the results of the ANOVAs and MANOVAs, the answer is "yes". Starting with the significant results from gender, female fans are less forgiving of previous tanking in the NBA when they are looking to buy tickets. When grouping gender with fantasy football, those who do not play fantasy football are highly unlikely to buy NBA tickets if the teams are tanking. Continuing to look at the gender and fantasy groupings, those who do not play fantasy are highly unlikely to watch and NFL game if they know the team is tanking. Women who play fantasy football are highly likely to watch NFL games if the teams are not tanking, but if the teams are tanking, they are not likely to watch the game even with fantasy football money on the line. Next, looking at regional data, those from the Mid-Atlantic are more forgiving of previous tanking than those from New England. However, both Mid-Atlantic and New England fans are unlikely to buy tickets for a team that is currently tanking. Another significant observation is that casual fans of the

NBA are unlikely to buy merchandise for NBA teams that are tanking. This can be a large loss in revenue as fans who might have bought an NBA jersey for the team in their city just for fun are not likely to do that if the team is tanking. The last notable result is that age was not related to fans' perceptions of tanking teams. This came as a surprise to me since I had hypothesized that older fans would not be as supportive of tanking. This lack of significance based on age shows a shift in how fans think about sports. More fans, regardless of age, are embracing and increased use of statistics in sports and are seeing value in tanking. However, based on the other results, even if some agree with the decision to tank, there is enough controversy surrounding the decision that it is not an easy call for a team to make.

Taking all these results into consideration, it is clear that tanking can greatly impact fans perceptions as well as the revenue of teams. If teams lose a large portion of their fanbase by tanking, even if they then can draft top talent, they will not be able to pay the talent with the loss of revenue. Teams will not be able to afford the best facilities, coaches, and staff that go in to building a winning team if they lose a large amount of revenue in the process of tanking. In conclusion, although the in long run, teams may have good intentions when they tank, they risk losing fans and revenue in the short run.

FURTHER ANALYSIS

One of the ways I would have liked to further my analysis into the statistical advantages of tanking would have been to look into the records of the teams after their period of tanking. I would have looked at the team records themselves as well as looking at the contribution that the athletes that these teams tanked for had on their respective teams. For the NBA, the metric I would have used is the player efficiency rating, PER, and for the NFL, I would use approximate value, AV. Both of these statistics are used to try to quantify the value of this particular player. PER is used to determine the player's per-minute productivity. This allows analysts to compare players who have very different playing times. Looking at the Philadelphia 76ers, they tanked for Joel Embiid who has a career PER of 27.1. The average PER is 15. Embiid was the 3rd pick in the 2014 draft. By comparison, the 16th pick, Jusuf

Nurkić, has a career PER of 19.5. This difference in productivity per minute shows the power of tanking that picking 13 spots earlier resulted in a more productive player. For the NFL, I would look at AV. AV looks at the quality of the player by position. Looking at the NFL, for the Dolphins and Tua Tagovailoa, Tua has a career AV of 12. The was the 5th pick of the 2020 draft. The 1st pick of the draft, QB Joe Burrow, has a career AV of 22, and the 6th pick of the draft Justin Herbert has a AV of 30. This shows that the attempt to tank for Tua did not result in the best QB from that draft class. This is just a start of the analysis I would do to further my analysis. I would also look as to how PER and AV of these players contributed to the wins of those teams.

Another way I would want to further my analysis would be to get data from different regions. The two regions were the New England and the Mid-Atlantic regions. These two regions represent the large, passionate fanbases found in Boston, Philadelphia, and New York. These regions are also on the East Coast and only represent a small population of all sports fans in the United States and across the world. Regions that have a different culture around sports might feel differently about tanking since they are less intense about their teams. It would also be interesting to see if those outside the United States have similar opinions about tanking as those from the United States. I am only familiar with tanking in US sports, but tanking could be happening across the world without my knowledge, and it would be interesting to see those fans' opinions.

A final step I would take for further analysis would be to repeat this analysis with MLB and NHL teams. When I had conducted my survey, I had asked respondents if they had ever heard of tanking cases outside of the NBA and NFL. The majority of these responses were about MLB and NHL teams. Since tanking is less common in these leagues as compared to the NBA and NFL, I did not focus on baseball and hockey, but a further analysis would be to investigate fans opinions on tanking in the MLB and NHL. Since tanking still happens in these leagues, it would be interesting to see if fans of these leagues share the same opinions as NBA and NFL fans.

APPENDICES

Appendix A – Survey

Q1. You are being asked to take part in a research study. The purpose of the research study is to get your opinion on tanking in professional sports. Please read the following before agreeing to be in the study. If you agree to be in this study, it will take you approximately 5-7 minutes to complete this survey. Questions will be asked about your opinions on tanking in the NBA and NFL. There are no known risks or benefits. The responses may be used in research finding within my honors thesis. The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigator of this study or Bryant University. Your decision will not result in any loss of benefits to which you are otherwise entitled. You have the right to withdraw completely from the survey at any point during the process; additionally, you have the right to request that the researcher not use any of your responses. You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have questions about the study, at any time feel free to contact me. Additionally, you may contact the Bryant Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. If you would like to keep a copy of this document for your records, please print or save this page now. You may also contact the researcher to request a copy. By clicking "accept" below you indicate that you have read and understood the participation authorization and volunteer to participate in this study. Then please click the next arrow to proceed. Thank you. jayres@bryant.edu

- o Accept
- o Decline

Q2. Are you familiar with the concept of "tanking" in professional sports?

- o No
- o Somewhat
- o Yes

Q3. Tanking is defined as "the practice of intentionally fielding non-competitive teams to take advantage of league rules that benefit losing teams". Do you know of any professional sports teams who have "tanked"?

- o No
- o Maybe
- o Yes

Q4. If so, what NFL or NBA teams do you know of that have tanked?

_____

Q5. Have you ever heard of a case of tanking outside of the NFL or NBA?

- o Yes
- o Maybe
- o No

Q6. If so, what teams have you heard of that have tanked?

_____

Q7. Does a team tanking impact your perception of that team?

- o Tanking makes me significantly dislike the team
- o Tanking makes me somewhat dislike the team
- o No impact on my view of the team
- o Tanking makes me somewhat like the team more
- o Tanking makes me significantly like the team more

Q8. Do you support NFL teams tanking?

- o Never
- o Maybe, but only if it is my favorite team
- o Maybe, but only if it is a team I do not support
- o Yes, but only if it is my favorite team
- o Yes, but only if it is a team I do not support
- o Always

Q9. Do you support NBA teams tanking?

- o Never
- o Maybe, but only if it is my favorite team
- o Maybe, but only if it is a team I do not support
- o Yes, but only if it is my favorite team
- o Yes, but only if it is a team I do not support
- o Always

Q10. Do you support any teams tanking?

- o Never
- o Maybe, but only if it is my favorite team
- o Maybe, but only if it is a team I do not support
- o Yes, but only if it is my favorite team
- o Yes, but only if it is a team I do not support
- o Always

Q11. What is your favorite professional sports team?

_____

Q12. Please use the slider scale below to answer how likely you are to do the follow scenarios. 0 means extremely unlikely, 5 is neutral, and 10 is extremely likely. These questions apply to the NFL.

0 1 2 3 4 5 6 7 8 9 10

- Buy tickets to a NFL game?
- Buy tickets for a NFL team that has previously tanked?
- Buy tickets for a NFL team that is currently tanking?
- Buy merchandise for a NFL team?
- Buy merchandise for a NFL team that has tanked?
- Watch a NFL game on TV?
- Watch a NFL game on TV if one of the teams are tanking?
- Stop supporting your favorite NFL team because they tanked?
- Start supporting a NFL team because they tanked?

- Play fantasy football?
- Play fantasy football if NFL teams are tanking?

Q13. Please use the slider scale below to answer how likely you are to do the follow scenarios. 0 means extremely unlikely, 5 is neutral, and 10 is extremely likely. These questions apply to the NBA.

0 1 2 3 4 5 6 7 8 9 10

- Buy tickets to a NBA game?
- Buy tickets for a NBA team that has previously tanked?
- Buy tickets for a NBA team that is currently tanking?
- Buy merchandise for a NBA team?
- Buy merchandise for a NBA team that has tanked?
- Watch a NBA game on TV?
- Watch a NBA game on TV if one of the teams are tanking?
- Stop supporting your favorite NBA team because they tanked?
- Start supporting a NBA team because they tanked?
- Play fantasy basketball?
- Play fantasy basketball if NBA teams are tanking?

Q14. What is your age?

_____

Q15. What is your gender?

- o Male
- o Female
- o Non-binary
- o Prefer not to say

Q16. Do you identify as transgender?

- o Yes
- o No

Q17. What is your ethnicity?

- o White

- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Hispanic or Latino
- Other

Q18. What region of the country are you from?

- New England - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
- Middle Atlantic - New Jersey, New York, Pennsylvania
- East North Central - Illinois, Indiana, Michigan, Ohio, Wisconsin
- West North Central - Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
- South Atlantic - Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia
- East South Central - Alabama, Kentucky, Mississippi, Tennessee
- West South Central - Arkansas, Louisiana, Oklahoma, Texas
- Mountain - Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
- Pacific - Alaska, California, Hawaii, Oregon, Washington
- Not from the US

Appendix B – Complete ANOVA and MANOVA Results – R Markdown

Age Data

Age and Support of NFL Tanking

```
##                     Df Sum Sq Mean Sq F value Pr(>F)
## SupportNFL_Tanking  3    529   176.3   0.788  0.504
## Residuals          77  17231   223.8
```

Age and Support of NBA Tanking

```
##                     Df Sum Sq Mean Sq F value Pr(>F)
## SupportNBA_Tanking  3    545   181.8   0.817  0.488
## Residuals          78  17351   222.4
```

Age and Support of Any Tanking

```
##                     Df Sum Sq Mean Sq F value Pr(>F)
## SupportAny_Tanking  3    849   282.9   1.286  0.285
## Residuals          78  17167   220.1
```

Age and Familiarity with Tanking

```
##                   Df Sum Sq Mean Sq F value Pr(>F)
## Familiar_Tanking  2    456   227.8   1.035   0.36
## Residuals        81  17831   220.1
```

Age and Knowledge of Teams that have Tanked

```
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Know_Teams_Tanked  2    590   294.9    1.35  0.265
## Residuals         81  17697   218.5
```

Age and if Tanking Causes Fans to Change their Perception of Teams

```
##                      Df Sum Sq Mean Sq F value Pr(>F)
## Changing_Perception  2    307   153.3   0.686  0.507
## Residuals           79  17666   223.6
```

Age and Favorite Team Sport

```
##                      Df Sum Sq Mean Sq F value Pr(>F)
## Favorite_Team_Sport  3    384   127.9   0.564   0.64
## Residuals           77  17465   226.8
```

Age Grouped by College and Out of College

Grouped Age and Watch NFL and NBA

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.013704  0.56272      2     81 0.5719
## Residuals 82
```

Grouped Age and Likelihood to Buy NFL Tickets

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.0031455 0.084146      3     80 0.9685
## Residuals 82
```

Grouped Age and Likelihood to Buy NBA Tickets

```
##           Df  Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.02643  0.72393      3     80 0.5406
## Residuals 82
```

Grouped Age and Likelihood of Buying NFL Merch

```
##           Df  Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.01209  0.49563      2     81  0.611
## Residuals 82
```

Grouped Age and Likelihood of Buying NBA Merch

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.013356  0.54824      2     81 0.5801
## Residuals 82
```

Grouped Age and Likelihood of Watching NFL Games

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.014022  0.57596      2     81 0.5644
## Residuals 82
```

Grouped Age and Likelihood of Watching NBA Games

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.0088925  0.36338      2     81 0.6965
## Residuals 82
```

Grouped Age and Likelihood of Playing Fantasy Football

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.0021383 0.086787      2     81  0.917
## Residuals 82
```

Grouped Age and Likelihood of Playing Fantasy Basketball

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.020487  0.84708      2     81 0.4324
## Residuals 82
```

Grouped Age and Likelihood of Starting to Support Tanking NFL and NBA Teams

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.001519 0.061612      2     81 0.9403
## Residuals 82
```

Grouped Age and Likelihood of Stopping Support of Tanking NFL and NBA Teams

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## agecat     1 0.0015215 0.061714      2     81 0.9402
## Residuals 82
```

Gender Data

Gender and Watch NFL and NBA

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## Gender     1 0.023533  0.96398      2     80 0.3858
## Residuals 81
```

Gender and Likelihood of Buying NFL Tickets

```
##           Df   Pillai approx F num Df den Df  Pr(>F)
## Gender     1 0.081788   2.3456      3     79 0.07915 .
## Residuals 81
```

Gender and Likelihood of Buying NBA Tickets

```
##           Df  Pillai approx F num Df den Df    Pr(>F)
## Gender     1 0.23182    7.947      3     79 0.0001071 ***
## Residuals 81
```

Gender and Likelihood of Buying NFL Merch

```
##           Df  Pillai approx F num Df den Df   Pr(>F)
## Gender     1 0.14454   6.7585      2     80 0.001941 **
## Residuals 81
```

Gender and Likelihood of Buying NBA Merch

```
##           Df   Pillai approx F num Df den Df  Pr(>F)
## Gender     1 0.063481   2.7113      2     80 0.07255 .
## Residuals 81
```

Gender and Likelihood of Watching NFL Games

```
##           Df   Pillai approx F num Df den Df  Pr(>F)
## Gender     1 0.073047   3.1521      2     80 0.04812
## Residuals 81
```

Gender and Likelihood of Watching NBA Games

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Gender     1 0.0042296   0.1699      2     80  0.844
## Residuals 81
```

Gender and Likelihood of Playing Fantasy Football

```
##           Df  Pillai approx F num Df den Df   Pr(>F)
## Gender     1 0.18702   9.2018      2     80 0.000253
## Residuals 81
```

Gender and Likelihood of Playing Fantasy Basketball

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## Gender     1 0.049464   2.0815      2     80 0.1314
## Residuals 81
```

Gender and Likelihood of Starting to Support Tanking NFL and NBA Teams

```
##           Df  Pillai approx F num Df den Df Pr(>F)
## Gender     1 0.02084  0.85133      2     80 0.4307
## Residuals 81
```

Gender and Likelihood of Stopping Support of Tanking NFL and NBA Teams

```
##           Df   Pillai approx F num Df den Df  Pr(>F)
## Gender     1 0.070388   3.0287      2     80 0.05396 .
## Residuals 81
```

Region Data

Region and Watch NFL and NBA Games

```
##           Df  Pillai approx F num Df den Df  Pr(>F)
## Region     1 0.06811    2.887      2     79 0.06165 .
## Residuals 80
```

Region and Likelihood of Buying NFL Tickets

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## Region     1 0.060728    1.681      3     78 0.1779
## Residuals 80
```

Region and Likelihood of Buying NBA Tickets

```
##           Df  Pillai approx F num Df den Df  Pr(>F)
## Region     1 0.12798   3.8159      3     78 0.01316 *
## Residuals 80
```

Region and Likelihood of Buying NFL Merch

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Region     1 0.0046516   0.1846      2     79 0.8318
## Residuals 80
```

Region and Likelihood of Buying NBA Merch

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Region     1 0.0082624  0.32908      2     79 0.7206
## Residuals 80
```

Region and Likelihood of Watching NFL Games

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## Region     1 0.016661  0.66927      2     79  0.515
## Residuals 80
```

Region and Likelihood of Watching NBA Games

```
##           Df   Pillai approx F num Df den Df  Pr(>F)
## Region     1 0.075949   3.2466      2     79 0.04416 *
## Residuals 80
```

Region and Likelihood of Playing Fantasy Football

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Region     1 0.0071501  0.28446      2     79 0.7532
## Residuals 80
```

Region and Likelihood of Playing Fantasy Basketball

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Region     1 0.0069702  0.27725      2     79 0.7586
## Residuals 80
```

Region and Likelihood of Starting Support for Tanking NFL and NBA Teams

```
##           Df    Pillai approx F num Df den Df Pr(>F)
## Region     1 0.0085773  0.34173      2     79 0.7116
## Residuals 80
```

Region and Likelihood of Stopping Support for Tanking NFL and NBA Teams

```
##           Df   Pillai approx F num Df den Df Pr(>F)
## Region     1 0.044238   1.8283      2     79 0.1674
## Residuals 80
```

Favorite Sport

Favorite Sport and Watch NFL and NBA Games

```
##                      Df  Pillai approx F num Df den Df    Pr(>F)
## Favorite_Team_Sport  3 0.27639   4.1158      6    154 0.0007333
## Residuals           77
```

Favorite Sport and Likelihood of Buying NFL Tickets

```
##                      Df  Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport  3 0.22333   2.0644      9    231 0.0336
## Residuals           77
```

Favorite Sport and Likelihood of Buying NBA Tickets

```
##                      Df  Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport  3 0.25962   2.4316      9    231 0.0117
## Residuals           77
```

Favorite Sport and Likelihood of Buying NFL Merch

```
##                      Df  Pillai approx F num Df den Df  Pr(>F)
## Favorite_Team_Sport  3 0.17659   2.4858      6    154 0.02529
## Residuals           77
```

Favorite Sport and Likelihood of Buying NBA Merch

```
##                      Df  Pillai approx F num Df den Df    Pr(>F)
## Favorite_Team_Sport   3 0.32777   5.0308      6    154 9.748e-05
## Residuals            77
```

Favorite Sport and Likelihood of Watching NFL Games

```
##                      Df   Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport   3 0.051022  0.67192      6    154 0.6725
## Residuals            77
```

Favorite Sport and Likelihood of Watching NBA Games

```
##                      Df  Pillai approx F num Df den Df   Pr(>F)
## Favorite_Team_Sport   3 0.21257   3.0523      6    154 0.007533
## Residuals            77
```

Favorite Sport and Likelihood of Playing Fantasy Football

```
##                      Df   Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport   3 0.032802  0.42797      6    154 0.8595
## Residuals            77
```

Favorite Sport and Likelihood of Playing Fantasy Basketball

```
##                      Df  Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport   3 0.07639   1.0193      6    154 0.4149
## Residuals            77
```

Favorite Sport and Likelihood of Starting Support for Tanking NFL and NBA Teams

```
##                      Df   Pillai approx F num Df den Df Pr(>F)
## Favorite_Team_Sport   3 0.057297    0.757      6    154 0.6048
## Residuals            77
```

Favorite Sport and Likelihood of Stopping Support for Tanking NFL and NBA Teams

```
##                      Df  Pillai approx F num Df den Df  Pr(>F)
## Favorite_Team_Sport   3 0.14245   1.9683      6    154 0.07345 .
## Residuals            77
```

Gender and Fantasy Football Data

Gender and Fantasy Football and Likelihood of Watching NFL and NBA Games

```
##                                Df  Pillai approx F num Df den Df Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.20143  2.9492      6    158 0.009348
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Buying NFL Tickets

```
##                                Df  Pillai approx F num Df den Df  Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.25829   2.4808      9    237 0.01006
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Buying NBA Tickets

```
##                                Df  Pillai approx Fnum Df den Df  Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.35363  3.5189     9    237 0.0004124
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Buying NFL Merch

```
##                                Df  Pillai approx Fnum Df den Df   Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.21499   3.1717     6    158 0.005768
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Buying NBA Tickets

```
##                                Df  Pillai approx F num Df den Df Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.12636   1.7759      6    158 0.1073
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Watching NFL Games

```
##                                Df  Pillai approx Fnum Df den Df   Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.28669   4.4065     6    158 0.0003798
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Watching NBA Games

```
##                                Df  Pillai approx F num Df den Df  Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.13018   1.8334      6    158 0.09583
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Starting Support for Tanking NFL and NBA Teams

```
##                                Df   Pillai approx F num Df den Df Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.090908    1.254      6    158 0.2819
## Residuals                      79
```

Gender and Fantasy Football and Likelihood of Stopping Support for Tanking NFL and NBA Teams

```
##                                Df  Pillai approx F num Df den Df  Pr(>F)
## Gender_and_Fantasy_Preferences  3 0.14775   2.1005      6    158 0.05606
.
## Residuals                      79
```

Favorite Team Sport and Watch NBA Preferences

Favorite Team Sport and Watch NBA and Likelihood of Buying NFL Tickets

```
##                  Df  Pillai approx F num Df den Df Pr(>F)
## Region_Watch_NBA  3 0.15377   1.4047      9    234 0.1868
## Residuals        78
```

Favorite Team Sport and Watch NBA and Likelihood of Buying NBA Tickets

```
##                  Df  Pillai approx F num Df den Df    Pr(>F)
## Region_Watch_NBA  3 0.50701   5.2877      9    234 1.438e-06
## Residuals        78
```

Favorite Team Sport and Watch NBA and Likelihood of Buying NFL Merch

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Region_Watch_NBA   3 0.12423   1.7219      6    156 0.1193
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Buying NBA Merch

```
##                   Df  Pillai approx F num Df den Df   Pr(>F)
## Region_Watch_NBA   3 0.43302   7.1848      6    156 8.81e-07
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Watching NFL Games

```
##                   Df  Pillai approx F num Df den Df  Pr(>F)
## Region_Watch_NBA   3 0.15262   2.1479      6    156 0.05095 .
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Watching Games for Tanking NBA Teams

```
##                   Df Sum Sq Mean Sq F value  Pr(>F)
## Region_Watch_NBA   3  135.6   45.19   5.309 0.00221
## Residuals         78  664.0    8.51
```

Favorite Team Sport and Watch NBA and Likelihood of Playing Fantasy Football

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_Watch_NBA   3 0.077995   1.0551      6    156 0.3921
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Playing Fantasy Basketball

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_Watch_NBA   3 0.086907   1.1811      6    156 0.3191
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Starting Support for Tanking NFL and NBA Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_Watch_NBA   3 0.028131  0.37092      6    156 0.8966
## Residuals         78
```

Favorite Team Sport and Watch NBA and Likelihood of Stopping Support for Tanking NFL and NBA Teams

```
##                   Df  Pillai approx F num Df den Df  Pr(>F)
## Region_Watch_NBA   3 0.14284   1.9997      6    156 0.06886 .
## Residuals         78
```

Age Category and Gender Data

Age Category and Gender and Likelihood of Watching NBA and NFL Games

```
##                    Df   Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender   3 0.040123   0.5391      6    158 0.7779
## Residuals          79
```

Age Category and Gender and Likelihood of Buying NFL Tickets

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender  3 0.11113    1.013      9    237 0.4302
## Residuals         79
```

Age Category and Gender and Likelihood of Buying NBA Tickets

```
##                   Df  Pillai approx F num Df den Df   Pr(>F)
## Agecat_and_Gender  3 0.26674   2.5699      9    237 0.007719
## Residuals         79
```

Age Category and Gender and Likelihood of Buying NFL Merch

```
##                   Df  Pillai approx F num Df den Df  Pr(>F)
## Agecat_and_Gender  3 0.16511   2.3695      6    158 0.03215
## Residuals         79
```

Age Category and Gender and Likelihood of Buying NBA Merch

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender  3 0.093325   1.2889      6    158 0.2653
## Residuals         79
```

Age Category and Gender and Likelihood of Watching NFL Games of Tanking Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender  3 0.094752   1.3096      6    158 0.2558
## Residuals         79
```

Age Category and Gender and Likelihood of Watching NBA Games of Tanking Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender  3 0.020972  0.27906      6    158 0.9462
## Residuals         79
```

Age Category and Gender and Likelihood of Playing Fantasy Football

```
##                   Df  Pillai approx F num Df den Df   Pr(>F)
## Agecat_and_Gender  3 0.23341   3.4792      6    158 0.002943
## Residuals         79
```

Age Category and Gender and Likelihood of Playing Fantasy Basketball

```
##                   Df  Pillai approx F num Df den Df  Pr(>F)
## Agecat_and_Gender  3 0.14224   2.0162      6    158 0.06652 .
## Residuals         79
```

Age Category and Gender and Likelihood of Starting Support for Tanking NFL and NBA Teams

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Agecat_and_Gender  3 0.03979  0.53453      6    158 0.7814
## Residuals         79
```

Age Category and Gender and Likelihood of Stopping Support for Tanking NFL and NBA Teams

```
##                   Df  Pillai approx F num Df den Df  Pr(>F)
## Agecat_and_Gender  3 0.14378   2.0397      6    158 0.06343 .
## Residuals         79
```

Age Category and Region

Age Category and Region and Likelihood of Watching NBA and NFL Games

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.12771   1.7735      6    156 0.1079
## Residuals         78
```

Age Category and Region and Likelihood of Buying NFL Tickets

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.12478   1.1283      9    234 0.3434
## Residuals         78
```

Age Category and Region and Likelihood of Buying NBA Tickets

```
##                   Df  Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.16703   1.5329      9    234 0.1371
## Residuals         78
```

Age Category and Region and Likelihood of Buying NFL Merch

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.010785  0.14097      6    156 0.9905
## Residuals         78
```

Age Category and Region and Likelihood of Buying NBA Merch

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.044134  0.58669      6    156 0.7406
## Residuals         78
```

Age Category and Region and Likelihood of Watching NFL Games for Tanking Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.056279  0.75282      6    156 0.6081
## Residuals         78
```

Age Category and Region and Likelihood of Watching NBA Games for Tanking Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.099303   1.3584      6    156 0.2348
## Residuals         78
```

Age Category and Region and Likelihood of Playing Fantasy Football

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.022908  0.30125      6    156 0.9355
## Residuals         78
```

Age Category and Region and Likelihood of Playing Fantasy Basketball

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.036406  0.48205      6    156  0.821
## Residuals         78
```

Age Category and Region and Likelihood of Starting Support for Tanking NBA and NFL Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.032087  0.42393      6    156 0.8622
## Residuals         78
```

Age Category and Region and Likelihood of Stopping Support for Tanking NBA and NFL Teams

```
##                   Df   Pillai approx F num Df den Df Pr(>F)
## Region_and_Agecat  3 0.062538  0.83923      6    156 0.5414
## Residuals         78
```

REFERENCES

Aiken, K. Damon, et al. "Investigating Sport Fan Attitudes Toward Tanking: The Role of Values-Based Connections." Sport Marketing Quarterly, vol. 29, no. 4, Dec. 2020, pp. 256–268. EBSCOhost, search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=147540084&site=ehost-live.

Balsdon, Ed, et al. "Corruption in College Basketball? Evidence of Tanking in Postseason Conference Tournaments." Journal of Sports Economics, vol. 8, no. 1, Feb. 2007, pp. 19–38, doi:10.1177/1527002505275095.

Beaton, Andrew. "NFL's New Tanking Strategy." *Wall Street Journal*, 28 July 2017.

Bernstein, Dan. "NBA Rest Rules, Explained: How New Load Management Policy Will Impact National TV Games, More." *Sporting News*, 23 Dec. 2020, www.sportingnews.com/us/nba/news/nba-rest-rules-load-management-explained/b2b7mfq26xfn1tli8r9fyumlb#:~:text=What%20is%20load%20management%20in,and%20in%20need%20of%20protection.

Bondy, Stefan. "New NBA Lottery Rules Take Away Power of Tanking." *The Star*, Toronto Star Newspapers Ltd, 22 Nov. 2018, www.thestar.com/sports/basketball/2018/11/22/new-nba-lottery-rules-take-away-power-of-tanking.html.

Crabbs, Kyle. "So You Want to Tank for Tua? A History of the #1 Overall Pick." *The Draft Network*, The Draft Network, 10 Sept. 2019, thedraftnetwork.com/articles/so-you-want-to-tank-for-tua-good-luck-.

Forsdick, Sam. "NFL 2019-20 Sponsors: Analyzing the Biggest Deals for the Season." *NS Business*, 10 Jan. 2020, www.ns-businesshub.com/business/nfl-2019-20-sponsors/.

Fuller, Colin, and Scott Drawer. "The Application of Risk Management in Sport." *Journal of Sports Medicine* , 2004, doi:10.2165/00007256-200434060-00001.

Gough, Christina. "NFL Revenue by Team." *Statista*, 2 Oct. 2020, www.statista.com/statistics/193553/revenue-of-national-football-league-teams-in-2010/.

Jones, Jonathan. "Why Doug Pederson Broke the Tanking Rules: Everyone with a Jersey or Headset Is Supposed to Give It Their All." *CBSSports.com*, 4 Jan. 2021, www.cbssports.com/nfl/news/why-doug-pederson-broke-the-tanking-rules-everyone-with-a-jersey-or-headset-is-supposed-to-give-it-their-all/.

"LeBron James and L.A. Lakers Remain atop NBA's Most Popular Jersey and Team Merchandise Lists." *NBA.com*, NBA Media Venture, 10 Oct. 2020, www.nba.com/news/most-popular-jersey-and-team-merchandise-official-release.

Motomura, Akira, et al. "Does It Pay to Build Through the Draft in the National Basketball Association?" Journal of Sports Economics, vol. 17, no. 5, June 2016, pp. 501–516, doi:10.1177/1527002516641169.

"NBA Attendance Report." *ESPN*, ESPN Internet Ventures, www.espn.com/nba/attendance/_/year/2001. – gives NBA attendance from 2001-2021

"NFL Attendance." *ESPN*, ESPN Internet Ventures, 2021, www.espn.com/nfl/attendance.

Price, Joseph, et al. "Tournament Incentives, League Policy, and NBA Team Performance Revisited." Journal of Sports Economics, vol. 11, no. 2, Apr. 2010, pp. 117–135, doi:10.1177/1527002510363103. - https://journals.sagepub.com/doi/pdf/10.1177/1527002510363103.

Tuck, Geoffrey N., and Athol R. Whitten. "Lead Us Not into Tanktation: A Simulation Modelling Approach to Gain Insights into Incentives for Sporting Teams to Tank." PloS One, vol. 8, no. 11, Nov. 2013, p. e80798. EBSCOhost, doi:10.1371/journal.pone.0080798.

Vermeulen, Euodia. "Big Data in Sport Analytics: Applications and Risks." *ResearchGate*, Oct. 2018.

Weitzman, Yaron. *Tanking to the Top: The Philadelphia 76ers and the Most Audacious Process in the History of Professional Sports*. Grand Central Publishing, 2020.