Article

A multi-dimensional analysis of NFL red zone efficiency

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SUMMARY

Red zone efficiency often characterizes high-performing offenses in the National Football League (NFL) because it can change the momentum of a competitive game. To succeed in red zone possessions, it is generally believed that teams must be effective in play design, quarterback proficiency, and strategic use of team personnel. These factors can be studied using full play-by-play analysis of the expected points before and after a play, gathered from Pro Football Reference. Central to this exploration is the question of what strategies can be employed to maximize red zone efficiency. We hypothesized that utilizing a conservative style of play is positively associated with red zone efficiency. In our analysis, we defined a conservative style of play by dividing the number of fourth-down and third-down passing attempts by the total number of red zone plays. We performed several analyses by leveraging NFL Savant and Pro Football Reference data and examining correlations between red zone efficiency metrics and team success. Our research revealed that while aggressive play calling was not statistically significantly correlated with the red zone efficiency metric, this style of play showed a strong negative relationship with expected points delta, defined as the change in expected points from before to after a play. This supported our hypothesis that increased red zone efficiency was achieved through a more conservative style of play. The results from this study offered insights to enhance team efficiency by illuminating offensive strategies and tactics that contributed to red zone success.

INTRODUCTION

The National Football League (NFL) is a professional football league where teams compete, utilizing strategies to achieve the end goal of winning the Super Bowl. Various studies have shown that taking advantage of scoring opportunities inside the red zone is critical (1). The red zone is the critical region between the opposing team's 20-yard line and goal line, where the effectiveness of play design and team personnel greatly impacts the outcome. The red zone is near the opponent's end zone, allowing teams to capitalize on major scoring opportunities. Red zone efficiency is measured by a team's ability to score points in this critical region, with the goal being a touchdown in the best-case scenario. It provides insight into strategy, execution, and overall team performance.

Previous research on this topic has focused primarily on identifying season-level indicators of success. For instance, *Bruin Sports Analytics* applied a linear regression model across six years of team-level NFL data, normalizing common offensive metrics such as completions, rushing attempts, and yards per carry to predict red zone touchdown percentage (2). Their analysis concluded that rushing first-down and passing first-down percentage were the most influential factors, suggesting that a balanced, consistent offense across early downs is one of the key drivers of red zone efficiency (2).

Our study took a different approach by shifting the emphasis from broad season-long predictors to in-game decision-making within red zone drives. We introduced an aggressive play calling metric, defined as the proportion of third-down passes and fourth-down attempts relative to all red zone plays. This helped us capture how often teams executed high-risk strategies in critical moments. Rather than focusing mainly on balance or early-down conversions, we hypothesized that utilizing a conservative style of play would drive scoring success rate in the red zone. We augmented this with play-level analysis using expected points (EP delta) and situational breakdowns, extending ideas similar to those previously reported in the literature who modeled how teams choose different plays depending on context (3).

Analyzing red zone efficiency required accounting for multiple scoring outcomes that made direct team-to-team comparisons difficult. To address this, we developed two composite measures: a red zone efficiency and aggressive play calling metric. Using 2023 NFL play-by-play data, we first compared the outcome distributions of the top five and bottom five teams, then examined correlations between our metrics and team performance with linear regression models. We also conducted a play-level analysis with expected points (EP delta) to evaluate how different play calling strategies influenced scoring efficiency in situational contexts. Across these methods, our results consistently showed that teams employing a conservative play calling approach achieved higher red zone efficiency and more favorable EP delta values.

RESULTS

Comparison of Teams' Turnover, Field Goal, and Touchdown Percentages

We analyzed the top and bottom five teams' overall activity in the red zone, analyzing the percentage of drives that resulted in a field goal, touchdown, or turnover. A touchdown is scored when a team crosses the opponent's end zone, a field goal occurs when a team's kicker kicks the ball through the goal posts, and a turnover takes place when a team loses possession of the football.

The Bills stood out in this analysis due to their high touchdown percentage (69%) and low turnover percentage (2%) (**Figure 1**). Denver also showcased a low turnover percentage (2%). In comparison, the New York Giants,
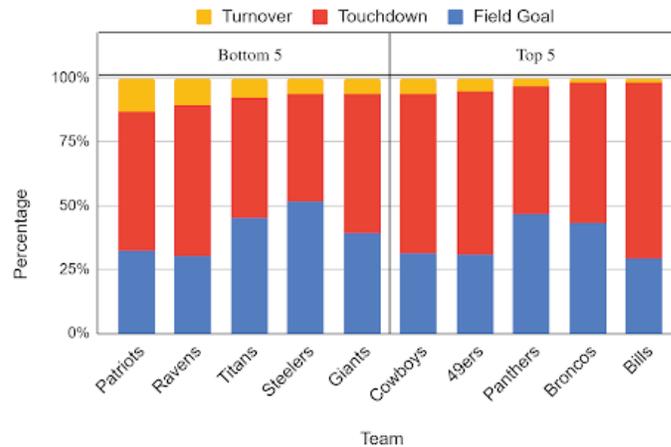
Figure 1: Team metrics breakdown of turnover, field goal, and touchdown percentages. Stacked bar chart displaying the breakdown of touchdown, field goal, and turnover percentages in the red zone for the top five and bottom five teams in the NFL at the end of the 2023–24 season.

Tennessee Titans, Baltimore Ravens, and New England Patriots had high turnover percentages that were detrimental to an offense. The Carolina Panthers were among the league's most red zone-efficient teams due to their high field goal percentage (47%) and relatively high touchdown percentage (50%) despite having only 157 red zone plays (4). This number is relatively small when compared to teams like the Dallas Cowboys, who had 300 red zone plays (4). Similar to the Panthers, the Pittsburgh Steelers also relied heavily on field goals (52%).

When comparing the teams' field goals, touchdowns, and turnover percentages, some excelled at converting red zone opportunities, while others struggled to finish these drives effectively. Ranking teams based on their red zone efficiency proved challenging in this analysis because we relied on a multidimensional data set. Therefore, we developed both a red zone efficiency and an aggressive play calling metric to enable a comparison between these teams.

Red Zone Efficiency and Aggressive Play Calling Metric

We studied the relationship between a team's red zone efficiency and play calling. Play calling was an aspect of the game that differed significantly for many teams, with some opting for a more conservative approach while others implemented a more aggressive style. Aggressive play calling refers to the selection of high-risk plays that can yield successful outcomes (5). In our analysis, we defined aggressive play calling as the ratio of fourth-down attempts and third-down passing attempts to the number of red zone plays, and measured red zone efficiency by dividing the total number of points scored on red zone possessions by the total number of red zone plays. Using these metrics, we then calculated a play calling score, with a high score indicating a more aggressive approach and a low score showcasing a conservative style of play in the red zone. We also developed a red zone efficiency score to analyze how teams capitalize on critical scoring opportunities.

The regression line suggested a weak negative correlation between aggressive play calling and red zone efficiency (two-

tailed t-test, $R^2 = 0.106$, $p = 0.0686 > 0.05$) (**Figure 2**). While the trend indicated that greater aggressiveness was linked to slightly lower red zone efficiency, the relationship was not statistically significant at the conventional 5% level. The R^2 value showed that aggressive play calling explained only 10.6% of the variance in red zone efficiency, leaving most of the variability attributable to other factors. Teams with similarly aggressive play calling strategies often achieved varied performance in the red zone (e.g., the Texans and Jets had high aggressive play calling tendencies but varied significantly in red zone efficiency).

The red zone's most aggressive play calling teams showed more inconsistent results than teams that used a conservative style of play (**Figure 2**). For example, the Washington Commanders were the most aggressive play calling team, with 20% of their red zone plays considered aggressive and a high red zone efficiency score of around 1.35. This type of aggressive play was illustrated in a matchup between the Commanders and Broncos. On fourth down and goal at the Broncos' four-yard line, the Commanders' quarterback passed to their tight end for the touchdown (6). In contrast, the New York Jets, a team known for aggressive play calling, had an extremely low red zone efficiency score of around 0.94. An example of an aggressive but inefficient play included a matchup between the Jets and Eagles. On third down and 17 at the Eagles' 20-yard line, the Jets' quarterback threw an incomplete pass intended for their wide receiver (6).

The teams that opted for a conservative style of play in the red zone displayed consistent results (**Figure 2**). None of these teams had a red zone efficiency under 1.08, and most maintained a score between 1.17 and 1.33. The graph also showed that most teams followed a certain percentage of aggressive play calling and achieved similar results. For example, only 13% of the Buffalo Bills' plays in the red zone were considered aggressive. This similarity placed them among other teams with a red zone efficiency score of 1.32. The Arizona Cardinals had an interesting result in this data set, with an extremely high red zone efficiency score of 1.44 and a below-average aggressive play calling score of 0.11
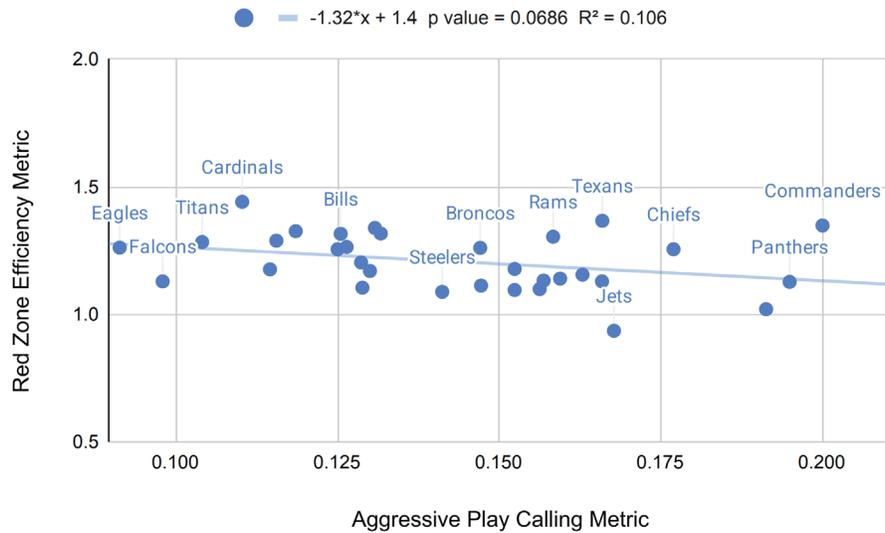
Figure 2: Relationship between red zone efficiency and aggressive play calling. Scatter plot displaying the relationship between a team's red zone efficiency and play calling in the 2023–24 NFL season.

(11%). This type of playstyle was demonstrated in a matchup between the Cardinals and the Texans, on fourth down and goal at the Houston one-yard line, where Kyler Murray (quarterback) rushed for a one-yard touchdown (6). This showcased how the Cardinals converted in critical situations, rather than relying on an overly aggressive style of play.

This analysis provided insight into the relationship between a team's play calling and red zone efficiency. The red-zone efficient teams we ranked from our prior analysis varied in their play calling tendencies, showing that turnovers alone are not the best measure of red zone efficiency. Furthermore, red zone efficiency was not the only metric used to analyze a team's performance in the red zone. We conducted an analysis using expected points to explore how play calling styles impacted a team's success in the red zone.

EP Delta and Aggressive Play Calling Metric

We analyzed the relationship between the expected points delta (EP delta) and play calling styles for different teams. EP delta represents the difference between the actual and expected number of points, before and after a play. To analyze red-zone efficiency using EP delta, we gathered 2023–24 season plays and filtered them based on whether they were played in the red zone. We then compared a team's EP delta to their play calling style to find the relationship between the two variables. Similar to our red zone efficiency and aggressive play calling analysis, high play calling scores indicated an aggressive play calling team, and lower scores showed a team with a conservative style of play. Our results showed that teams with negative EP delta values resembled an offense that used one play calling style to an extreme, leading to unnecessary turnovers and poor efficiency in the red zone (**Figure 3**). In contrast, teams with positive EP delta values mirrored teams with conservative play styles, leading to efficient performances in the red zone.

The regression line suggested a strong negative correlation between aggressive play calling and EP delta

(two-tailed t-test, R^2 = 0.132, p = 0.0412 < 0.05) (**Figure 3**). As teams relied more on aggressive play calling, their EP delta decreased. The R^2 value showed that 13.2% of the variation in the EP delta metric can be explained by the aggressive play calling metric. This relationship is statistically significant at the 5% level. Similar to the previous analysis, this correlation suggested that aggressive play calling alone may not be a significant predictor of EP delta.

The teams with the highest EP delta were the Buffalo Bills (44.66) and the San Francisco 49ers (49.56). Both teams employed a conservative style of play, with the Bills having 13% of their plays considered aggressive and the 49ers with 12%. Specifically, the Bills tended to convert in high-pressure situations. For example, in a matchup between the Bills and Raiders, on fourth down and goal at the Raiders' two-yard line, the Bills' quarterback threw a touchdown to their wide receiver (6). This play had an EP delta of 3.75, outperforming expectations and displaying the execution of the Bills' aggressive play calling. Additionally, the 49ers converted most of their drives on first and second downs as displayed in a matchup between the Cowboys, on first down and 10 at the Cowboys' nineteen-yard line, the 49ers' quarterback threw a touchdown to their tight end (6).

The two teams with the most negative EP delta were the New York Jets (-28.85) and the Minnesota Vikings (-31.04). These teams also utilized an aggressive play calling approach in the red zone, with 17% of the Jets' plays considered aggressive and 19% of the Vikings' plays considered aggressive. The Jets were forced to use aggressive play calling in tough situations due to their poor efficiency on non-aggressive play calls. The Vikings struggled with turnovers in the red zone. For example, in a matchup between the Vikings and Panthers, on third down and goal at the Panthers' five-yard line, Kirk Cousins (quarterback) threw an interception that was returned for a touchdown (6). This play had an EP delta of -11.26, showing the detrimental effect of a pick-six, interception returned for a touchdown, on a key scoring
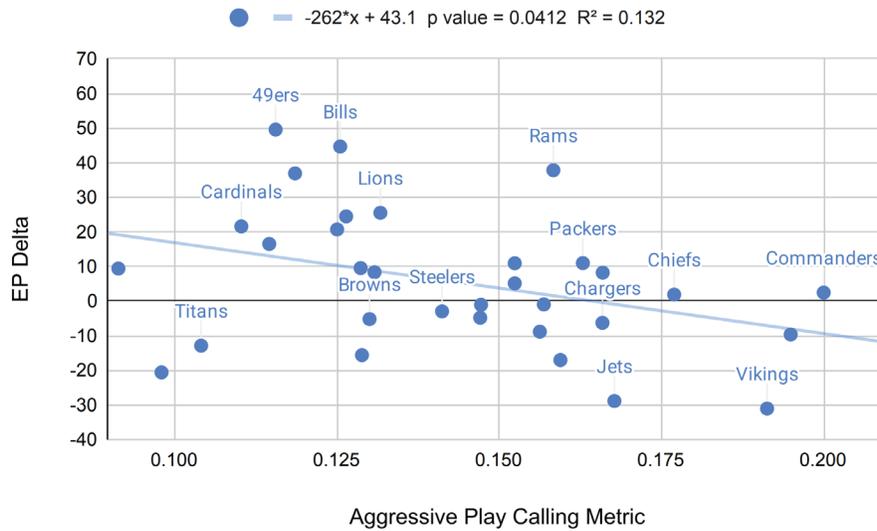
Figure 3: Relationship between EP delta and aggressive play calling. Scatter plot illustrating the relationship between a team's EP delta breakdown and play calling in the 2023–24 NFL season.

opportunity.

Teams with moderate play calling styles exhibited a more net-even EP delta. Two teams that utilized this play calling style and had neutral EP delta scores included the Pittsburgh Steelers (-2.95) and the Los Angeles Chargers (-6.27). The Steelers' EP delta was achieved through the sum of low-stakes plays that had a score of nearly zero, leading to their net-even EP delta (6). The Chargers also used a moderate play calling style; however, their EP delta was achieved through varying results, such as touchdowns on aggressive play calls and crucial turnovers in the red zone (6). The combination of these high-impact positive and negative plays canceled out and resulted in their neutral EP delta.

DISCUSSION

We investigated strategies to maximize red zone efficiency in the National Football League (NFL). We used various methodologies to uncover key factors affecting overall red zone success. The first investigation involved an analysis of the top five teams and bottom five teams in red zone plays, displaying their breakdown of touchdown, field goal, and turnover percentages. The second analysis utilized a red zone efficiency and aggressive play calling metric that showed the relationship between these two variables. Using a game situational analysis, the third analysis expanded upon play calling tactics and expected outcomes. We used expected points Delta (EP delta) to find the effectiveness of a team's play calling in the red zone.

Understanding how successful teams converted these valuable opportunities into points provided insight into the strategies, execution, and performance of these teams within this crucial area. The Bills showcased this through their high touchdown and low turnover percentage. In contrast, the high turnover percentages of the New York Giants, Tennessee Titans, Baltimore Ravens, and New England Patriots demonstrated how turnovers halted an offensive drive and contributed to poor red zone efficiency. Analyzing teams'

touchdown, field goal, and turnover rates revealed how some teams succeeded in converting critical opportunities while others struggled through high turnover percentages.

Comparing a team's play calling style to their red zone efficiency provided an understanding of how different strategies impacted team performance. The regression line suggested a slight negative correlation between aggressive play calling and red zone efficiency (two-tailed t-test, p = 0.0686 < 0.05) despite a relatively low R^2 value (R^2 = 0.106). In this analysis, teams like the Washington Commanders employed aggressive play calling and displayed an extremely high red zone efficiency score, indicating an offense that used this approach in favorable situations. Conversely, the New York Jets relied on aggressive play calling in long-down situations, which led the team to achieve an extremely low red zone efficiency score. Different play calling strategies had a crucial impact on a team's red zone efficiency.

Our analysis of the relationship between a team's play calling style and EP delta revealed insights into their red zone performances. Our regression line revealed a negative relationship between aggressive play calling and EP delta (two-tailed t-test, p = 0.0412 < 0.05) despite a relatively low R^2 value (R^2 = 0.132). This showed that third-down passing and fourth-down attempts generally led to worse scoring outcomes in the red zone, resulting in wasted scoring opportunities and poor red zone efficiency. For example, the Minnesota Vikings' aggressive approach backfired, resulting in many costly turnovers and an extremely negative EP delta. However, teams like the Chargers and Steelers demonstrated how they achieved a net-even EP delta using the same type of play calling through different results. By incorporating EP delta into our game-situational analysis, we found valuable insight into the play calling, approach, and execution of a team.

The most intriguing finding in this study was the importance of adopting a conservative approach in the red zone. Most teams with high red zone efficiency and EP delta

used this style of play, which helped them limit turnovers and utilize aggressive play calling in manageable situations. While there may be exceptions –– for example, the Rams leaning towards an aggressive approach while maintaining high red zone efficiency and EP delta –– the overall trend showed that a conservative play style allowed teams to capitalize on key scoring opportunities in the red zone (6).

While this study used publicly accessible NFL data, a main limitation was data sparsity. We collected the data over the span of a few months, between September and December of 2023 (the majority of the 2023–24 NFL season). Some touchdown data included penalties that we could not remove because filtering out individual penalties were not feasible. Additionally, in our game situational analysis, we included some outliers in the dataset. For example, on first down and goal, in a matchup between the Ravens and Texans, JK Dobbins (running back) rushed for a four-yard touchdown, resulting in an EP delta of seven for the Ravens. While a four-yard touchdown did not equate to a large expected points gain, the penalty before the rushing touchdown for the opposing team led to the high EP delta. The penalty reset the EP delta, leading to an extremely high EP delta for the touchdown play. We kept these outliers in the dataset to show how expected points account for the overall situation of a game. The model also used field goal, touchdown, and turnover percentages, which can create ambiguity since the model cannot compare the magnitude of scoring possessions between Team A and Team B. For example, if an NFL game ended in a score of 7-0, one team could theoretically have a touchdown percentage of 100%, and the other team could have had a turnover percentage of 100%. However, these values lacked critical context about the low-scoring nature of that particular game. Additionally, a team's offense is only part of the story, as the opposing team's defense also plays a major part in red zone efficiency. A potential future direction for this research involves incorporating defensive data into the model, enhancing our comprehension of red zone efficiency. For example, specific variables include turnover data, including interceptions, fumbles, and the number of touchdowns and field goals allowed. This would help us understand the red zone performance of both the offense and defense, further exploring the implications of red zone efficiency. From this analysis, we would be able to create a customizable red zone play sheet for each NFL team, including scouting information to strategically adapt to the opposition.

Specifically, our findings showed the relationship that play calling has on red zone efficiency. By understanding the correlation between the two variables, NFL teams could apply this knowledge to create play calling strategies in the red zone. For example, when a team has a lead in the fourth quarter, they could opt for a more conservative approach that helps maintain these consistent results and minimize costly plays. Additionally, teams can understand the benefits of adopting aggressive play calling in manageable situations. This enables a team to capitalize on high-stakes opportunities and help them achieve red zone efficiency. Teams must not only use play calling strategies to their advantage, but also execute these dynamic plays.

Similar studies used regression models to determine the importance of each offensive statistic. In a previous study,

researchers assembled these statistics to create a perfect red zone offense (2). This study displayed that a consistent rushing and passing offense played a major role in achieving red zone efficiency (2). Specifically, converting on first down utilizing this offensive approach accurately predicted red zone efficiency (2). Similar to our analysis, their results yielded a balanced offensive team that was effective due to their conservative play calling in the red zone (2).

In our study, we expanded on the idea of maximizing red zone efficiency. We utilized various data to quantitatively determine teams' red zone efficiency and play-calling strategies. We used linear regression to find the relationship between play-calling and red zone efficiency (7, 8). We then explored the implications of these findings using play-by-play data in the red zone. Using expected points, we found the specific plays and play-calling strategies that determined their red zone performances.

Holistically, we used the distribution of offensive drive outcomes, the relationship between red zone efficiency and play calling, and EP delta to quantitatively analyze teams' red zone performance and critical play calling decisions. These methodologies offered valuable insights into the importance of play calling styles on red zone efficiency. By recognizing the patterns and factors that lead to red zone failure or success, teams can adapt offensive strategies to optimize scoring and limit turnovers. This enables NFL offenses to improve their red zone efficiency strategically and, in turn, achieve favorable outcomes more broadly on the field.

MATERIALS AND METHODS

The data for this analysis was acquired from the Pro Football Reference and NFL Savant (4, 6). The scope of the data was limited to the 2023 NFL season, excluding the postseason, for the purposes of working with a dataset of manageable size. It should be noted that using expected points to assess play calling efficiency may be susceptible to some errors and edge cases. The expected points were reset to zero by a penalty or turnover before a play. These outliers were left inside our data because they showed the teams' ability to draw penalties and put themselves in a more viable position to score. It was shown by these outliers that the circumstances of a play played a major part in a team's ability to capitalize on opportunities in the red zone.

An exploratory data analysis at the game level was carried out, where disparate data sources were merged, such as the NFL schedule and NFL Savant red zone play data (4, 6). This data was then used to find the top five and bottom five red zone teams' touchdowns, turnovers, and field goal percentages. Furthermore, stats for the top five and bottom five red zone teams were aggregated to describe these outcomes as a percentage of all red zone plays. The correlation of metrics were determined, including red zone efficiency and aggressive play calling. The variables' relationship and the importance of play calling styles on a team's red zone efficiency and performance in the red zone were determined using a linear regression model.

Red Zone Efficiency and Aggressive Play Calling Analysis

The idea of a red-zone efficient offense was defined by the

following results, calculated by dividing a team's sum of total points by their total number of red zone plays. An aggressive play calling metric was also utilized to compare its correlation with red zone efficiency. Regression models were leveraged using this metric to determine the importance of a team's play calling on their red zone efficiency.

The data for this analysis included all the plays from the 2023–24 season and was filtered to include only red zone plays. A separate data sheet that imported each team's player rosters was created to acquire this data. A function that copied the player's name from the play-by-play data onto a separate column was then applied. Subsequently, the player's team was identified, and it was determined whether it matched the location of the football. If the team matched the location of the football, that play was not in the red zone. Conversely, if the team did not match the location of the football, that play was in the red zone. The data was also filtered on Google Sheets based on the condition: "less than or equal to 20" to filter out non-red zone plays.

Our red zone efficiency metric included a team's sum of total points divided by their total number of red zone plays. The total points in a red zone drive include a touchdown, accounting for extra point opportunities worth seven points, a field goal worth three points, and non-scoring plays worth zero. The number of red zone plays was calculated by how many times a team reaches the red zone in a season. Based on this red zone efficiency metric, a function was created in our data set that searched for the phrases "touchdown" and "field goal is good" to determine the outcome of the red zone play. If the play included "touchdown," that play was set to seven points, the phrase "field goal" was set to three points, and the rest of the data was set to zero points. All these points were then added for each team and divided by the number of red zone plays to calculate their red zone efficiency.

An aggressive play calling metric was also utilized by dividing a team's number of fourth-down attempts and third-down passing attempts in the red zone by their total number of red zone plays. Based on this metric, a function was developed that searched for third-down plays and the phrase "pass." Fourth-down plays were searched for, and all field goal plays were filtered out using this function. If the play included any of these conditions, the play was set equal to "aggressive" in a separate column. Similar to our red zone efficiency metric, each play was scored as a value, with aggressive plays scored as one and the rest scored as zero. These points were then added for each team and divided by the number of red zone plays to determine their aggressive play calling.

Game Situational Analysis

The predicted point value of a certain play was determined by an advanced metric called expected points. This was determined by the expected point value, which was based on the down, distance, and field position (9). A thorough game-situational study of red zone efficiency and styles of play calling was conducted using the expected points before and after red zone plays. The EP delta formula is shown below:

EP delta = expected points after - expected points before **(1)**

Linear Regression Models

The relationship between how styles of play calling affect a team's red zone efficiency and performance in the red zone was found by applying linear regression using built-in Google Sheets functions, building upon existing research (10, 11). For both of the following linear relationships, R^2 values were used to explain the variables' effectiveness in predicting the result of each game (12).

REFERENCES
1. "Study: What's Going on With Red Zone Offense?" *Sports Info Solutions.* https://www.sportsinfosolutions.com/2024/09/26/study-whats-going-on-with-red-zone-offense/. Accessed 9 Apr. 2024.
2. "Analytical Red Zone Percentage." *Bruin Sports Analytics.* https://www.bruinsportsanalytics.com/post/analytical-red-zone-percentage. Accessed 11 Feb. 2024.
3. Otting, Marius. "Predicting play calls in the National Football League using hidden Markov models." *IMA Journal of Management Mathematics,* vol. 32, no. 4, Oct. 2021, pp. 535-545, https://doi.org/10.1093/imaman/dpab005
4. "NFL Savant." *NFL Savant.* https://nflsavant.com/search.php?hfPTY=&hfRTY=&hfPT=&hfF=&ddlDown=&ddlQuarter=&ddlYardLineGT=75&ddlYardLineLT=&txtGameDateGT=&txtGameDateLT=&txtYTGGT=&txtYTGLT=&txtYFPGT=&txtYFPLT=&hfPR=&ddlYear=2023&ddlOTeam=&ddlDTeam=&ddlBall=Offense&ddlPenaltyType=&ddlOrderBy=Plays#results. Accessed 3 Mar. 2024.
5. Jordan, Jeremy D., et al. "Optimizing Football Game Play Calling." *Journal of Quantitative Analysis in Sports*, vol. 5, no. 2, May 2009, https://doi.org/10.2202/1559-0410.1176
6. "Pro Football Reference." *Pro Football Reference.* https://www.pro-football-reference.com/. Accessed 18 Mar. 2024.
7. Beal, Ryan, et al. "A Critical Comparison of Machine Learning Classifiers to Predict Match Outcomes in the NFL." *International Journal of Computer Science in Sport*, vol. 19, no. 2, Dec. 2020, pp. 36–50, https://doi.org/10.2478/ijcss-2020-0009
8. Morgan, Jack Pierpont V. "Forecasting the Outcome of NFL Playoff Games: A Regression Analysis." *UVM Patrick Leahy Honors College Senior Theses,* 2024, https://scholarworks.uvm.edu/hcoltheses/653
9. "Football Glossary and Football Statistics Glossary." *Pro-Football-Reference.* https://www.pro-football-reference.com/about/glossary.htm. Accessed 5 May. 2024.
10. "How I Built a Competitive NFL Prediction Model with Only Five Statistics." *Samford University Sports Analytics.* https://www.samford.edu/sports-analytics/fans/2023/How-I-Built-a-Competitive-NFL-Prediction-Model-with-Only-Five-Statistics/. Accessed 3 Apr. 2024.
11. Brighenti, Caio. "NFL Data Bowl: Analyzing NFL Play Data for Predictive Modeling." *NFL Data Bowl*, Dec. 2019, https://caiobrighenti.github.io/nfl-data-bowl.pdf.
12. "Linear Regression Analysis." *FasterCapital. https://*

fastercapital.com/topics/linear-regression-analysis.html.
Accessed 26 July. 2024.