Analyzing NFL Injuries & Impact

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Introduction

Background

- Established in 1920.

- Currently has 32 teams and 1,696 players.

- The League is trying to increase player safety through advancements in technology and equipment.

Problem Statement

- How can we protect players by anticipating and preventing injuries before they occur?

- Are there positions that are at a higher risk?

- What factors contribute to a greater risk of injury?

Problem Objective

Exploratory Analysis

- Basic statistical and visual analysis

- Time-trend analysis

Predictive Analysis

- Decision tree analysis

Methodology

- **Data**

  - Observed NFL Concussion Data from 2012-2014

  - **Seventeen** variables total

  - **Seven** categorical variables
    - Position, Team, Winning Team

  - **Ten** numerical variables
    - Average Time Before Injury, Average Time After Injury, Games Missed

- **Key Assumptions**

  - Patterns from the data are still significant today

  - There is crossover into other contact sports and common injury types

  - The population of injuries in our time period is a good sample representation of the entire league as a whole

Finding 1: Position Matters

Concussion Counts by Position in Football (Categorized by Offense, Defense, Special Teams)
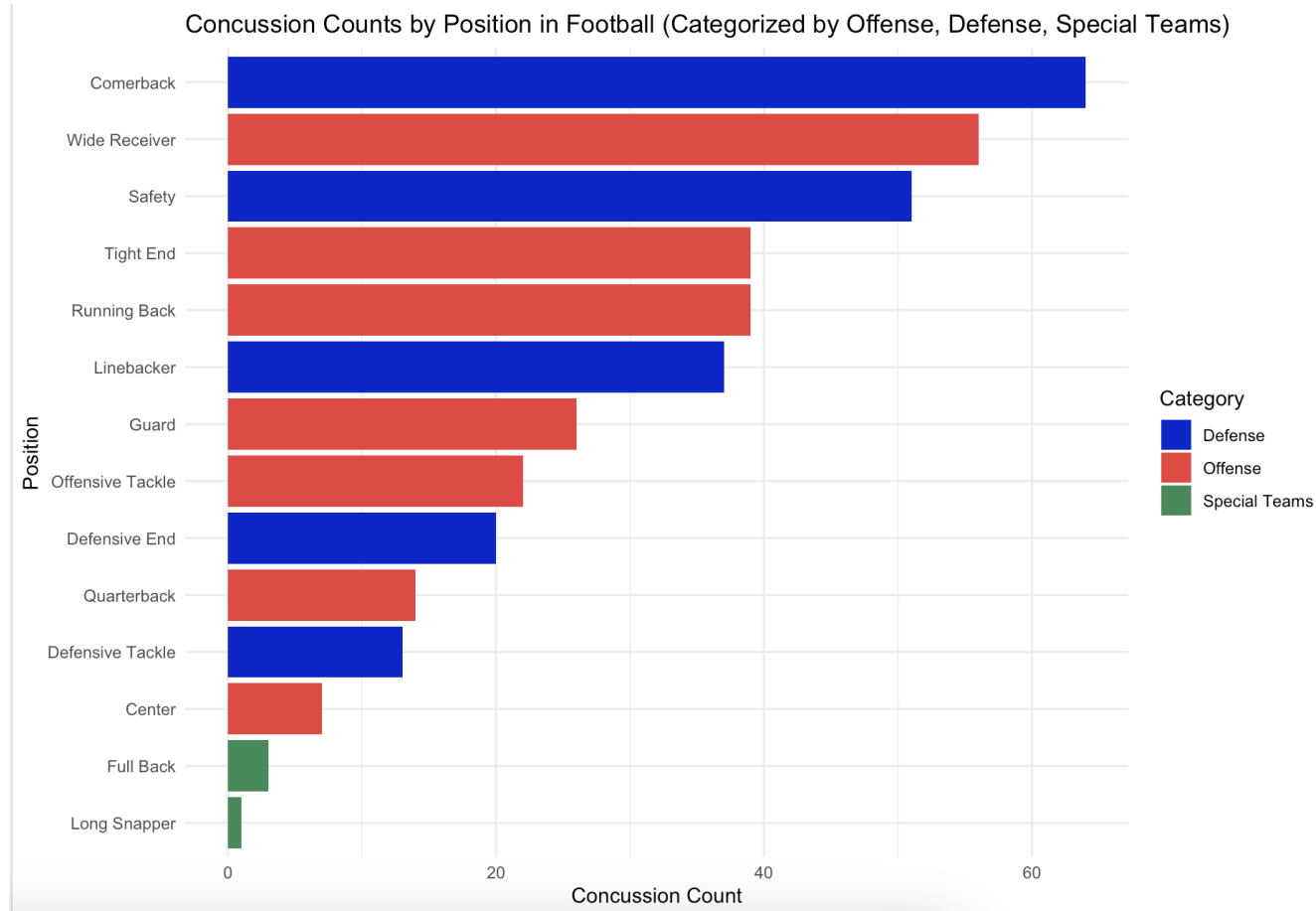

Our reports state that cornerbacks have the highest concussion rate out of any position.

The positions with the highest concussion rate tend to be in the open field.

Finding 2: Playtime Decreases Post-Injury

- The histogram of playtime before injury shows a slightly right skewed distribution

- The histogram of playtime after injury is less skewed

- These histograms shows that average playtime tends to decrease post-injury with a higher frequency of playtimes less than 20 downs

Average Playtime Before Injury

Frequency / Playtime (Downs)
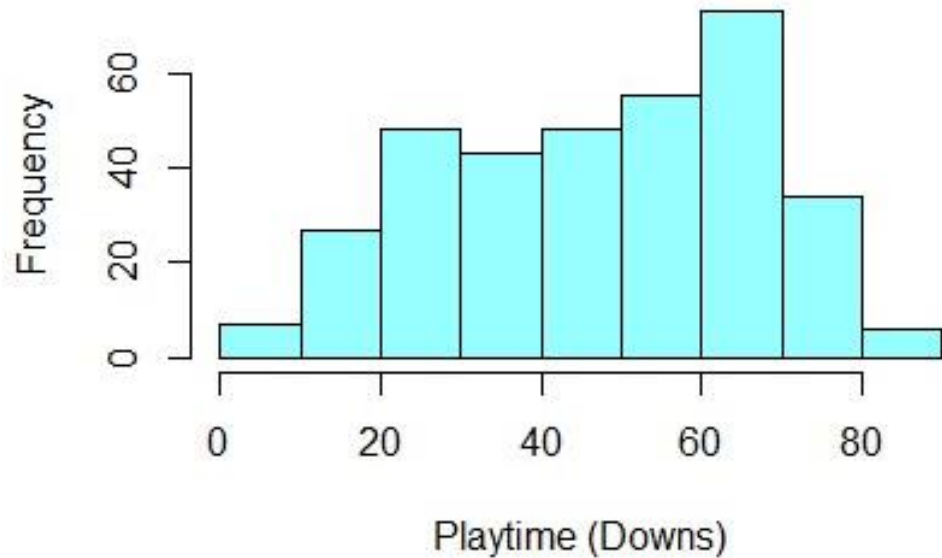
Average Playtime After Injury

Frequency / Playtime (Downs)
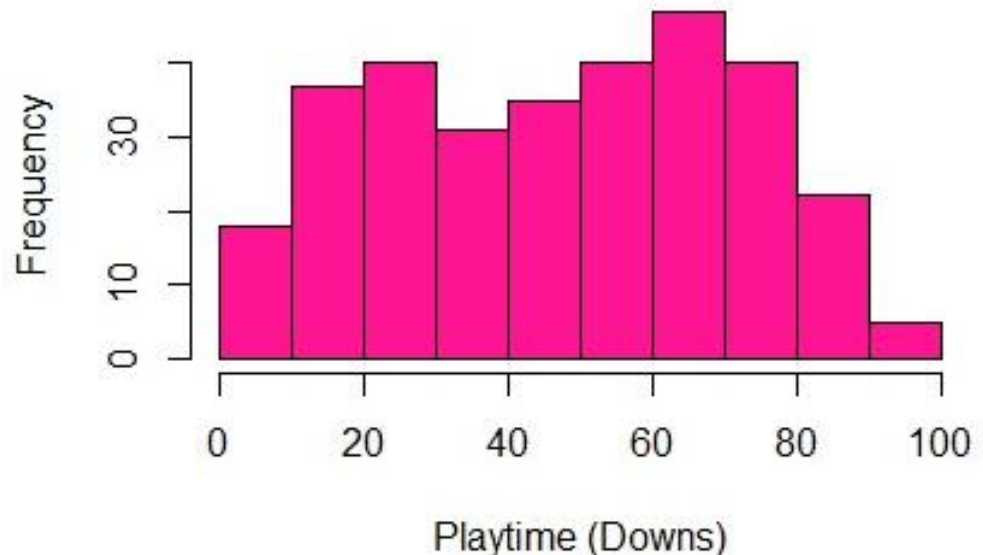
Finding 3: Most Likely to Get Injured Halfway Through Season

An NFL football season is 18 weeks

Based on the boxplot, we can see that the median is right under 10 weeks, hovering around 9 weeks
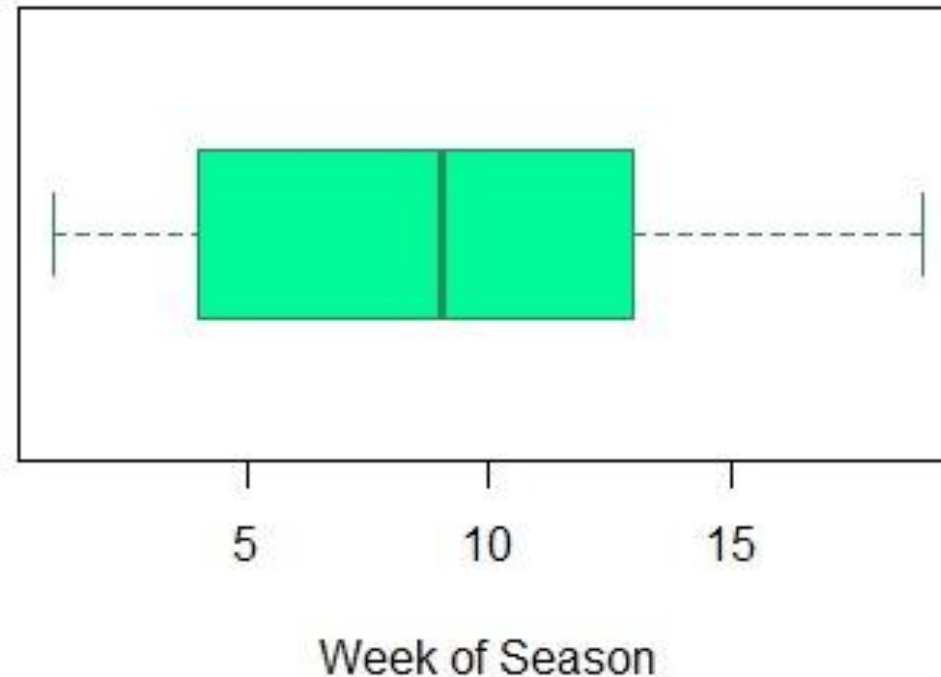
This is approximately halfway through the NFL football season

The boxplot is also right skewed

More likely to get injured in the 1st half of the season

Distribution of Week of Injury
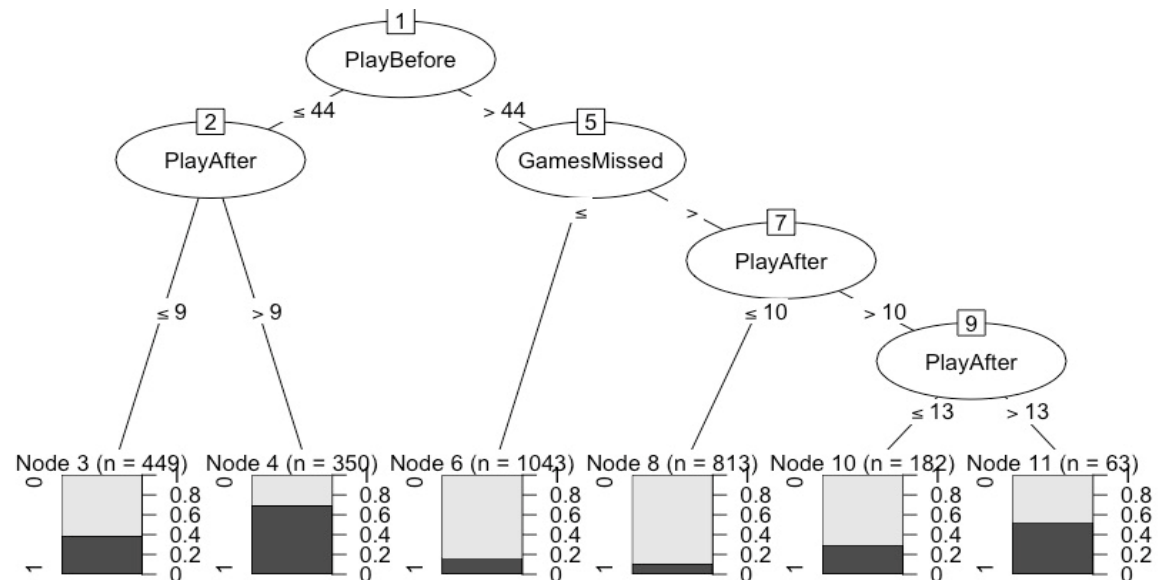
Week of Season

Finding 4: Team Success is Directly Correlated With Injury

Decision Tree

- Target dependent variable: Is the team a winning team or not?
- Key Nodes
  - **PlayBefore**: The amount of time a player is on the field
  - **PlayAfter**: The amount of time a player is on the field after an injury
  - **GamesMissed**: Are the coaches adhering to concussion protocol and benching players
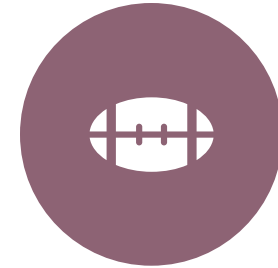
Implications

REFEREES NEED TO BE ON HIGH ALERT FOR PLAYER SAFETY IN THE MIDDLE OF THE SEASON.

SKILL POSITIONS ARE AT THE HIGHEST RISK FOR INJURY.

PLAYERS CAN EDUCATE THEMSELVES ON SAFE TACKLING PRACTICES AND AVOID BIG HITS.

TOO MANY PLAYERS ARE REMAINING ON THE FIELD AFTER AN INJURY.

Conclusion

Analyzing the concussion trends in the NFL allows us to conclude that the main takeaways players and referees should keep in mind are:

The NFL has made progress by improving policy, but there is still a lot of work that needs to be done.

Concussions are not just common with linemen and frequent heavy hitters.

Policy needs to be strictly enforced and strengthen penalties for violation of concussion protocol.

References

- https://www.kaggle.com/datasets/rishidamarla/concussions-in-the-nfl-20122014

- http://nflcombineresults.com/nflcombinedata_expanded.php?year=1999&pos=&college=

- https://data.world/datasets/nfl