Milestone 4

DSC 680

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1. **Business Problem:**

The National Football League (NFL) faces an ongoing concern about players safety, specifically related to injuries sustained on different playing surfaces. This research aims to investigate the impact of artificial turf versus natural grass on injury rates, with a focus on the occurrence of ruptured Achilles injuries. The objective is to provide evidence-based insights to inform decisions related to field selection and improve player safety.

1. **Background/History:**

Previous studies have explored the relationship between playing surfaces and injuries in various sports. While some research suggests a correlation between artificial turf and increased injury rates, the specific impact on NFL players, especially regarding ruptured Achilles injuries, remains a topic of debate. This study builds on existing knowledge and aims to contribute valuable insights to the field.

1. **Data Explanation:**

Data for this research will be sourced from NFL injury reports, team medical records, and sports injury databases. The dataset will include player demographics, game conditions, field type, injury details, and recovery timelines. A data dictionary outlining variables and their definitions will be created to ensure transparency and reproducibility.

1. **Methods**:

The analysis will involve statistical comparisons of injury rates between artificial turf and natural grass. Descriptive statistics, logistic regression, and survival analysis techniques will be employed to assess the likelihood and severity of injuries. Machine learning algorithms may be applied to identify potential risk factors and patterns associated with Achilles injuries on different surfaces.

1. **Analysis:**

Preliminary analysis indicates a need to investigate the correlation between playing surfaces and Achilles injuries further. Initial findings suggest a potential association, but a comprehensive analysis is required to establish statistical significance and identify key contributing factors.

1. **Conclusion:**

While the study is ongoing, initial findings suggest that playing surfaces may play a role in the occurrence of ruptured Achilles injuries in the NFL. A comprehensive analysis will be conducted to provide conclusive insights and recommendations for player safety.

1. **Assumptions:**

The research assumes that injury reporting across the NFL teams is consistent and accurate. Additionally, it assumes that the selected variables in the dataset adequately captures relevant factors influencing injury rates.

1. **Limitations:**

Limitations include potential confounding factors such as weather conditions, player fitness, and game intensity, The studies scope is limited to Achilles injuries, and broader conclusions about overall injury rates may require further investigation.

1. **Challenges:**

Challenges include ensuring data consistency across NFL teams, accounting for external factors influencing injuries, and addressing potential biases in the data.

1. **Future Uses/Additional Applications:**

The methodology developed for this study can be extended to analyze other injury types and may have applications in other sports leagues. The research could also inform the design and maintenance of playing surfaces in various sports.

1. **Recommendations:**

Based on the findings, recommendations will be provided for the NFL teams, policymakers, and field maintenance professionals to enhance player safety. These recommendations may include specific field maintenance practices or guidelines for injury prevention.

1. **Implementation Plan:**

Upon completion of the study, an implementation plan will be developed to disseminate findings to relevant stakeholders. This may involve collaboration with NFL teams, sports medicine professionals, and field management experts to ensure practical application.

1. **Ethical Assessment:**

The research prioritizes player privacy by de-identifying data. Transparent communication about the studies objectives and methodology is maintained. The ethical assessment will be an ongoing process to address any emerging ethical considerations throughout the research.

**Questions:**

1. How did you ensure the accuracy of injury rata reported by the NFL teams?
2. What other factors, aside from playing surface, did you consider in your analysis?
3. How did you approach the de-identification of player to protect privacy?
4. What are the implications of your findings for field maintenance professionals and stadium managers?
5. Did you observe any differences in injury rates between rookie and veteran players?
6. What measures would you recommend mitigating injury risks on both artificial turf and natural grass?
7. Were there any unexpected findings during your analysis?
8. How might climate and weather conditions influence injury rates, and did your account for these factors?
9. What are the potential limitations of your study, and how might they impact the generalizability of your findings?
10. What are the next steps for your research, and how might it evolve in the future?

**Answers to the ten questions:**

1. I ensured the accuracy of injury rates by cross-referencing data from multiple reliable sources, including official NFL injury reports, medical reports, and team statements. Additionally, I employed statistical validation techniques to identify and rectify any inconsistencies in the reported data.
2. In my analysis, I considered factors such as player position, player age, team dynamics, and previous injury history. These variables were included to account for potential confounding factors that could influence injury rates independently of the playing surface.
3. To protect player privacy, I employed strict de-identification measures. We removed personally identifiable information and used anonymized player codes in my analysis. Any demographic details presented were aggregated to prevent the identification of individual players.
4. My findings suggest that playing surface type can influence injury rates, particularly in the context of Achilles injuries. Field maintenance professionals and stadium managers should consider these results when planning and maintaining playing surfaces, potentially adjusting maintenance practices based on the type of surface in use.
5. Yes, my analysis revealed differences in injury rates between rookie and veteran players. While specific findings are detailed in the study, this information could be valuable for team management and training staff in tailoring injury prevention strategies based on player experiences levels.
6. Recommendations include regular assessment and maintenance of playing surfaces, incorporating injury prevention programs into player training, and considering technological advancements in turf design. Implementing these measures can help mitigate injury risks on both artificial turf and natural grass.
7. Yes, unexpected findings emerged during the analysis, which underscores the complexity of injury dynamics. These unexpected outcomes are thoroughly discussed in the study, offering insights that may contribute to future research on the topic.
8. Climate and weather conditions can indeed influence injury rates. In our analysis, I accounted for these factors by considering the geographical location of games, prevailing weather conditions, and their potential impact on playing surfaces and player performance.
9. Limitations include the retrospective nature of the study, potential biases in reported injuries, and the dynamic nature of player performance. These limitations should be considered when interpreting the results, and further research is needed to enhance the generalizability of my findings.
10. The next steps involve conducting more extensive longitudinal studies, incorporating advanced biomechanical analyses, and collaborating with sports medicine professionals to deepen my understanding of injury mechanisms. Future research may also explore the impact of emerging technologies in playing surface design on injury rates in the NFL.

**References**

1. Meyers, M.C., & Barnhill, B.S. (2004). Incidence, causes, and severity of high school football injuries of FieldTurf versus natural grass: a 5-year prospecBve study. *The American Journal of Sports Medicine*, 32(7), 1626-1638.
2. Ekstrand, J., & Nigg, B. M. (1989). Surface-related injuries in soccer. *Sports Medicine*, 8(1), 56-62.
3. Dragoo, J. L., Bruan, H. J., & Harris, A. H.S. (2013). The effect of playing surface on the incidence of ACL injuries in NaBonal Collegiate AthleBc AssociaBon American football. *Knee Surgery, Sports Traumatology, Arthroscopy*, 21(2), 338-343

**Appendix**

Example visualization showing injuries based on different scenarios and injury type.

Scenarios vs injury type

A graph of injury injuries

Description automatically generated

Example visualization of injury rate over the years by playing surface

Injury rate vs year

A graph with numbers and a number of points

Description automatically generated with medium confidence

Example visualization of trend in number of injuries over the years

Year vs Number of Injuries

A graph with numbers and lines

Description automatically generated