**Is there correlation between playing conditions and injury risk to NFL players? Do factors like playing surface, weather, and play type influence the risk to players?**

Recently in popular media there have been increased conversations about the dangers of participating in professional sports. While each sport has some risk associated with participation, some of the more gruesome and long lasting injuries occur within the National Football League. Chronic traumatic encephalopathy (CTE) has dominated the niche conversation between medical science and the average fan. Studies surrounding concussions in the NFL have contributed to the overall conversation of athlete health. While these conversations around CTE are extremely important and have benefitted all parties involved, we aim to look more generally at injuries and the factors that cause them. Specifically we ask, is there a correlation between playing conditions and injury risk to NFL players? Do factors like playing surface, weather, and play type influence the risk to players?

The NFL adopted a system in the 1980s through which they can gather data on injuries that occur over the course of the 16 game season (Hershman). These data contribute not only to direct advancements in medical technologies and practices, but also to the individual treatment for athletes. With these data at their disposal, trainers and physicians can better document and assess injuries. Dynamic plans of treatment on a daily basis can be produced to efficiently return athletes to satisfactory health and play. To classify an injury under the NFL Injury Surveillance System: “Any injury that caused cessation of an athlete’s customary participation throughout two participation days after the day of onset” (Orchard). Using this definition as it pertains to injuries, with the exception of fractures and concussions, experts can better diagnose athletes and establish a recovery timeline.

Research and studies conducted surrounding our aforementioned variables can contribute to changes in rules and regulations, and advancements in performance and medical technologies. There are now conversations around removing the traditional kick-off from football as it is widely accepted as the single highest risk play of the game. This can be attributed to the high speed collisions that occur due to the longer duration in which opposing athletes can accelerate (Richardson). In considering the heightened risk of this play, a minor rule change was made to encourage returnmen to take a touchback (essentially giving themselves up in the endzone). Rather than beginning the drive at the 20 yard line, offenses start off at the 25 yard line. From an equipment standpoint, cleat, pad, and helmet options have greatly increased since the time of leather helmets. Players can now choose specific cleat length that is optimal for the weather and surface conditions of the game.

Our data comes from a competition held by Kaggle and the National Football League(NFL). The NFL provided this data by using Next Gen Stats, which allows them to capture real time location data, speed and acceleration for every player and play on the field. The dataset is a collection of 250 players over two regular season schedules. 100 of the athletes from the data set have experienced one or more injuries that fall under “non-contact” injury that may have turf interaction as a contributing factor to injury. The remainder, 150 athletes, serve as a sample of the larger NFL population that did not sustain a non-contact lower limb injury. In addition to player-tracked data, we were also provided the surface type and environmental parameters that may have influenced performance and outcomes. In doing this, we can better understand the conditions under which players get injured such that adjustments can be made by individuals and organizations to reduce the risk of injury.

**References**

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Richardson, Zachary and Lindrooth, Richard (2018): *The impact of NFL kickoff rule changes on player injuries: Forgoing excitement to reduce injuries?*

Extra:

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Heatmap of field showing areas of high vs low injury risk

Awareness around cte and concussions has induced response from the general public