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What Data Tells Us About Injuries in Professional Sports

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Sports are filled with all kinds of exciting and unforgettable moments. Fans from every walk of life almost religiously tune in to see the players that have come to dominate prime-time television and the culture at large. But beyond the glory, defeat, and theatrics is the difficult reality behind professional sports: injuries. Injuries are an ever present and largely unavoidable part of professional sports. Every year, star-players are relegated to the sidelines due to injuries on the field, and their respective teams spend what amounts to billions annually on injury-related medical expenses. With players, their teams, and fans collectively at their mercy, it begs the question: which athletes are getting hurt the most, and what does it say about their respective sport?

That's the question we are determined to answer. Before researching and analyzing datasets, our team made predictions to use as references for how productive our chosen study is at answering our question:

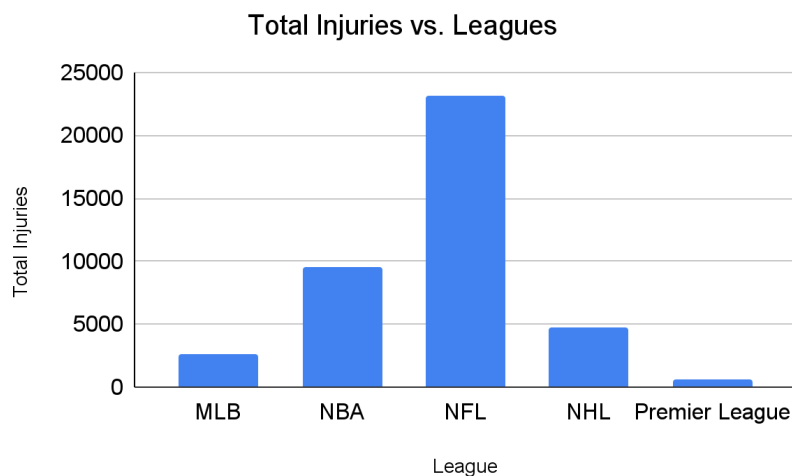
- Due to the high-contact nature of the sport, the National Football League (NFL) and National Hockey League (NHL) experience the highest number of injuries compared to the other leagues.
 - The NHL players will most frequently experience upper-body injuries, particularly to the shoulders, due to body checking against boards and other players.
 - The NFL players are most prone to knee and ankle injuries from sprinting and frequent collisions, even more than the highly publicized head injuries, as they would take hits to the lower body as they are getting tackled, in contrast to the head.
- Due to constant physical strain from high-intensity repetitive movements, the National Basketball Association (NBA) and Premier League (EPL) would experience lower-body injuries.
 - EPL and NBA players are prone to leg injuries due to the amount of running, kicking, juggling, and intense rapid redirection.

Now using five years of data across the NFL, NBA, NHL, Major League Baseball (MLB), and EPL, we dived into the numbers to find out where injuries happen most, what kinds of injuries are most common, and how the different sports show different injury results in their players. For

athletes in today's most competitive leagues, there is a thin line between physical glory and total breakdown.

The NFL: High Contact, High Injury

According to a dataset created by Chernak, our data analysis showed that the National Football League (NFL) had the highest number of reported injuries, with over 23,000 incidents logged in just five seasons. While the physicality of football is apparent, the idea that this number is more than double the second-place league is mind-boggling - suggesting a unique injury factor in this sport as compared with others (Chernak, 2021).



Data Visualization 1: Total Injuries per League

Knee and ankle injuries dominated the NFL data, aligning with the sport's explosive movements and driving contact. While head injuries garner the most attention in the media (likely due to a host of high-profile CTE-induced incidents), most NFL players will encounter a knee or ankle injury many times before they ever suffer a head injury. It is perhaps the severity of a head injury, not the frequency, that drives the constant attention. While a knee or ankle injury can be resolved in relatively short order and will have few latent consequences, head injuries in the NFL will necessarily involve a longer recovery period and affect the player for years after the injury has occurred. While head injuries can be catastrophic when they occur, our data suggested that they were not as common as most people have been led to believe, and the figures have been improving in recent years due to a crackdown on head-to-head contact rules and improvements in helmet technology.

The NBA: High Intensity

Second in total injuries reported was the National Basketball League (NBA). Despite the lower contact nature of this sport, our analysis proved the physical intensity of basketball's quick direction changes and repetitive movements to be more strenuous than other physical sports.

Lower body injuries were most common in the NBA, specifically in the knees and ankles. As we discussed in ASC, they constantly move from one side of the court to the other, leading their ankles to be overworked and worn out. For the knees, if they are constantly jumping to shoot or block a shot, their knees or ankles may come into contact with the opponents, which could lead to this common injury. Even just jumping and overworking it will lead to immediate injuries occurring. Shockingly similar injuries to the NFL, regardless of the ways these injuries are produced, we see a clear relationship between these two leagues' most common injuries.

The NHL: Hard Hitters

Any sports enthusiast would argue that the NHL would rival the NFL in injury counts and severity. But our findings revealed that the NHL reported significantly fewer injuries than both the NFL and the NBA. This raised questions about the reporting standards and the effectiveness of protective equipment.

Upper body injuries were most common in the NHL, with the majority being shoulder injuries. Discussed in the ASC Podcast, these shoulder injuries are likely due to frequent checks into the boards and high-speed contact from man-on-man contact. Yet, the lack of total injuries might be a result of the NHL's equipment standards, which protect these players more than any other sport we studied.

While we can only speculate as to why the NHL is so much safer than its reputation might suggest, it is immediately apparent that NHL players wear far more protective equipment than nearly any other sport we monitored. It would seem that players move faster and more recklessly than other sports, but they are simultaneously clad in protective padding specific to their position and level of risk exposure. The goalie, for instance, had his own specialized set of equipment designed to incur impact from fast rubber pucks, which would otherwise devastate a regular player. There was also some discussion as to whether players feel empowered by the equipment to make more reckless decisions, or whether the equipment serves to remind them of how dangerous the sport can be - it is difficult to definitively say much else about the equipment beyond it being more physically protective than not.

MLB and EPL: Repetition and Endurance

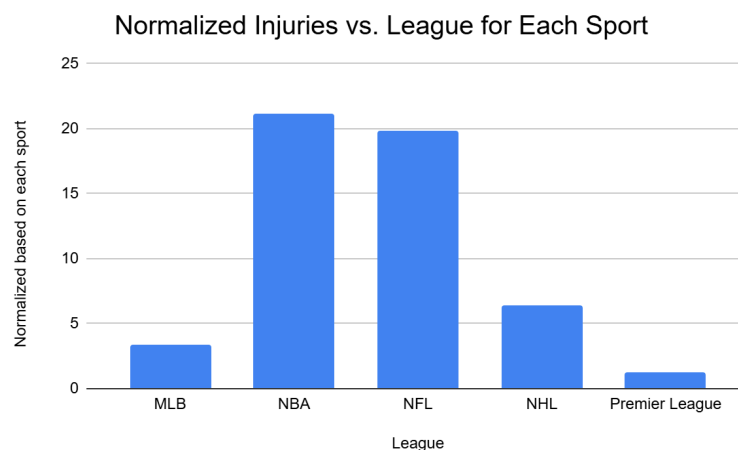
MLB and the Premier League had lower total injuries, but we were able to identify unique trends. In baseball, shoulder and elbow injuries dominated the league, likely as a result of pitching injuries related to repetitive high-speed movement throughout the game. As discussed in the ASC podcast, the pitchers are constantly throwing pitches at around 90-100 miles per hour and are throwing around 70-80 pitches in a game or even more, resulting in their elbows and shoulders wearing out, and they would need rest days after a game. When comparing this to what the other positions on the field do, they would have to be ready for any play to happen to them,

but they wouldn't have to be the ones constantly throwing on every single play like the pitcher would.

In soccer, the most common injury locations are the hamstrings and knees. Soccer injuries can be related to similar situations seen in other sports. The intense movements produce strain on the knees and other joints, as seen in the NBA. And the repetitive running throughout the game results in extreme strain on muscles like the hamstrings, which are being used for nearly the whole game by running up and down the field, similar to pitchers in the MLB.

Adjustments

Raw injury counts do not tell the whole story. Each sport consists of different numbers of players, different numbers of teams, games played, length of games, etc. To level the playing field, we normalized the data based on league size. What resulted was truly a surprise: the NBA experiences the most injuries on a per-player basis.

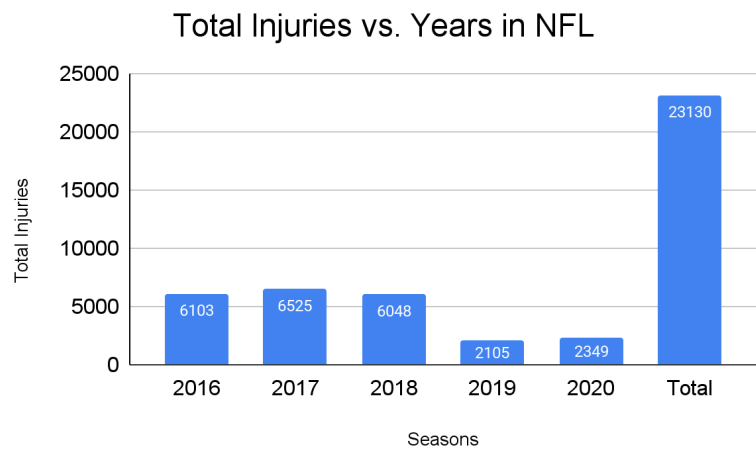


Data Visualization 2: Normalized Total Injuries per League

While the rest of the data seems unchanged, there is still a lot to unpack here. Firstly, the Premier League has a surprisingly low number of injuries per player. We know soccer to be highly strenuous on the legs of all players, yet it does not show in this new data. Next, we see the NFL and NBA having significantly more injuries than the other three leagues. To better understand why this is and how it should be interpreted, we researched further. Clarifying that the NFL plays 17 regular-season games a season, while the NBA and NHL play about 82 regular-season games, we can now clearly see the NFL continues to produce the most injuries compared to any other sport we've identified. In addition, the NHL has significantly fewer injuries than the NBA, given they play the same number of games in any given season.

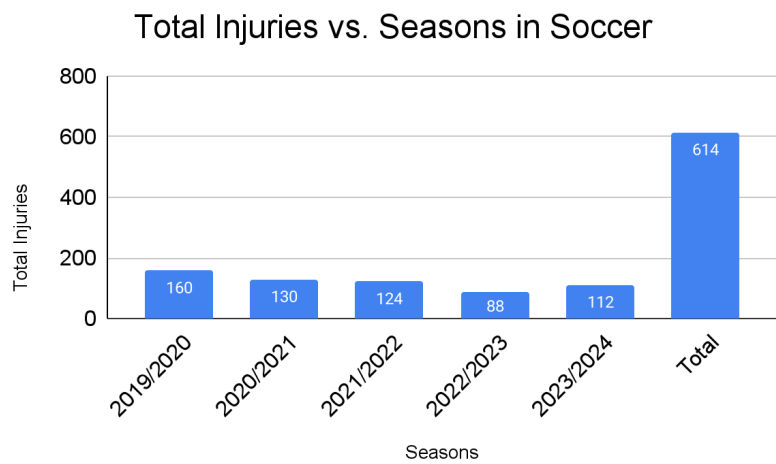
Injuries Over Time

Another trend we found was a slight decline in overall injuries across the five sports over the five years. Particularly in the NFL and EPL, new safety protocols, possible heightened medical oversight, and conditioning training might be proving to have a real difference.



Data Visualization 3: NFL Total Injuries vs. Years

An article by ESPN indicates that the NFL is taking the initiative to allow Guardian Caps in the regular season as of last year to protect against head injuries. It was mandated to wear during the training camp for the 2022 and 2023 seasons. They found some vital results, as the “... NFL executive vice president Jeff Miller said that Guardian Caps have contributed to a nearly 50% reduction in concussions for the position groups that wore them during those time periods.” This is significant as it demonstrates how they are taking initiatives to lower the amount of head injuries occurring, playing a key role in helping safety for the players and their mental health. (Seifert, 2024)



Data Visualization 4: EPL Total Injuries vs. Years

Still, injuries persist. While more equipment can protect from certain injuries, soft tissue injuries are more challenging. There is more work to be done to assist in preventing all kinds of injuries.

The Future of Sports

As we look to the future of these leagues, this data can reshape how sports organizations understand player health. By tailoring player conditioning to strengthen injury-prone locations or developing newer and smarter equipment, we can improve the quality of life of our idolized players and ultimately extend their careers and impact on their sports.

Concluding Remarks

Professional sports offer a lot to audiences; compelling stories, larger-than-life characters, etc. Audiences resonate with these games precisely because the stakes are so high. The more there is on the line, the more interested fans are likely to be. Tacitly included in that equation is the potential for injury, which can devastate teams, players, and fans alike.

Our research highlights that while injuries may always be a part of sports, they do not have to remain unpredictable. With heightened understanding of injury data, by applying this to players' training and daily routines, teams and their athletes can make informed decisions that reduce risk and promote health and longevity in the sport.

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