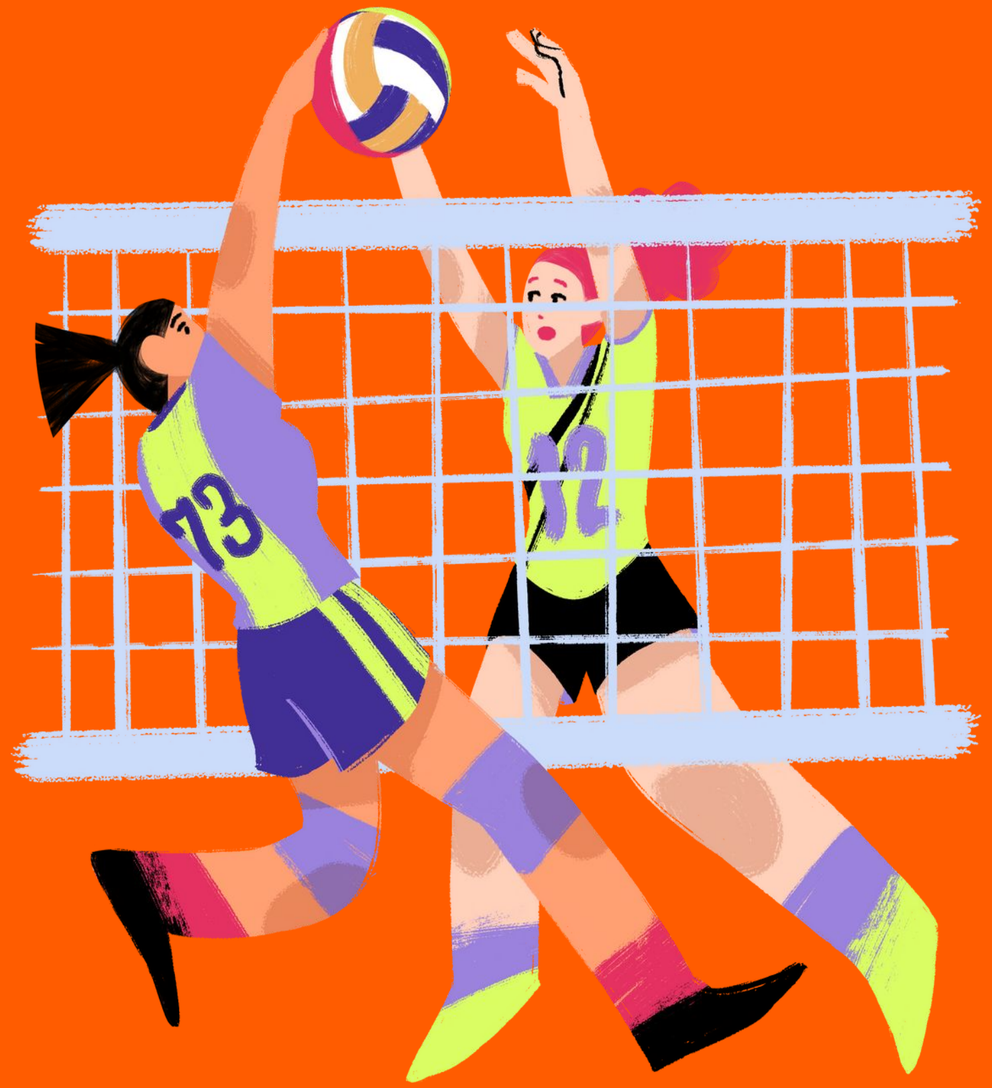
SPORTS INJURIES: Misconceptions in Athletics

By Joseph Angarola, Owen Carter, and Deep Shah

Table of Contents

1. Research Question
2. Literature and Theoretical Motivation
3. Data and Background
4. Research Methods
5. Findings
6. Implications
7. Conclusion



RESEARCH QUESTION

Do popular notions about injury prevalence in sports comport with the data?

Motivation

Why Does The Data Matter?

1. Injuries can prematurely end player prospects
2. Injuries can incur losses in revenue for leagues
3. Proactive trainers can potentially mitigate injuries if they are familiar with the data
4. Athletes themselves suffer the physical and mental consequences of injuries

Literature and Theoretical Motivation (1)

A more thorough understanding of injury occurrence allows for:

- more proactive training regiments
- more preventative measures
- more precise gametime decision making
- greater ability to make risk-assessments

Injuries are a reality of competitive sports, but we can use data to dampen their impact on leagues, fans, and the players themselves

Literature and Theoretical Motivation (2)

The “Cost” of Injuries

- The Premier League lost almost $325M over the 2023 season
- The NBA loses almost $350M every season
- In 2022, the NFL paid out nearly $800M to injured players
- Players lose career prospects during injury recovery
- Fans receive an inferior product when injuries occur

Injuries inevitably cause financial loss - the scale of which is proportional to the popularity/prominence of the player

The Data

5 Leagues

EPL - Soccer (Premier League)

MLB - Baseball (Major League Baseball)

NBA - Basketball (National Basketball Association)

NFL - Football (National Football Association)

NHL - Hockey (National Hockey League)

5 Seasons

Most recent data available

Data Types

EPL

csv | Kaggle | 2019-2023 Player Injury

MLB

csv | GitHub | 1999-2017 Player Injury

NBA

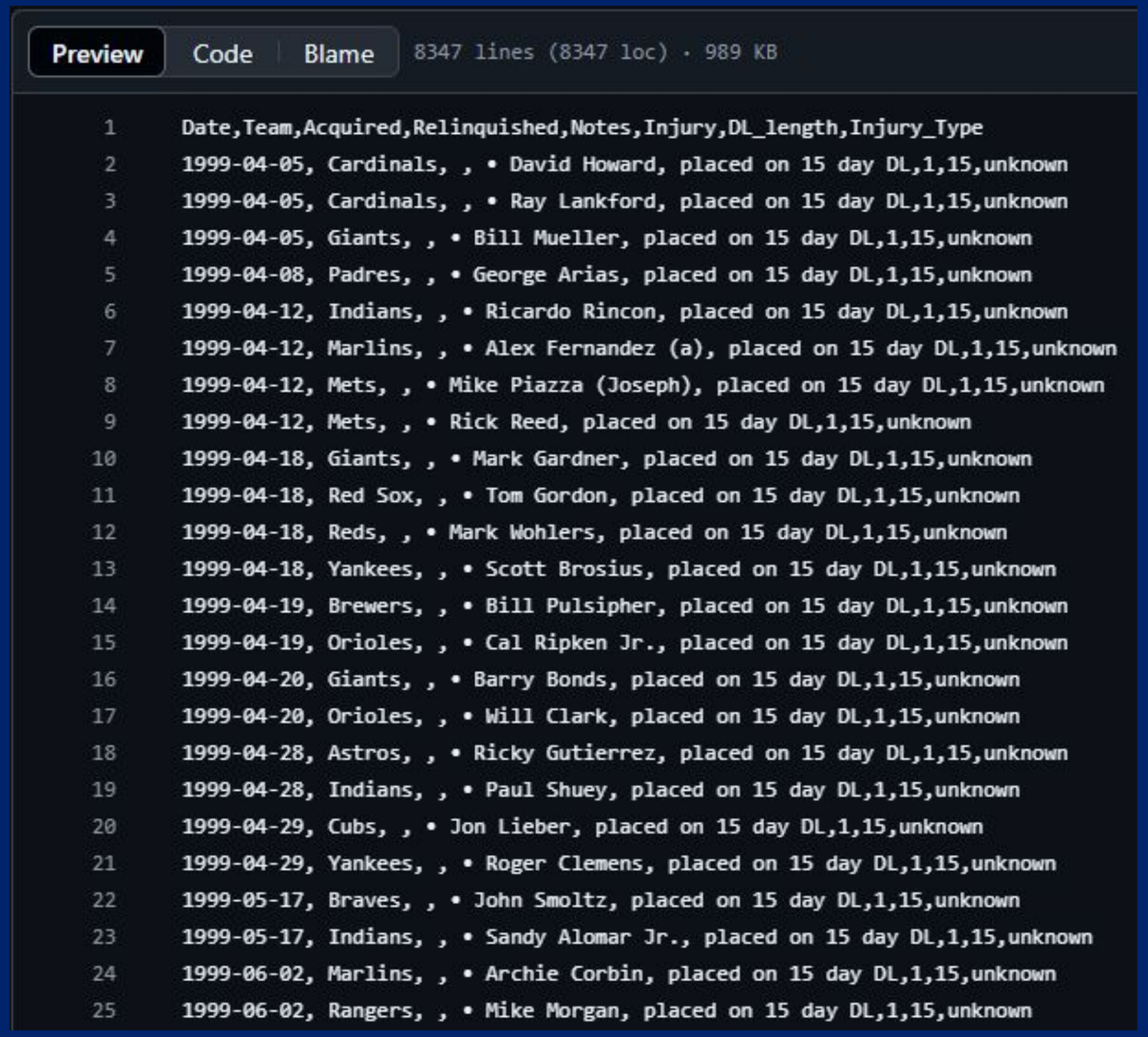
csv | Kaggle | 2010-2020 Player Injury

NFL

csv | GitHub | 2009-2020 Player Injury

NHL

csv | Viz Blog | 2000-2025 Player Injury



Preview | Code | Blame | 8347 lines (8347 loc) · 989 KB

```
Date,Team,Acquired,Relinquished,Notes,Injury,DL_length,Injury_Type
1999-04-05, Cardinals, , • David Howard, placed on 15 day DL,1,15,unknown
1999-04-05, Cardinals, , • Ray Lankford, placed on 15 day DL,1,15,unknown
1999-04-05, Giants, , • Bill Mueller, placed on 15 day DL,1,15,unknown
1999-04-08, Padres, , • George Arias, placed on 15 day DL,1,15,unknown
1999-04-12, Indians, , • Ricardo Rincon, placed on 15 day DL,1,15,unknown
1999-04-12, Marlins, , • Alex Fernandez (a), placed on 15 day DL,1,15,unknown
1999-04-12, Mets, , • Mike Piazza (Joseph), placed on 15 day DL,1,15,unknown
1999-04-12, Mets, , • Rick Reed, placed on 15 day DL,1,15,unknown
1999-04-18, Giants, , • Mark Gardner, placed on 15 day DL,1,15,unknown
1999-04-18, Red Sox, , • Tom Gordon, placed on 15 day DL,1,15,unknown
1999-04-18, Reds, , • Mark Wohlers, placed on 15 day DL,1,15,unknown
1999-04-18, Yankees, , • Scott Brosius, placed on 15 day DL,1,15,unknown
1999-04-19, Brewers, , • Bill Pulsipher, placed on 15 day DL,1,15,unknown
1999-04-19, Orioles, , • Cal Ripken Jr., placed on 15 day DL,1,15,unknown
1999-04-20, Giants, , • Barry Bonds, placed on 15 day DL,1,15,unknown
1999-04-20, Orioles, , • Will Clark, placed on 15 day DL,1,15,unknown
1999-04-28, Astros, , • Ricky Gutierrez, placed on 15 day DL,1,15,unknown
1999-04-28, Indians, , • Paul Shuey, placed on 15 day DL,1,15,unknown
1999-04-29, Cubs, , • Jon Lieber, placed on 15 day DL,1,15,unknown
1999-04-29, Yankees, , • Roger Clemens, placed on 15 day DL,1,15,unknown
1999-05-17, Braves, , • John Smoltz, placed on 15 day DL,1,15,unknown
1999-05-17, Indians, , • Sandy Alomar Jr., placed on 15 day DL,1,15,unknown
1999-06-02, Marlins, , • Archie Corbin, placed on 15 day DL,1,15,unknown
1999-06-02, Rangers, , • Mike Morgan, placed on 15 day DL,1,15,unknown
```

Cleaning the Data

Step 1

Gather and sort all datasets in Excel for each league

Step 2

Filter datasets to include only the most recent 5 seasons

Step 3

Manually input injury location based on muscle/injury type

League	Date	Injury_Type	Injury Location	Injury Type
MLB	3/28/2013	concussion	Head	Concussion
MLB	3/29/2013	strained right elbow (surgery)	Elbow	Strain
MLB	3/29/2013	strained right rotator cuff	Rotator Cuff	Strain
MLB	3/30/2013	torn labrum in left shoulder	Shoulder	Torn Cartilage

Displaying Data

Step 1

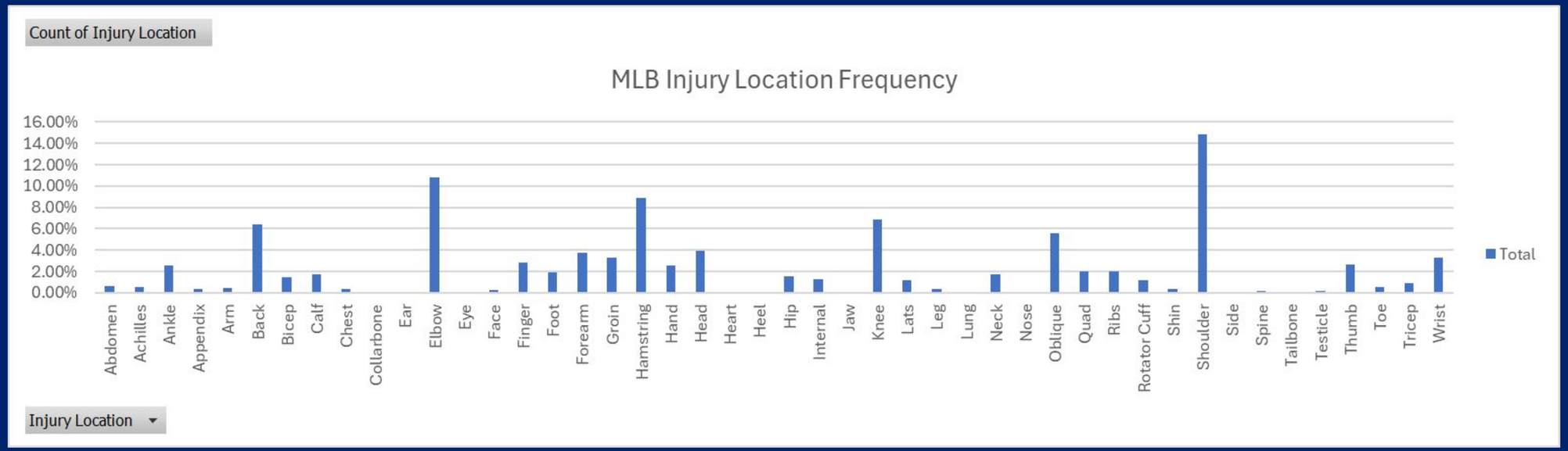
Insert pivot tables in Excel to pull necessary data

Step 2

Insert graphs to show each injury and its occurrence per sport

Step 3

Insert graphs to directly compare each sport's top injuries



Normalizing the Data

Step 1

Determined the number of teams in each league

Step 2

Determined the number of players on each team

Step 3

Calculate the total number of players per league for a given season

Step 4

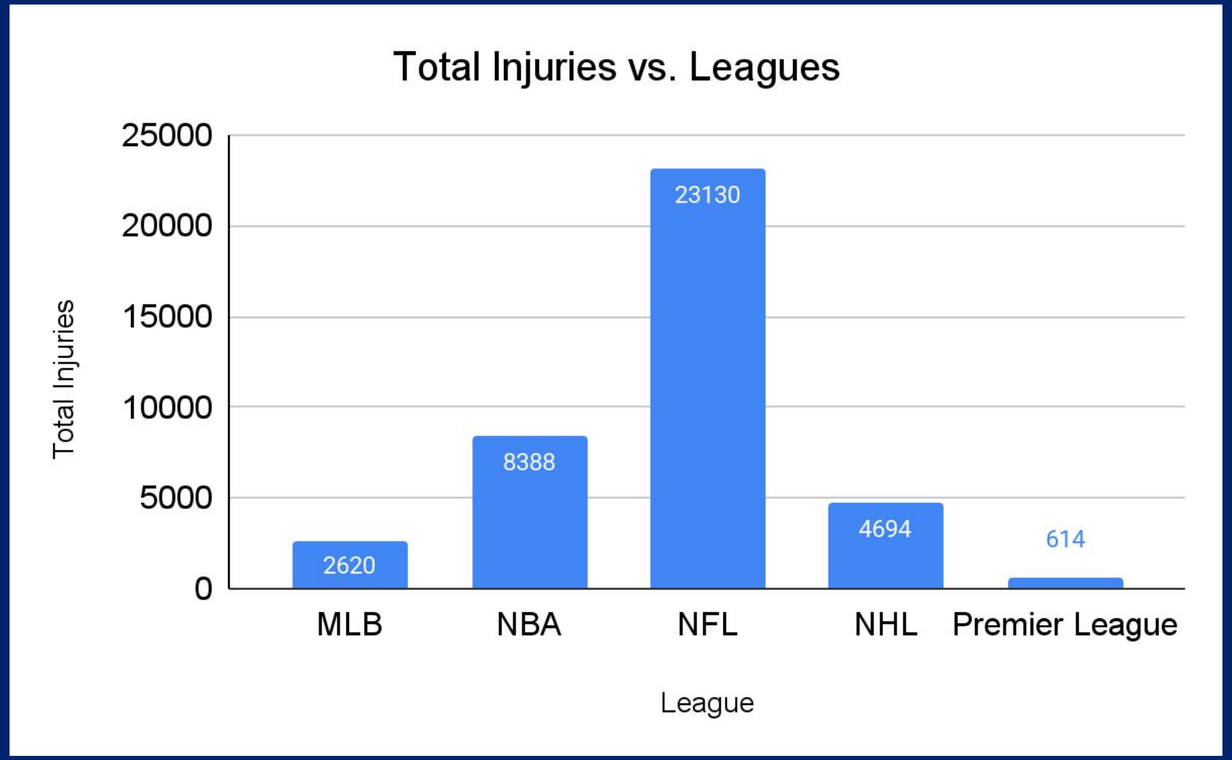
Determine the total injuries throughout 5 years from the pivot table in Excel

Step 5

Divide the total number of injuries per player by the total number of players in each league for a given season

League	Total Injuries Throughout 5 years	League	Normalized Injuries	League	Total Players in Each League
MLB	**2620**	**MLB**	=B2/F2	**MLB**	780
NBA	**9504**	**NBA**	=B3/F3	**NBA**	450
NFL	**23,130**	**NFL**	=B4/F4	**NFL**	1164
NHL	**4694**	**NHL**	=B5/F5	**NHL**	736
Premier League	**614**	**Premier League**	=B6/F6	**Premier League**	500

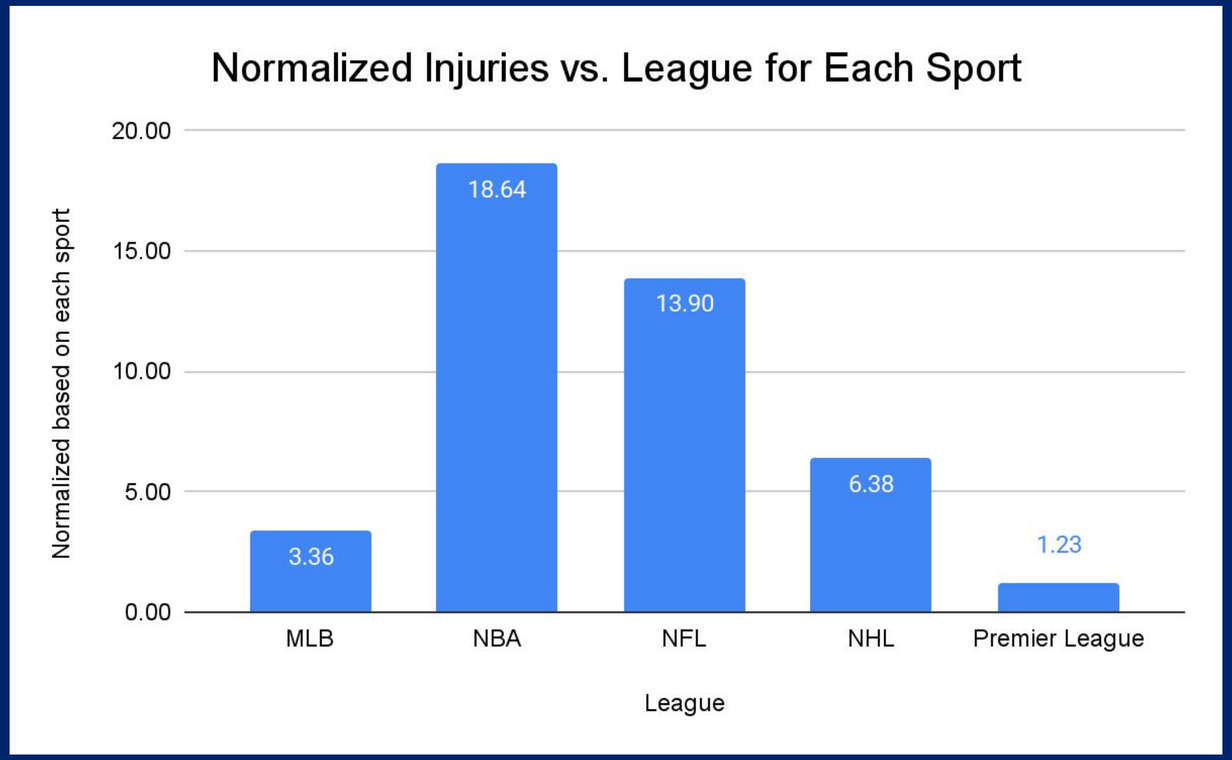
Findings - Total Injuries



The NFL reported roughly 23,000 injuries. Followed by NBA, NHL, MLB, then EPL.

Surprising Point: NBA players suffered more injuries than NHL, which experiences more contact.

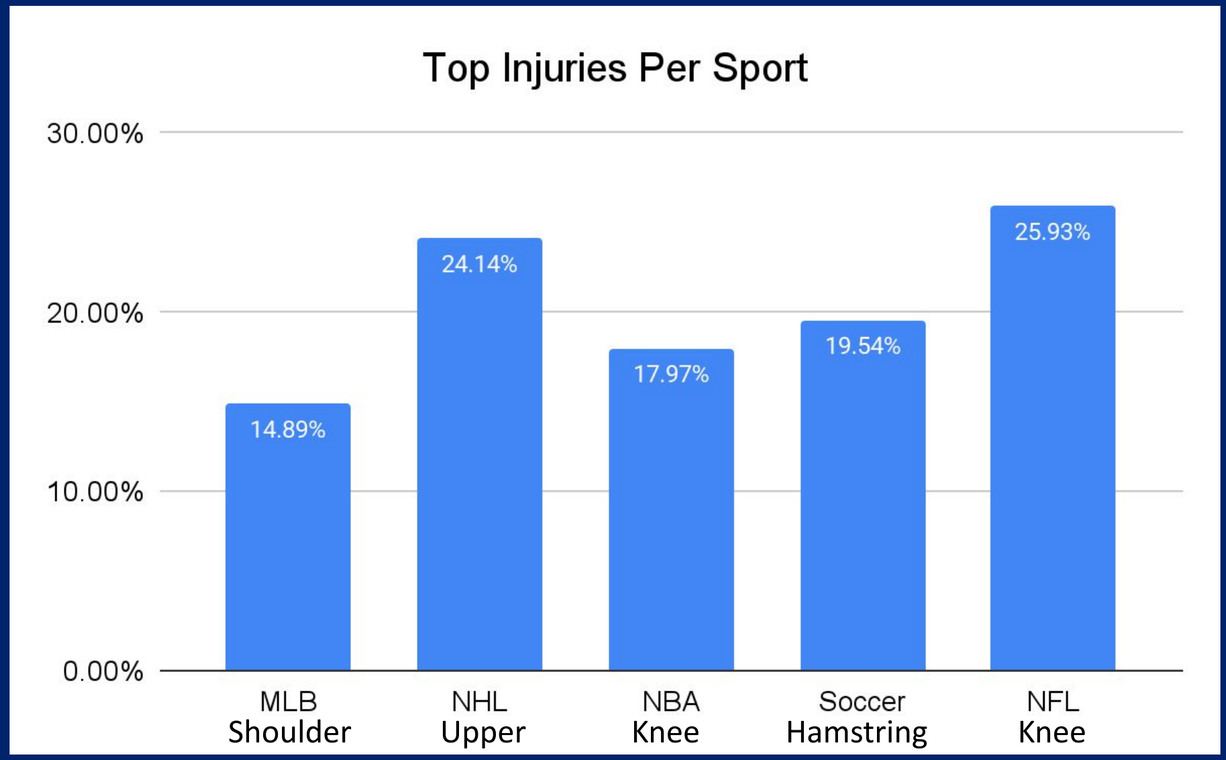
Findings - Normalized



After normalization - calculating injuries per player - NBA players experience injuries most frequently with 21 injuries reported per player over 5 seasons.

NBA = 450 Players | NHL = 736 Players | NFL = 1164 Players | MLB = 780 Players | Premier League = 500 Players

Findings - Injury Locations



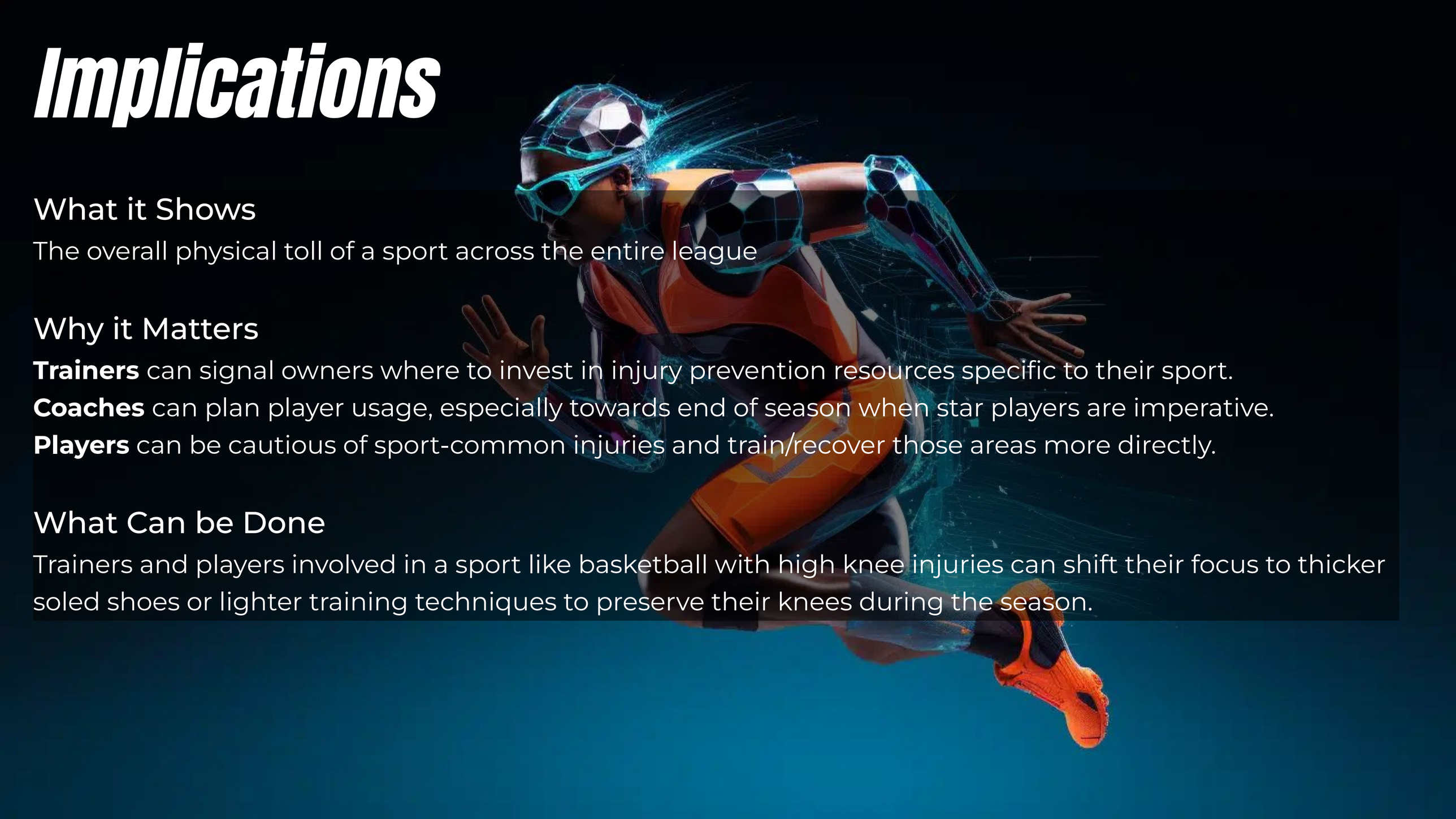
Knee injuries dominate the NBA and NFL, likely from intense and repetitive impact.

Soccer players experience frequent hamstring injuries.

Shoulder injuries dominate Major League Baseball, likely due to pitcher strain.

NHL players are overwhelmed by upper body injuries, specifically to the head and shoulders.

Implications



What it Shows

The overall physical toll of a sport across the entire league

Why it Matters

Trainers can signal owners where to invest in injury prevention resources specific to their sport.
Coaches can plan player usage, especially towards end of season when star players are imperative.
Players can be cautious of sport-common injuries and train/recover those areas more directly.

What Can be Done

Trainers and players involved in a sport like basketball with high knee injuries can shift their focus to thicker soled shoes or lighter training techniques to preserve their knees during the season.

Conclusions

After normalizing and filtering the datasets. we were able to prove that:

1. NBA Players are most prone to injuries
2. Premier League are the least prone to injuries
3. Knee Injuries are most prominent and common injury for NBA and NFL players
4. Hamstrings are most common injury for ELP players
5. Upper Body are the most common injury NHL players

Impact of Our Research

- Highlights that while injuries may always be a part of sports, they do not have to remain unpredictable
- Through the application of the data 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

References

1. TOI Sports Desk / TIMESOFINDIA.COM / Sep 21, 2024. “Top 10 Richest Sports Leagues in the World Including National Football League, Indian Premier League, and Others:” *The Times of India*, TOI, timesofindia.indiatimes.com/sports/top-10-richest-sports-leagues-in-the-world-including-national-football-league-indian-premier-league-and-others/articleshow/113548384.cms. Accessed 3 May 2025.
2. Basketball Motivation Royalty-Free Images, www.shutterstock.com/search/basketball-motivation. Accessed 3 May 2025.
3. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.statsignificant.com/p/whats-the-true-cost-of-nfl-injuries&ved=2ahUKEwiO1-fx1YqNAxU4LVkFHcJaKIcQFnoECBMQAw&usg=AOvVaw2Dov69Hh7_b-nxy5UTZS7g

STEVENS
INSTITUTE OF TECHNOLOGY
1870

THANK YOU

Stevens Institute of Technology
1 Castle Point Terrace, Hoboken, NJ 07030