



# Draw 2: Identifying Key Players in Drawing NHL Power Plays

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## Background & Introduction



### Penalty Pathway

Connor McDavid and Michael Bunting lead the league in the 2022-2023 NHL season for penalties drawn with 45 and 43 penalties drawn respectively.

Given McDavid and Bunting have a substantial count of penalties drawn, does this indicate their ability to create power play opportunities? Are these events where penalties are drawn leading to power plays or are other penalties that occur at the same time offsetting these results?

Our focus in this project was to determine what NHL players draw the most power plays.

## Data

For this project we used the hockeyR package in R for the play-by-play data for each season and scraped the player statistics for each season from natural stat trick. By wrangling the data we created 3 metrics.

### hockeyR:

Using the hockeyR play-by-play data we created variables for penalty events that represent the player who the penalty is on, drew by, and who, if applicable, drew the power play.

### Natural Stat Trick:

From the natural stat trick website we scraped data regarding players time on ice and games played statistics for the regular season and playoffs.

### Created Metrics: Counts and Per 60

To create the counts we summed by player ID for the created variables in the play-by-play data. Then to create the per 60 statistics for these metrics we used games played and time on ice from the natural stat trick data.

General Equation to calculate per 60 statistic:

$$Per\ 60\ Stat = \frac{Total\ Count}{Total\ Time\ On\ Ice} * 60$$

Penalty On	Player whos is guilty of penalty
Drew By	Player who drew the penalty
Drew Power Play	Player who drew the power play

Each of the created variables in the play-by-play data also have corresponding player id and team columns.

**IMPORTANT:** New metrics track player actions: penalties taken, penalties drawn, and power plays drawn. Player's are only credited once even if they draw multiple penalties at a given time in the game.

## Methodology

In order to evaluate the repeatability of our new power plays drawn metric we used a simple linear regression model.

Simple Linear regression model equation:

$$PP\ Drawn_x = \beta_0 + \beta_1 (PP\ Drawn_{x-1})$$

where:

x is the response season  
x - 1 is the previous season, (explanatory)

### R-Squared results from Linear Regression Model

Response Season	Explanatory Season	R-Squared
2022-2023	2021-2022	0.324
2021-2022	2020-2021	0.279
2020-2021	2019-2020	0.313
2019-2020	2018-2019	0.301
2018-2019	2017-2018	0.284
2017-2018	2016-2017	0.323
2016-2017	2015-2016	0.327
2015-2016	2014-2015	0.281
2014-2015	2013-2014	0.311

LINK TO SHINY APP



Currently optimized for displaying on computer

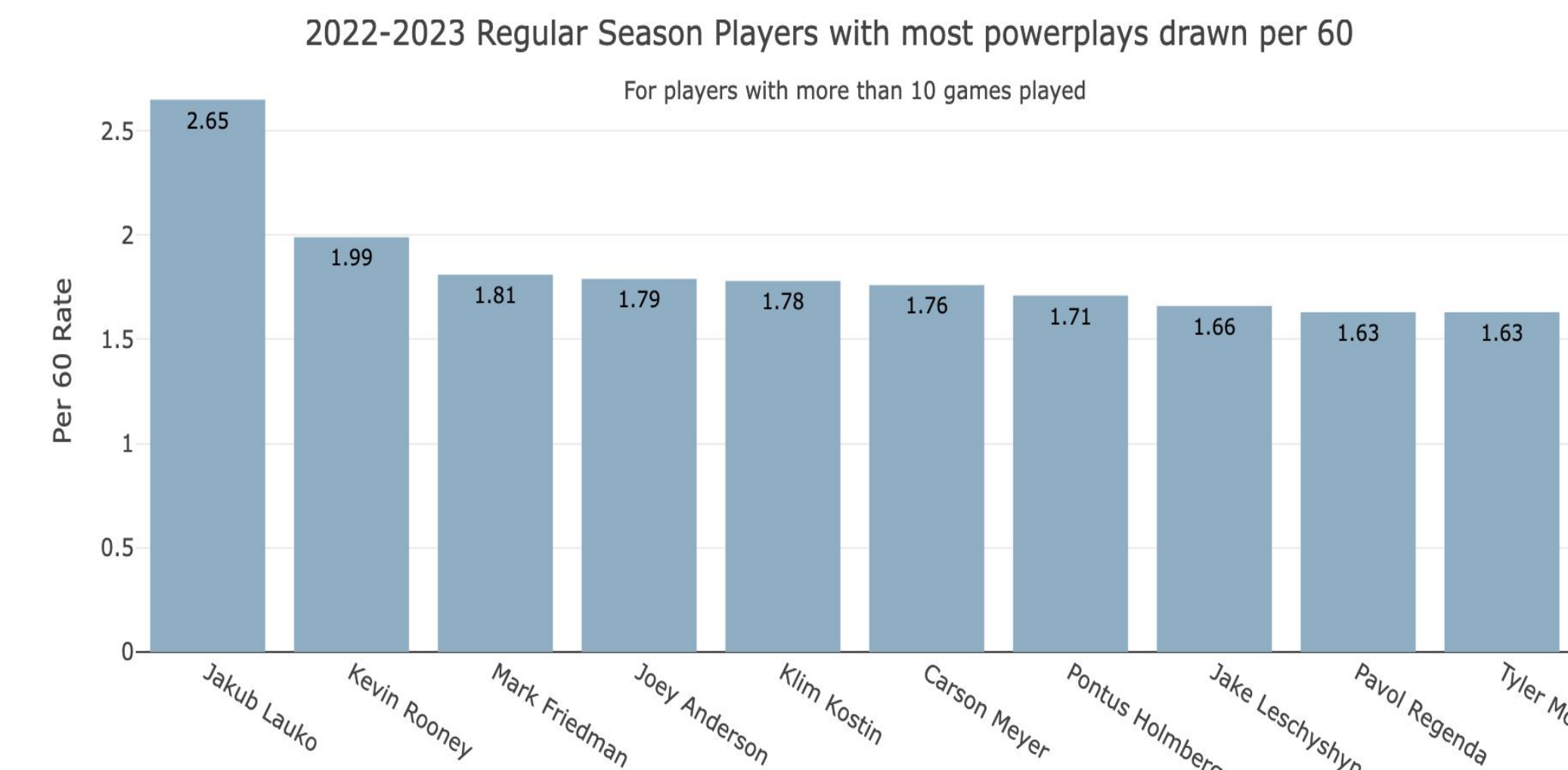
## Analysis & Results

### Back to the drawing board: Top 5 Power Play Drawer (by per 60) Table

Season 2022-2023 Regular Season penalties table for players with more than 10 games played

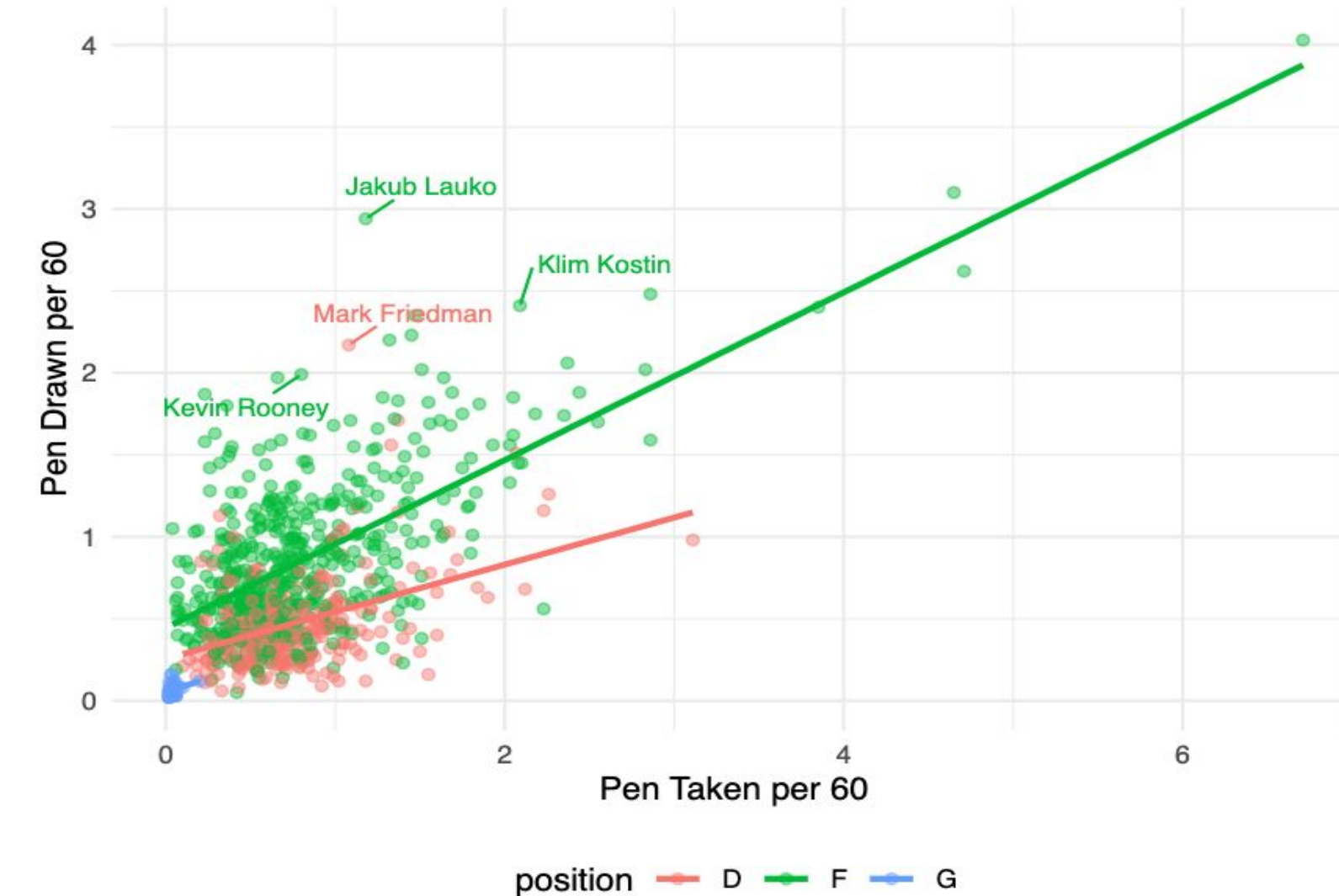
	Player	Team	Pos	GP	TOI	PP Drawn	PP Drawn/60	Pen Drawn	Pen Drawn/60	Pen Taken	Pen Taken/60
1	Jakub Lauko	BOS	F	23	203.88	9	2.65	10	2.94	4	1.18
2	Kevin Rooney	CGY	F	17	150.67	5	1.99	5	1.99	2	0.8
3	Mark Friedman	PIT	D	23	332.35	10	1.81	12	2.17	6	1.08
4	Joey Anderson	TOR	F	14	134.08	4	1.79	4	1.79		
5	Klim Kostin	EDM	F	57	573.38	17	1.78	23	2.41	20	2.09

### Comparison: Power Play Drawn and Penalty Drawn (by per 60)

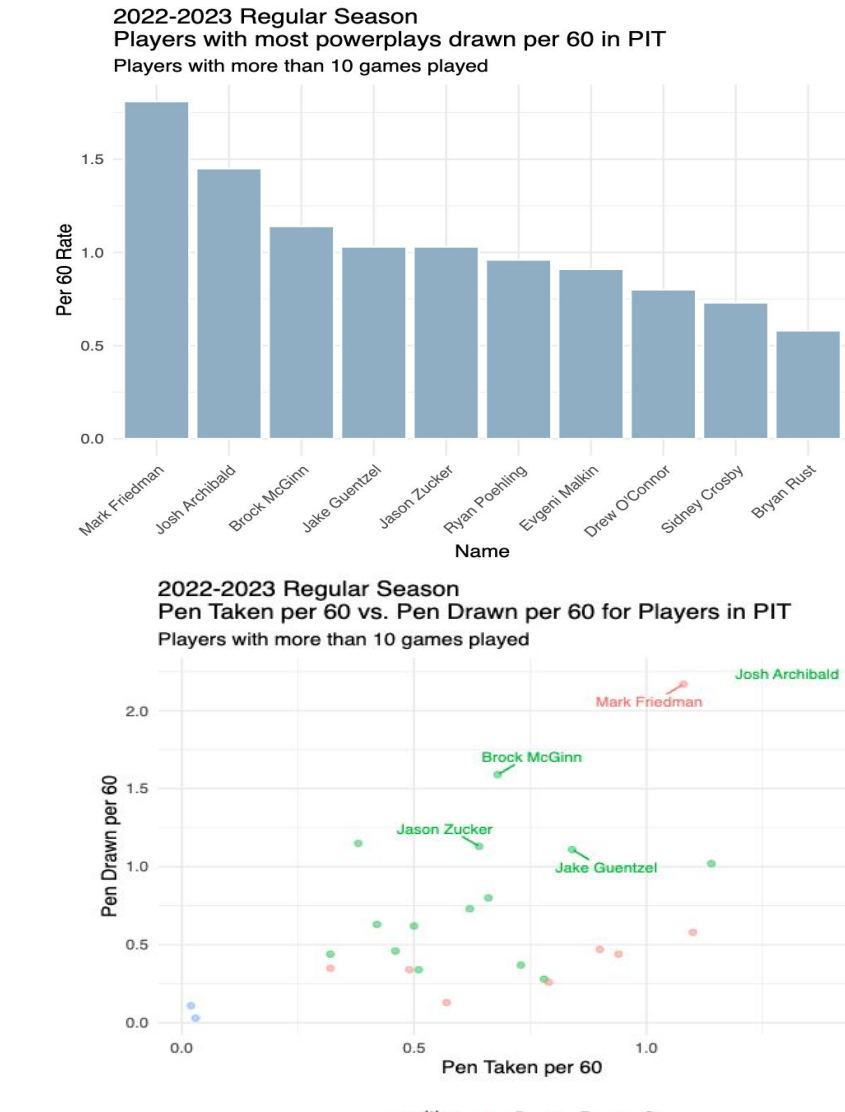
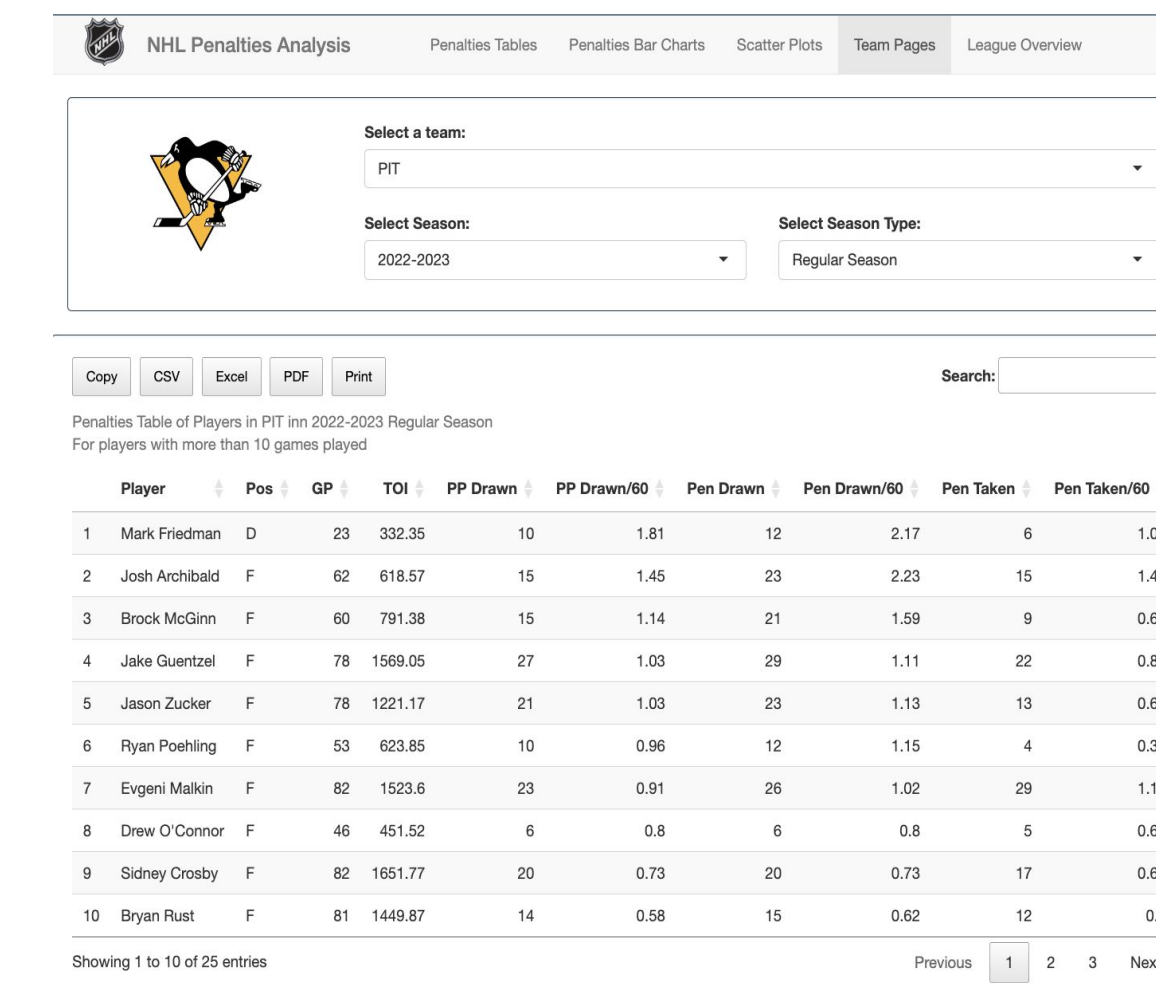


### Positional Influence on Penalties and Power Play Opportunities

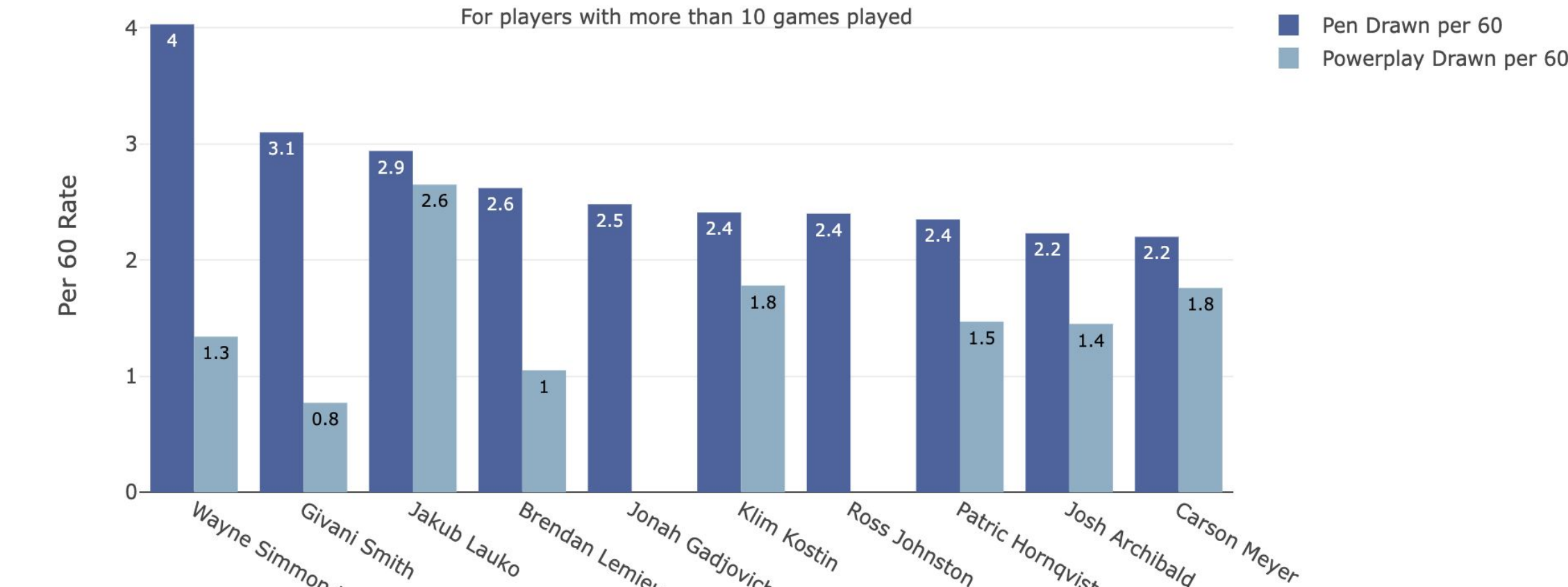
2022-2023 Regular Season: Pen Taken per 60 vs. Pen Drawn per 60 For players with more than 10 Games Played, top 5 power play drawer (by per 60)



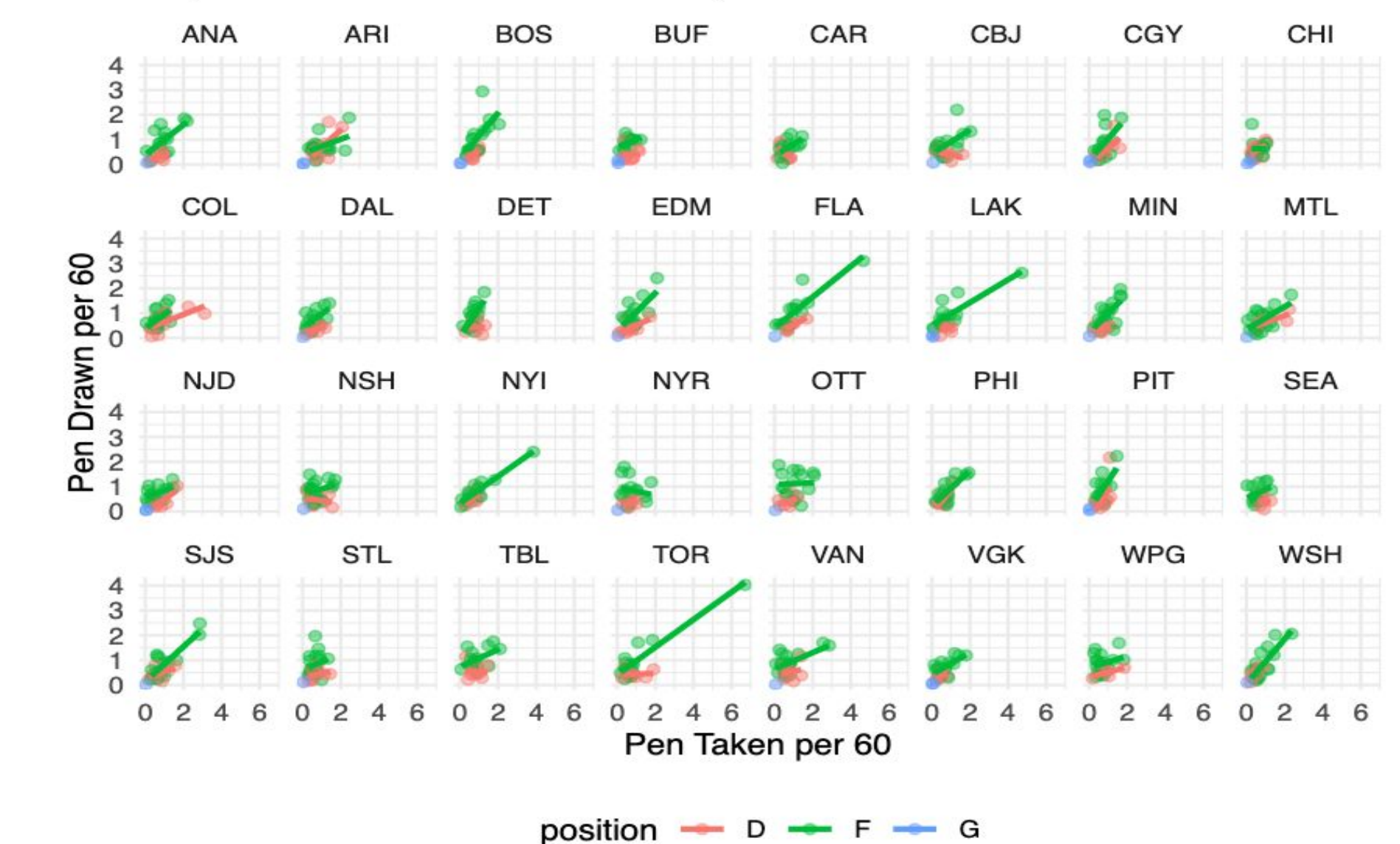
### Shiny App Interactive Team Page



### 2022-2023 Regular Season Players with most penalties drawn per 60



### 2022-2023 Regular Season Pen Taken per 60 vs. Pen Drawn per 60 Players with more than 10 Games Played Included



The League Overview Scatterplot allows the analysis of teams' penalty patterns, showcasing linear regression lines representing the relationships between Penalty Taken Per 60 (explanatory variable) and Penalty Drawn Per 60 (response variable), with data grouped by teams and positions. The positional scatterplot on the left shares a similar structure, but with data grouped solely by positions.

## Discussion

- The per 60 rates provide a more accurate evaluation of players' ability to draw power plays and penalties compared to raw counts, accounting for differences in ice time.
- Forwards are more likely to draw penalties than defense players given the same penalty-taken amount, significantly impacting their team's power play opportunities.
- The League Overview Scatterplot shows variations in teams' penalty-drawing performance, with the Penguins, Bruins, and Capitals having the highest slope coefficient for penalties taken per 60. Given the same penalties taken per 60, these teams have higher estimated penalties drawn per 60 and, thus, higher power play opportunities.

## Limitations

- Utilizing a 2-game threshold for players in playoffs may generate biased per 60 rates.
- String analysis on inconsistent documentation can introduce potential errors in penalties count and types.

## Future Steps

- Modeling goal time distribution in power plays to assess potential rule change impact.
- Predicting the penalty that will be most frequently called in the upcoming season.
- Regularly updating and enhancing the ShinyApp for a better user experience.