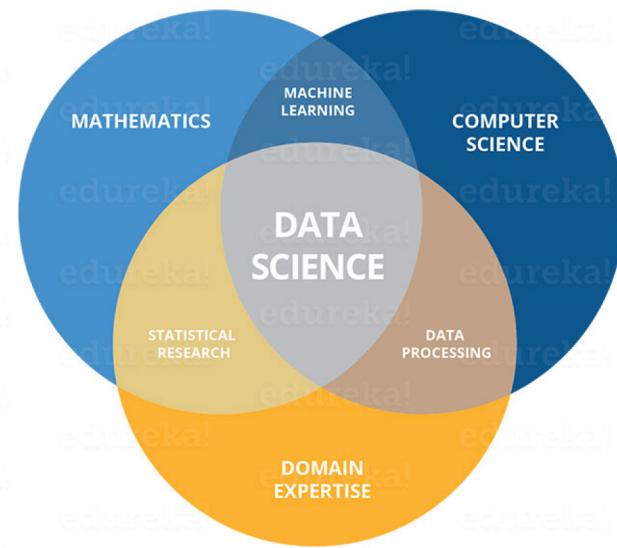


Investigating NHL Goaltender Usage, Injury, and Performance Trends #GGR2019

Cole Anderson
@ice_cole_data
cole@sportlogiq.com

I. Introduction

A Tale of Two Coles



Limitations

NHL Data Only

Macro data - results, travel, injuries at game-level

No practice, reported injuries, only 'see' shots

'Found' data, not experimental

Data Sources

NHL Game-Level Data, 1997 - 2019

NHL Shot-Level Data, 2010 - 2019

<https://pypi.org/project/hockey-scrapers/1/>

NHL Injury Data (@NHLInjuryViz), 2010 - 2019

<https://nhlinjuryviz.blogspot.com/p/index-page.html>

II. Measuring Performance

Measuring Performance

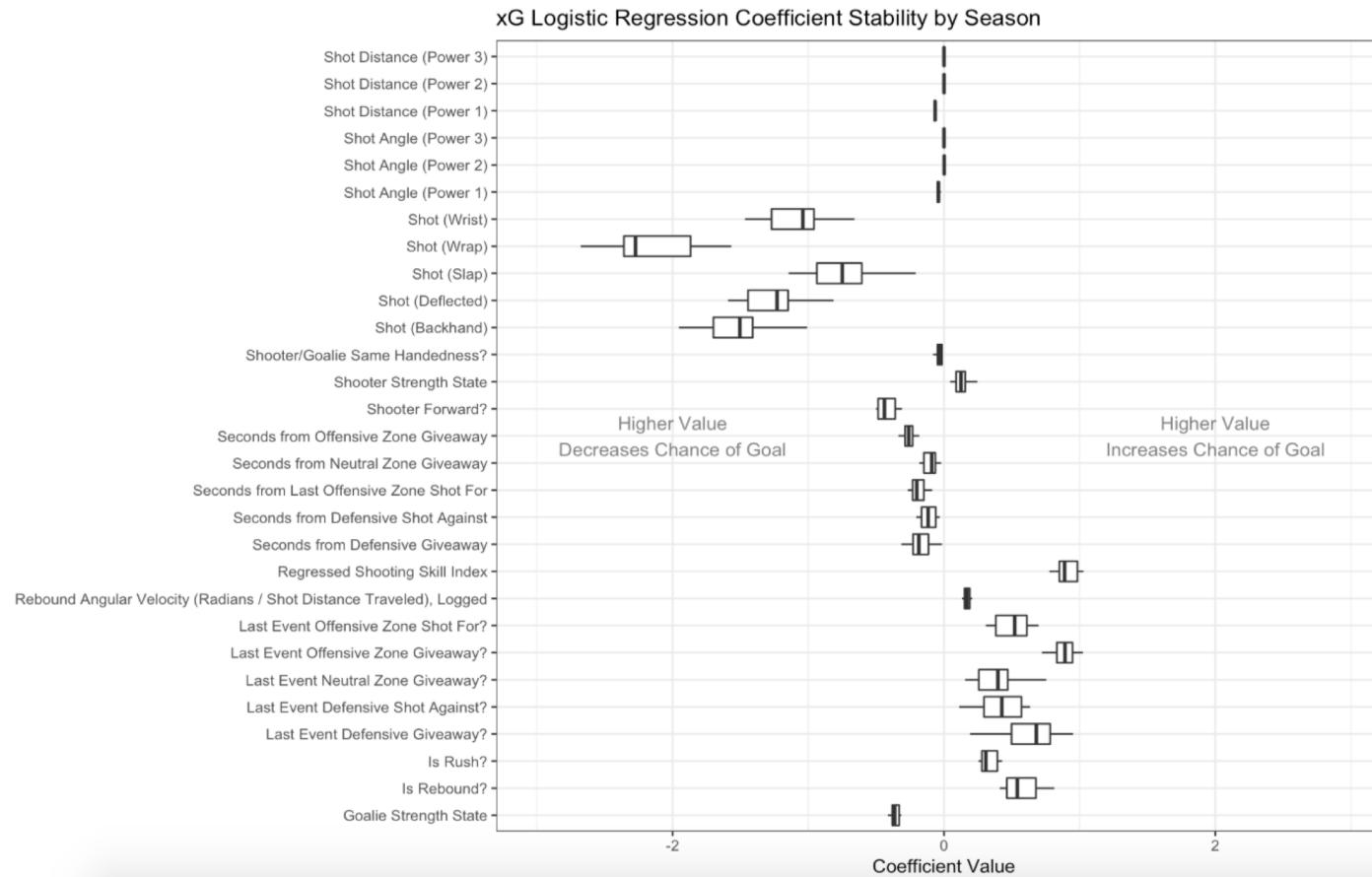
Try to adjust goaltender results for:

Shot quality (expected goals model)

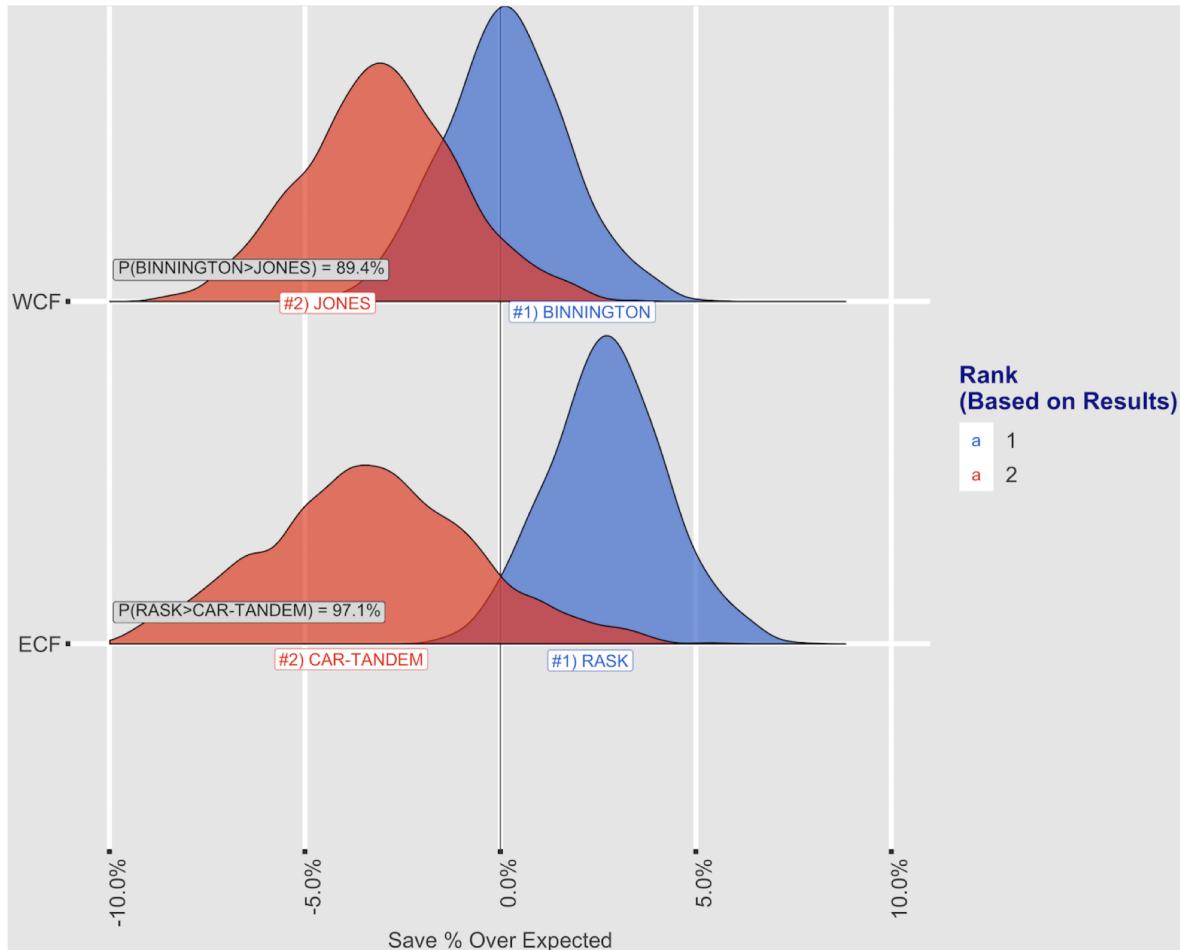
Rebounds (expected rebounds model)

Sample size (regress to average)

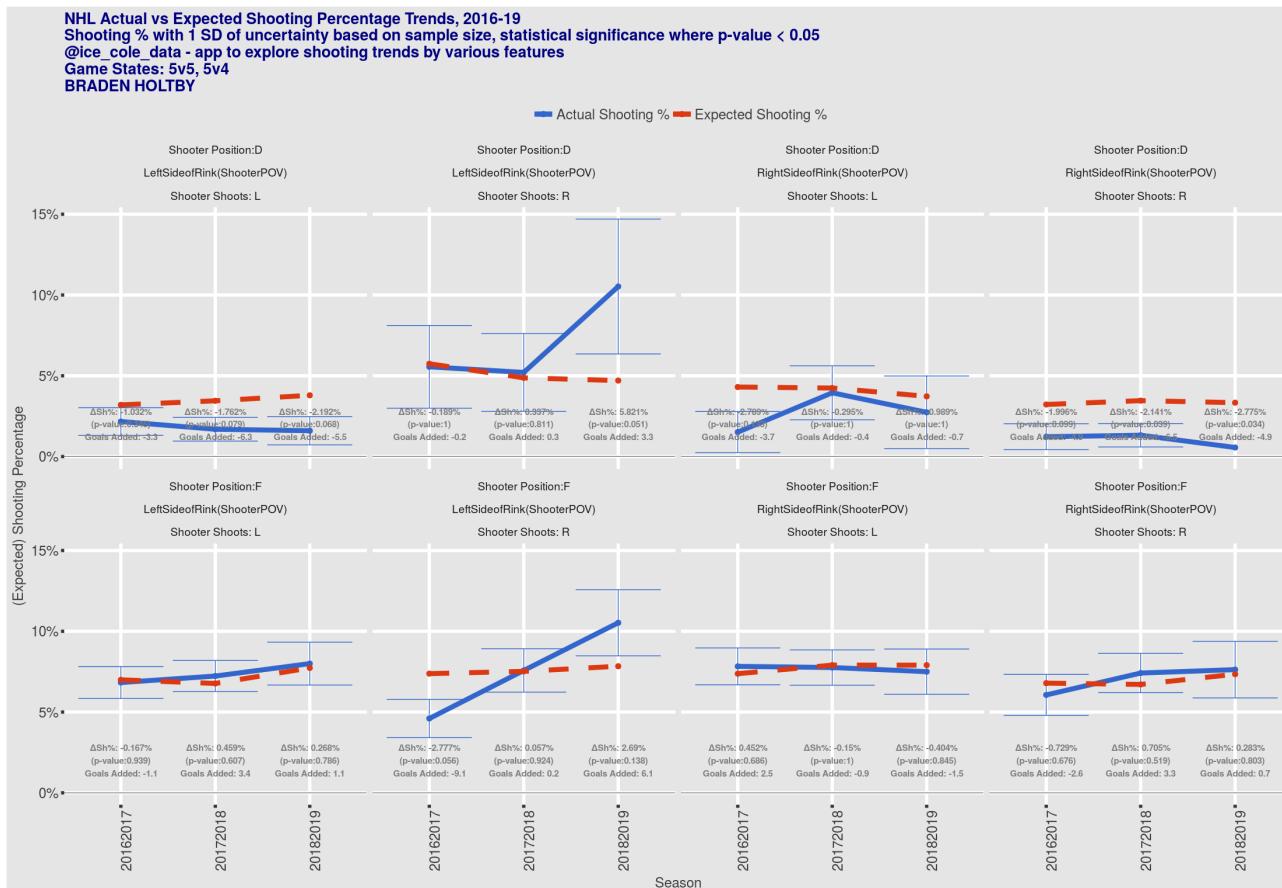
Expected Goals Model Recipe



More Shots, More Certainty



Applications_v0



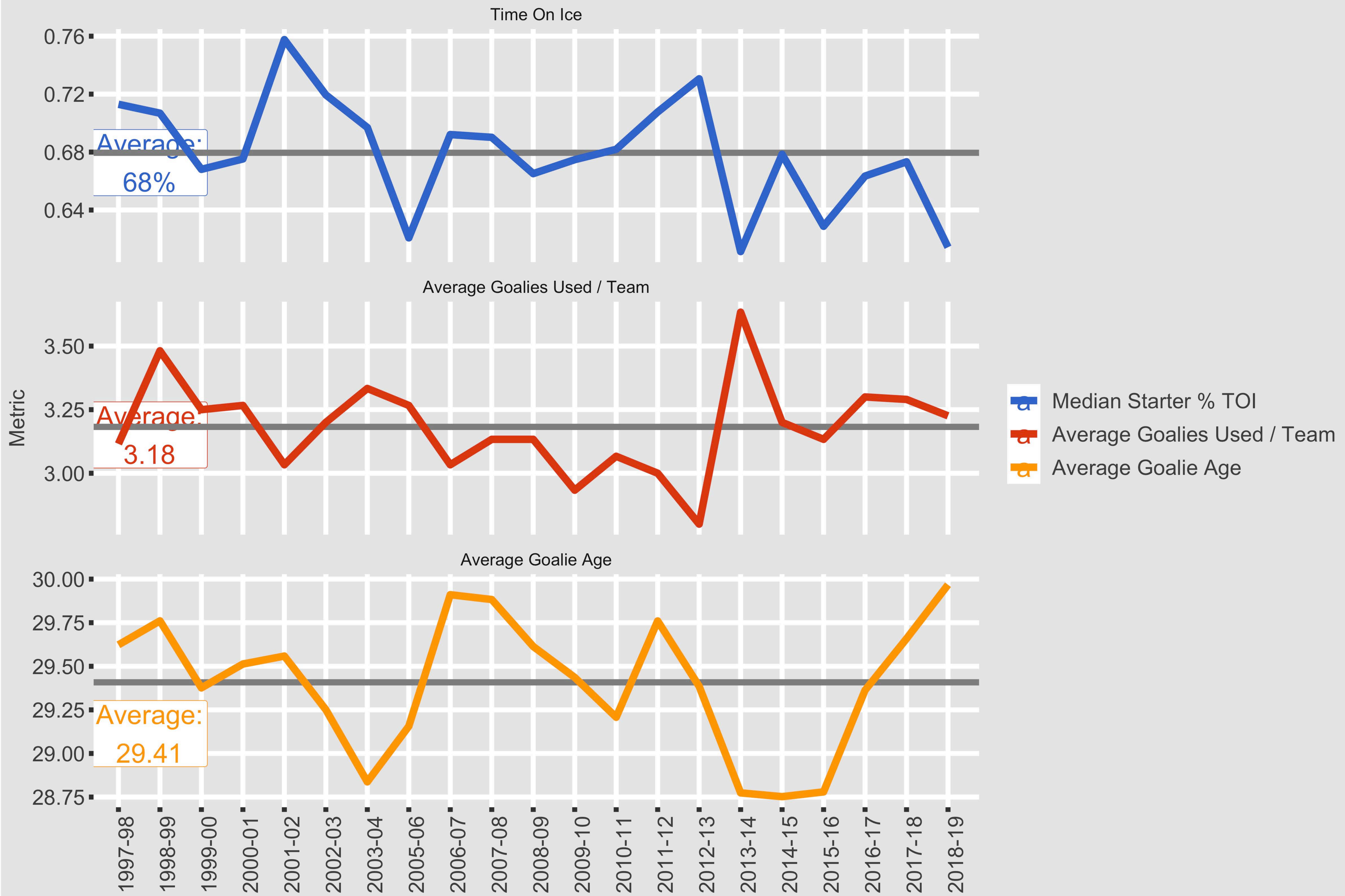
<https://crowdscoutsports.shinyapps.io/ShootingSplits/>

III. NHL Goaltender Usage Trends, 1997-2019

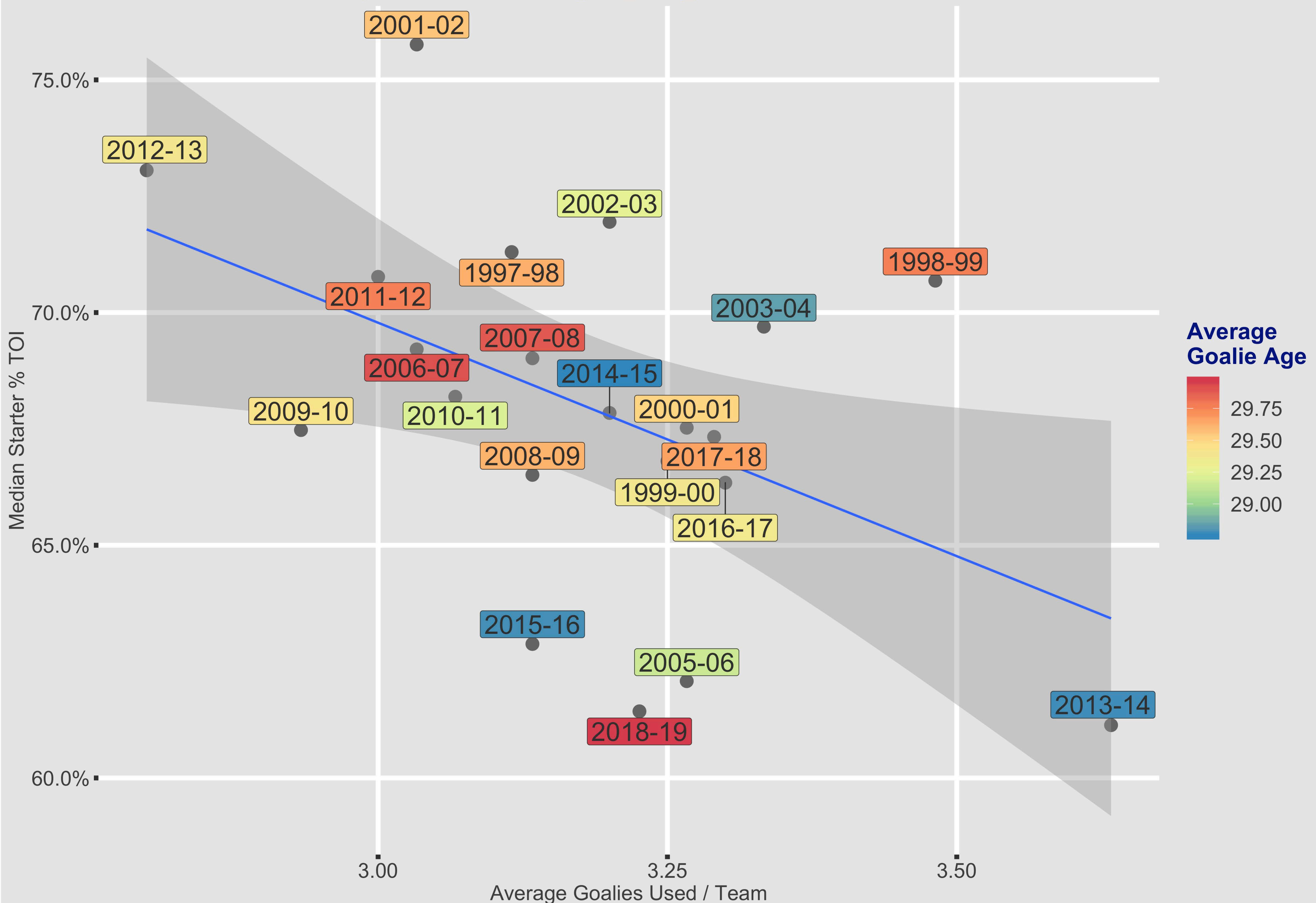
League Goaltender Usage Seasonal Trends, 1997-2019
Starter Share of Workload
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



League Goaltender Usage Seasonal Trends, 1997-2019
 Starter Workload vs Team Age and Roster by Season
 #GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Team Goaltender Usage Seasonal Trends, 1997-2019
Starter Workload vs Team Goalies Used / Team
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data

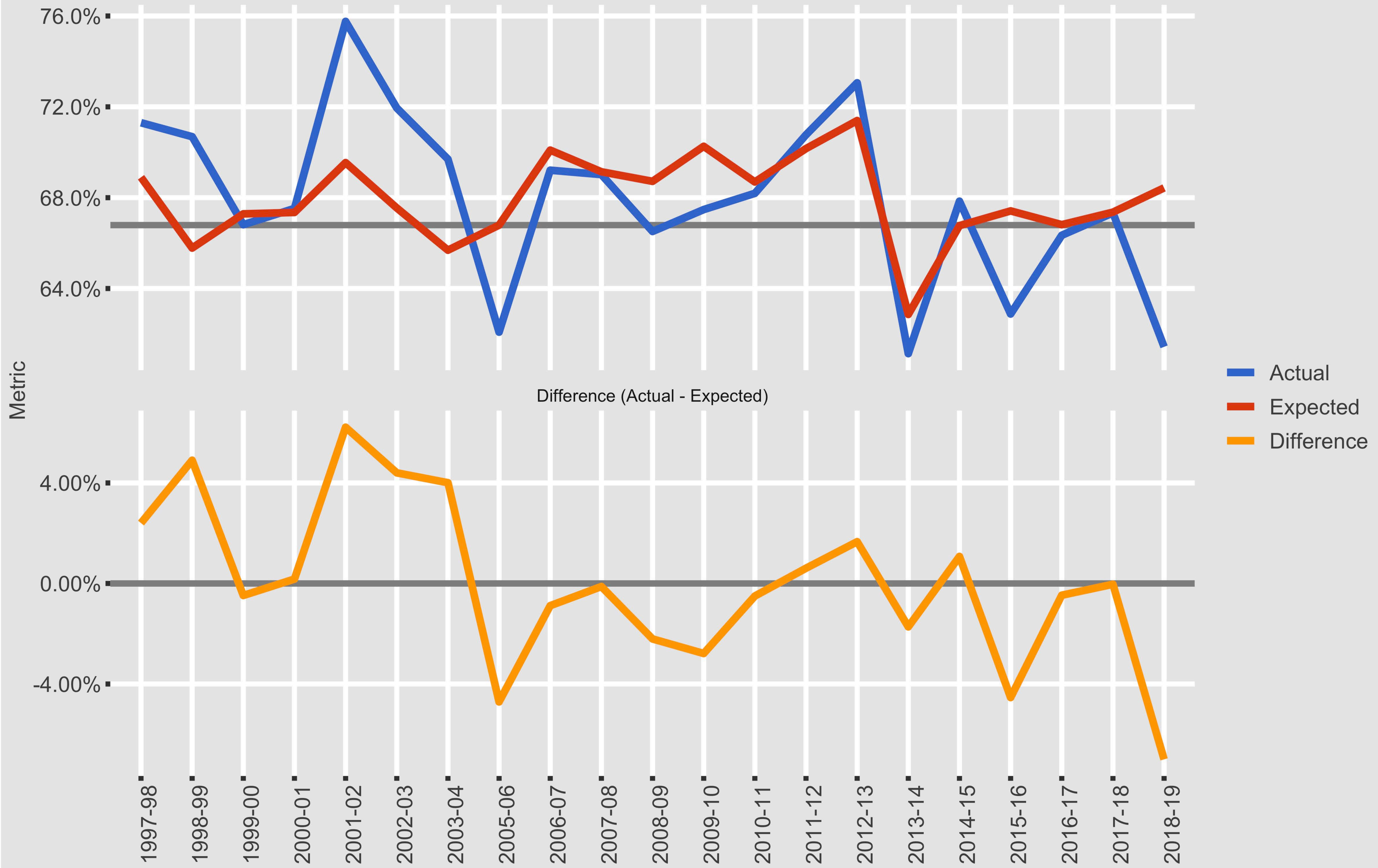


League Goaltender Usage Seasonal Trends vs Expected, 1997-2019

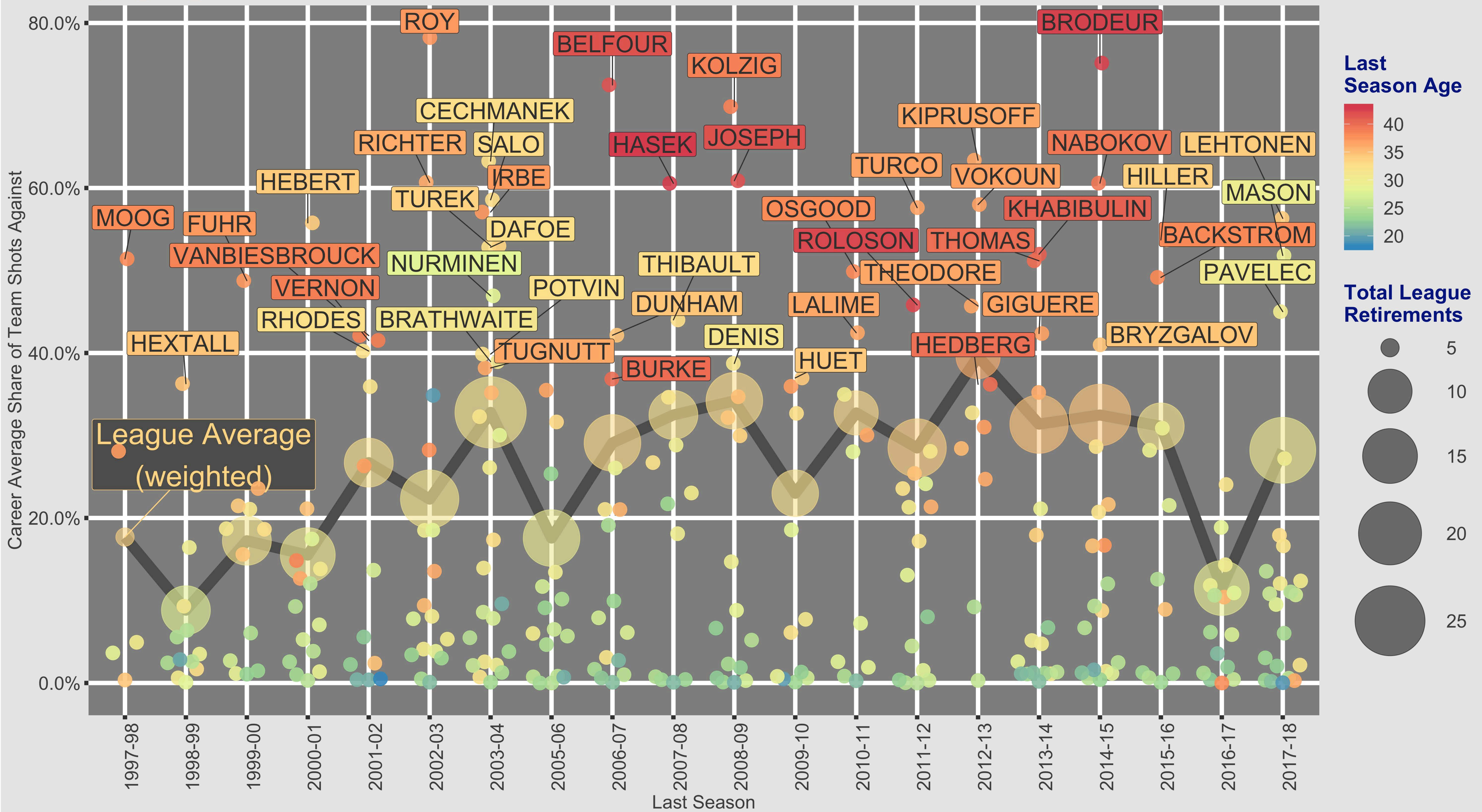
Team Actual vs Expected Starter Workload

Expected Usage a Function of Average Age (+) and Goalies Used (-**)

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Goalie Retirements by Season
Career Workload and Age For Each Retirement Class
@ice_cole_data



Summary

NHL Goaltender Usage Trends

Workload lessening for starters

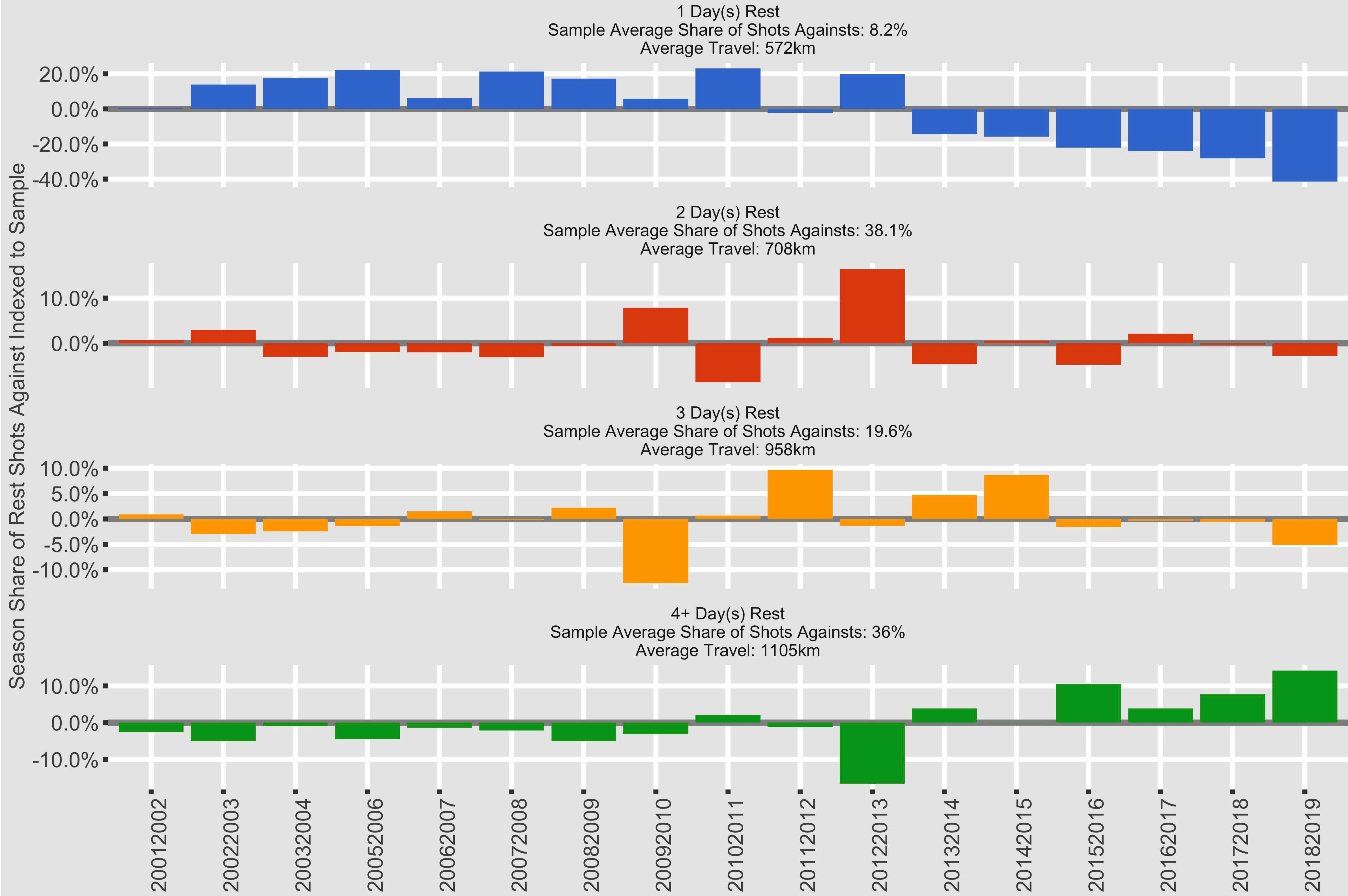
Age appears cyclical, currently at a possible peak

Teams steadily average more than 3 goalies used

Accounting for age and goalies used, recent season saw biggest drop in defacto starter workload


IV. NHL Season-Level Deployment and Results, 2001-2019

League Goaltender Usage Seasonal Trends, 2001-2019
Rest Day Share of Shots Against Indexed to Sample Period
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



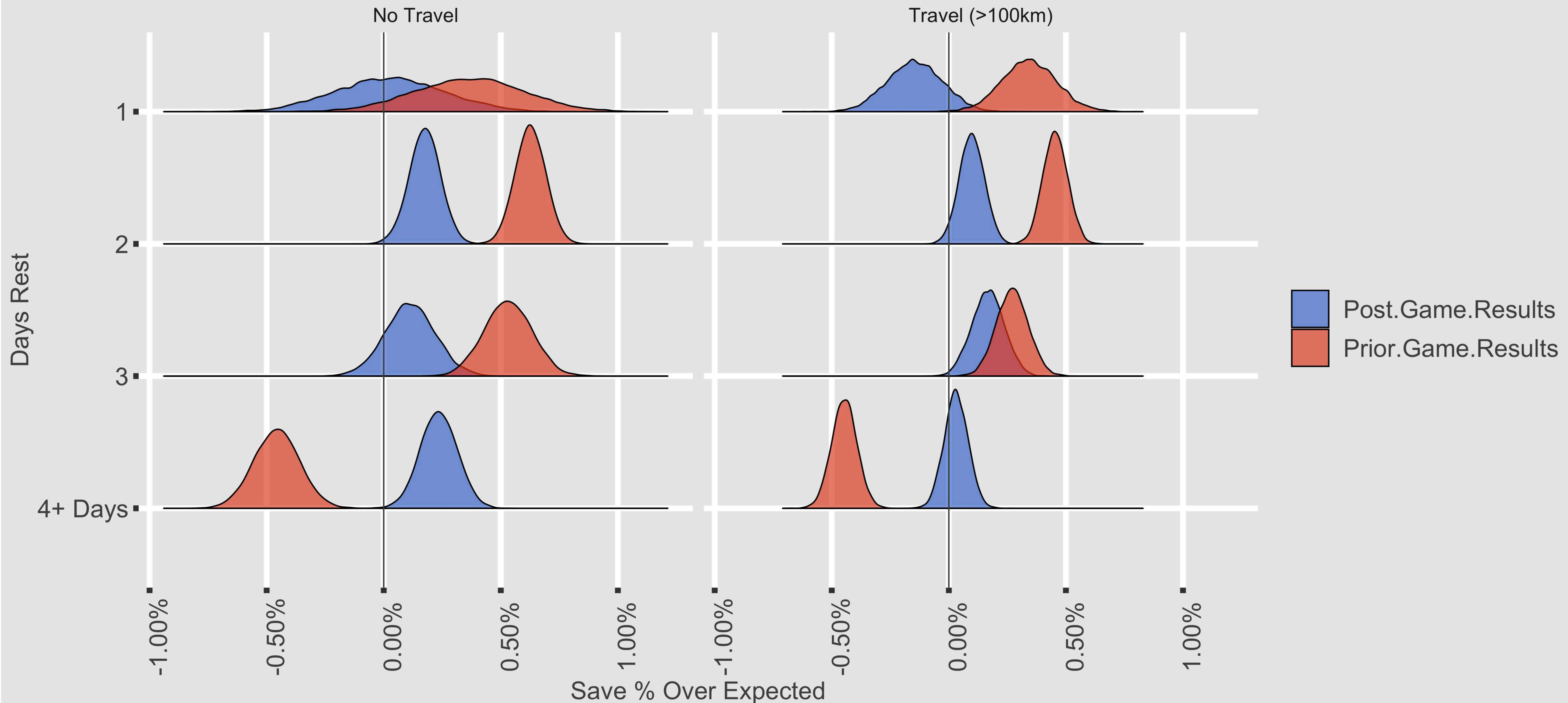
Goaltender Performance Before and After Days Rest

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Goaltender Performance Before and After Days Rest - Travel Type

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



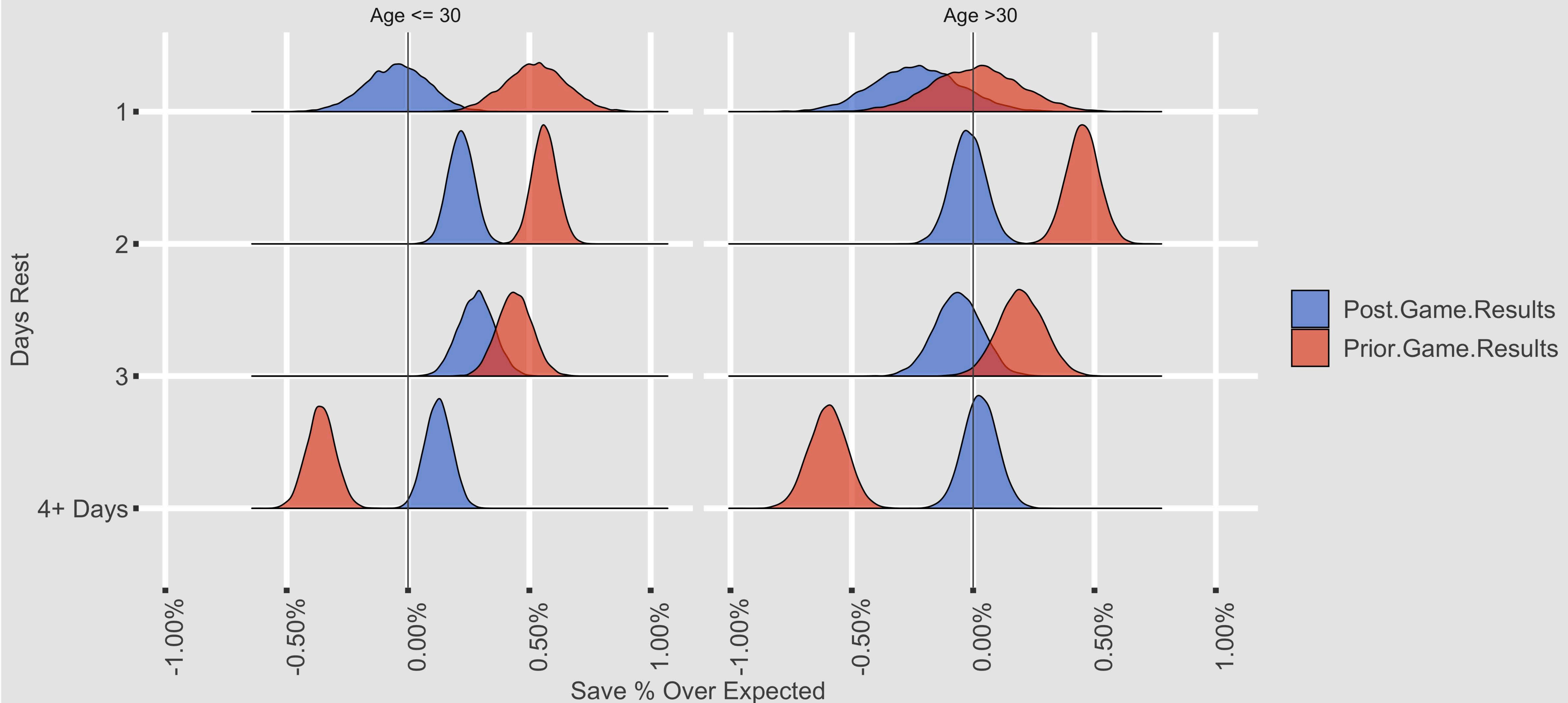
Goaltender Performance Before and After Days Rest - Season Workload

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data

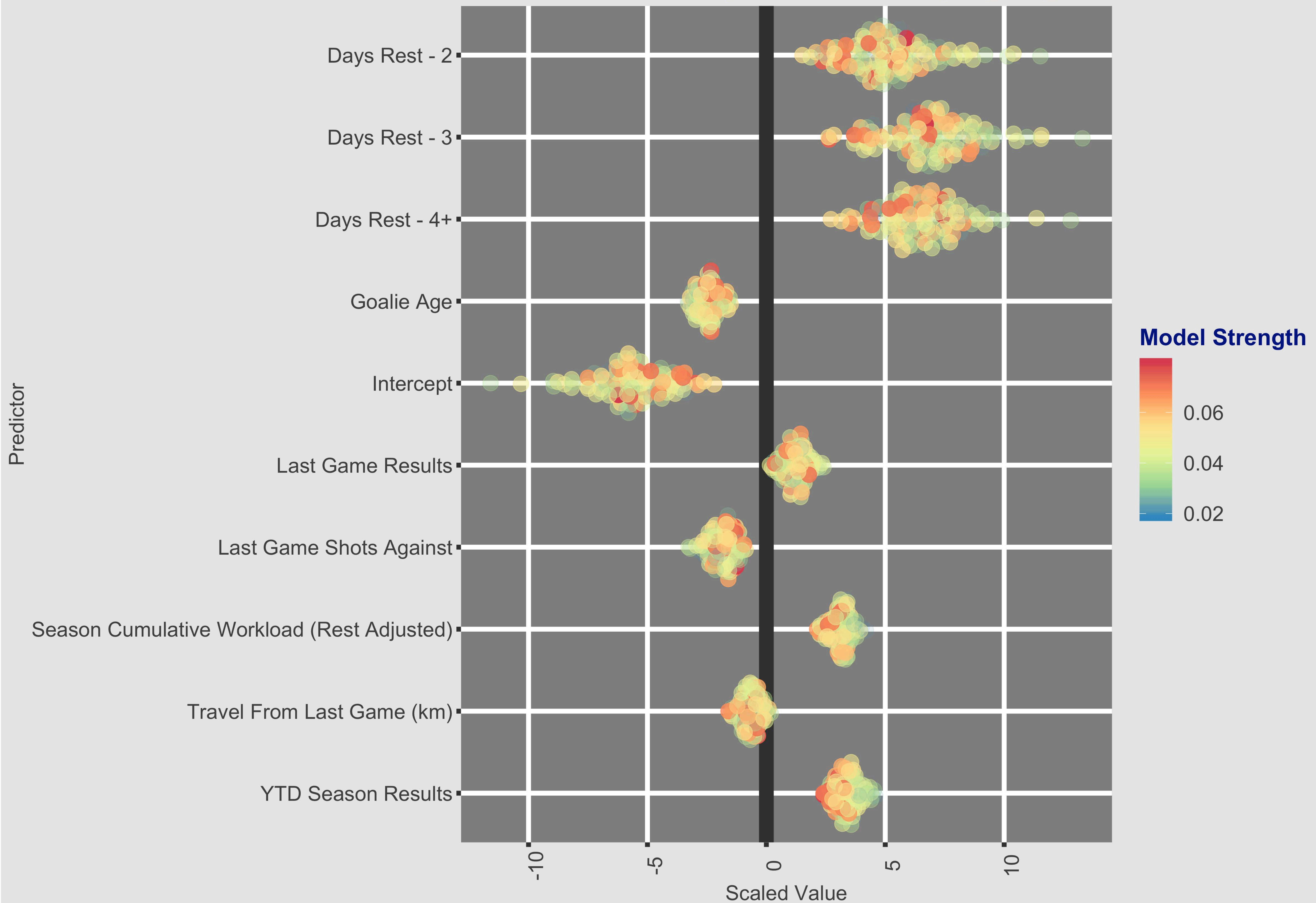


Goaltender Performance Before and After Days Rest - Goalie Age

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Predictors of Game Results, Stability of Coefficients, 2010-2019
100 Bootstrapped Models
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Summary

NHL Season-Level Deployment and Results

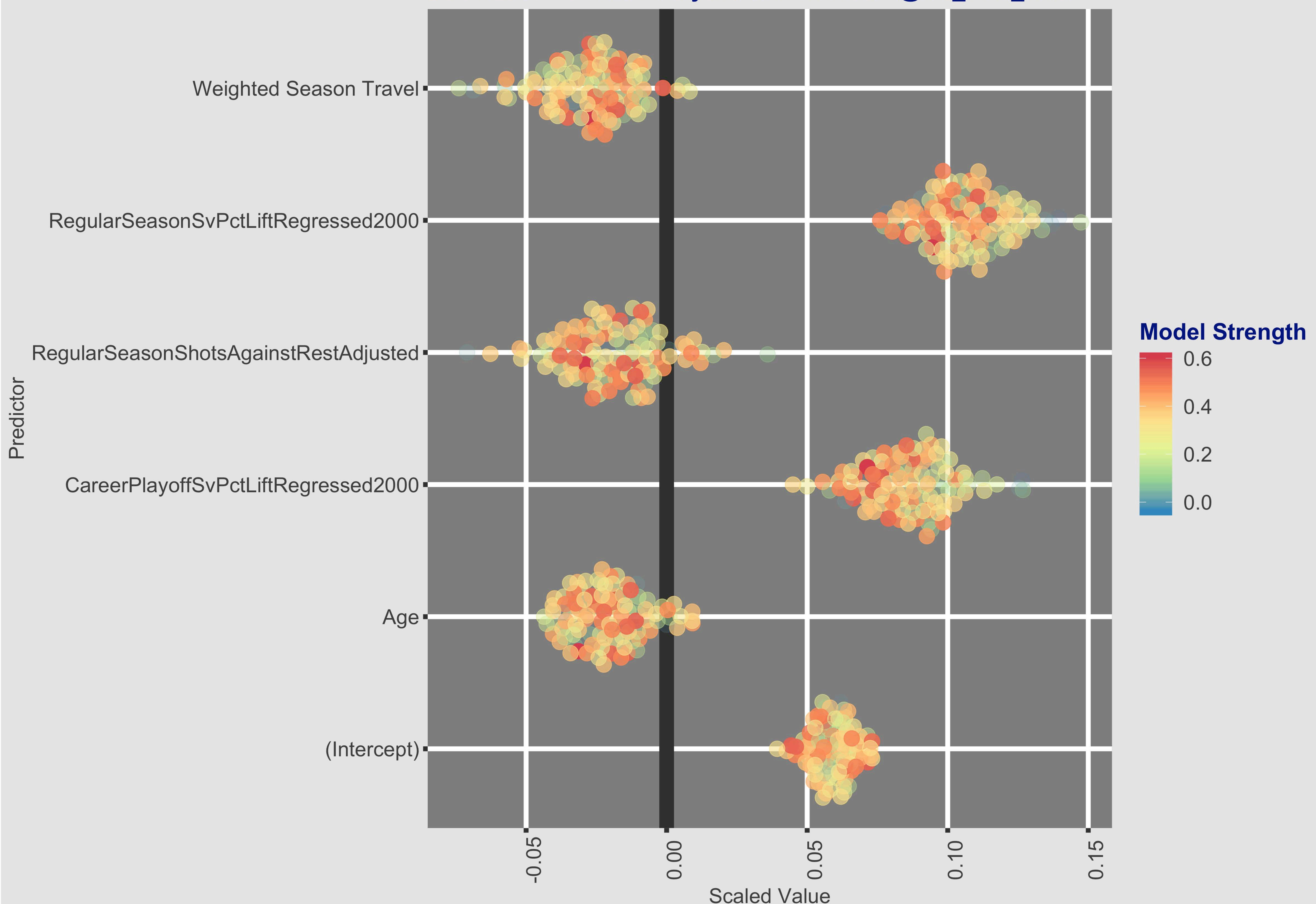
Share of work in back to back games is down ~40% from period average (4.8% in 2019 vs 8.2% 2001-2019)

Performance in back to back games is about 0.5% worse in game after (~1 goal every 4 games)

Effect is lessened with no travel (<100km) between games

V. NHL Season-Level Usage and Playoff Results, 2010-2019

Predictors of Playoff Performance, Stability of Coefficients, 2010-2019
100 Bootstrapped Models
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Summary

NHL Season-Level Usage and Playoff Results

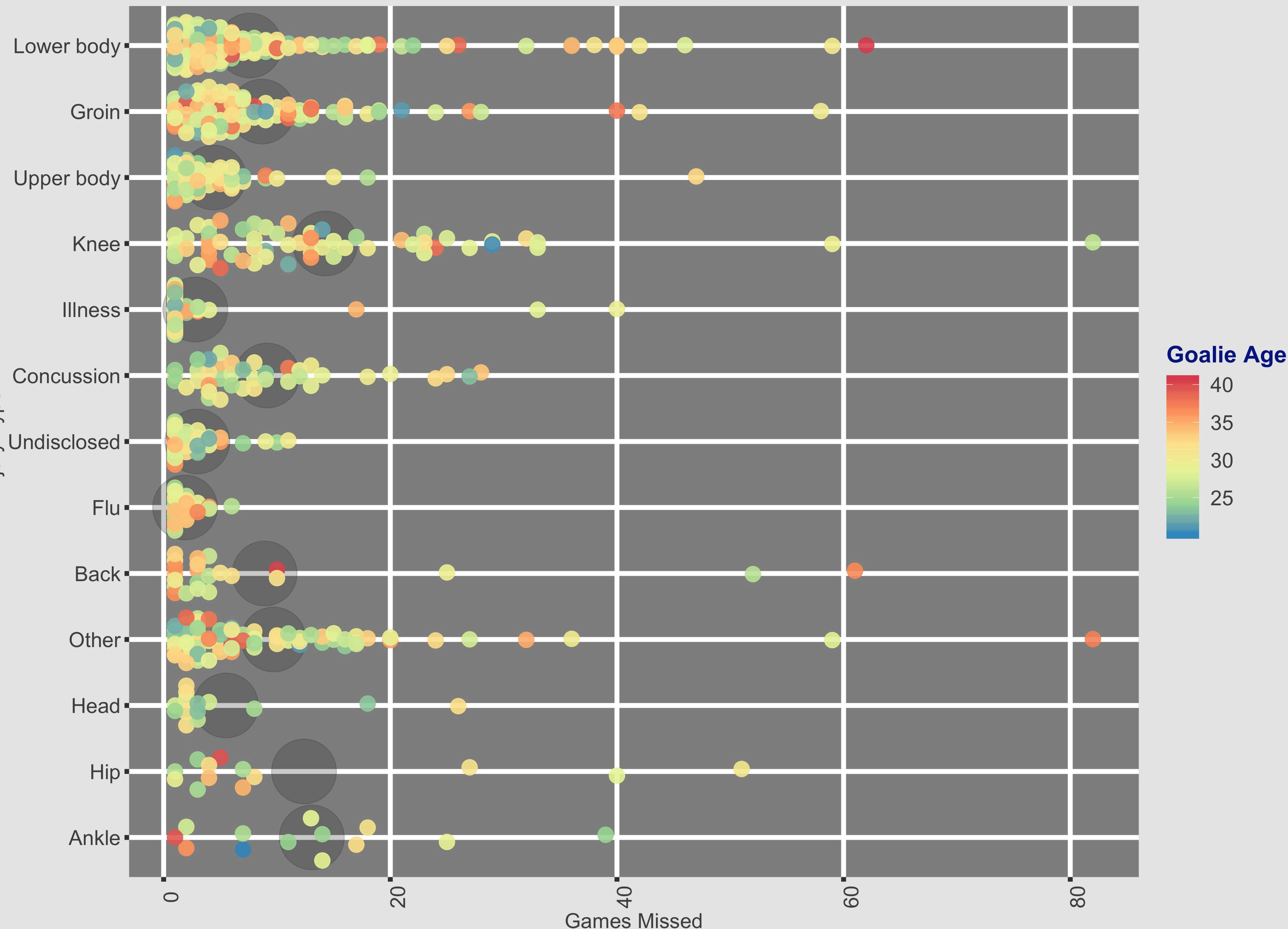
Travel, regular season shots against (adjusted for rest) and age have are directionally negative predicting playoff results

Regular season results more important (positive) factor

VI. NHL Season-Level Usage and Injuries, 2010-2019

Games Missed by Injury Type, 2010-2019

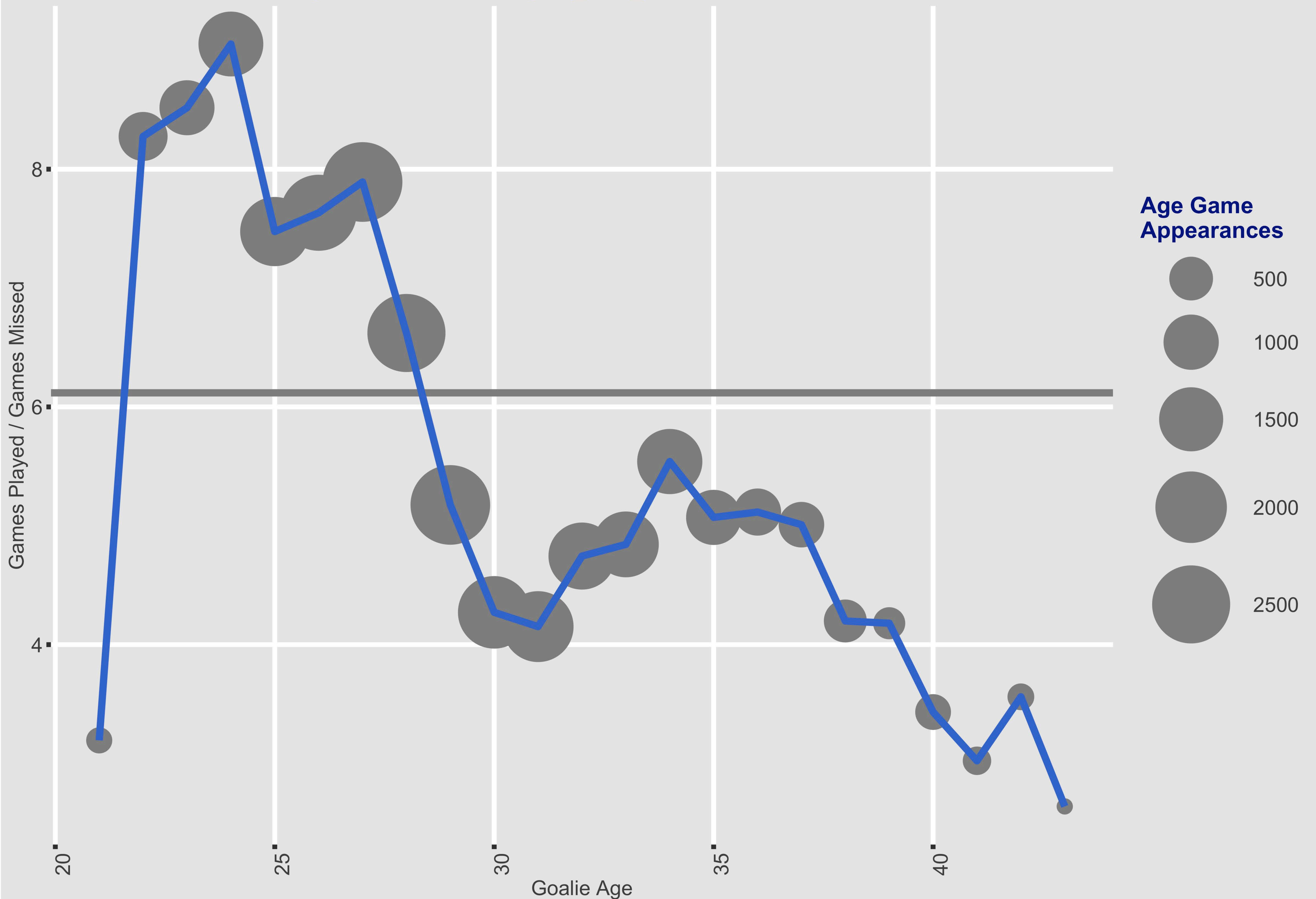
#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Ratio of Games Played to Games Missed Due to Injury by Age, 2010-2019

Reported Injury from @NHLInjuryViz

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data

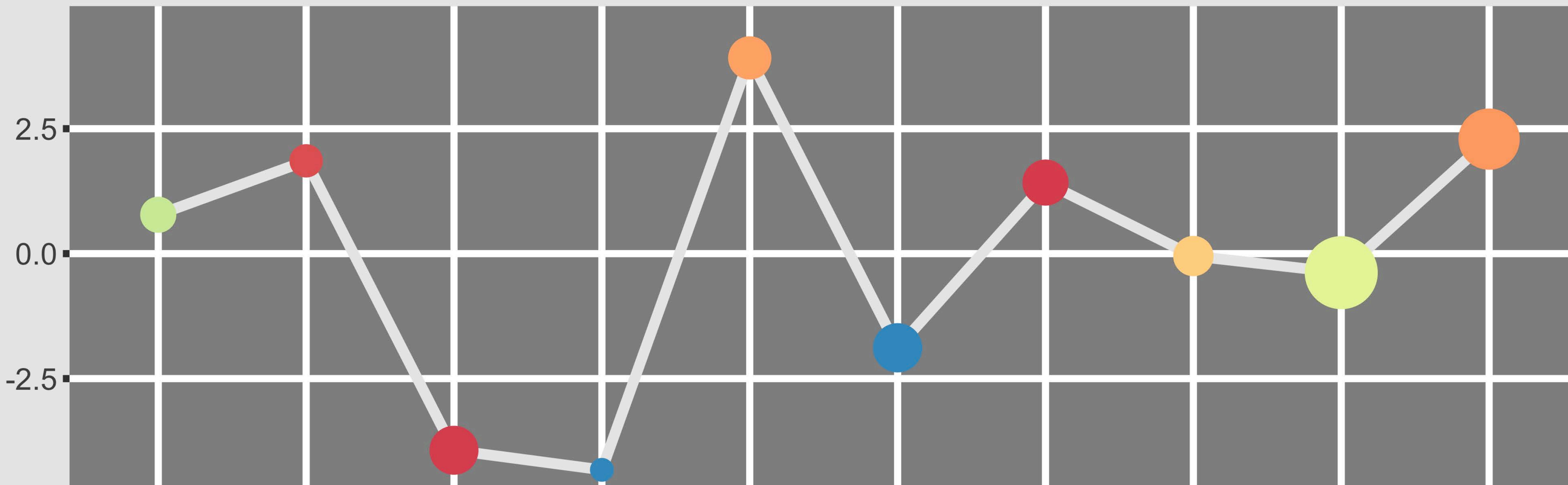


Seasonal Trends of Goaltender Age by Injury Type, 2010-2019

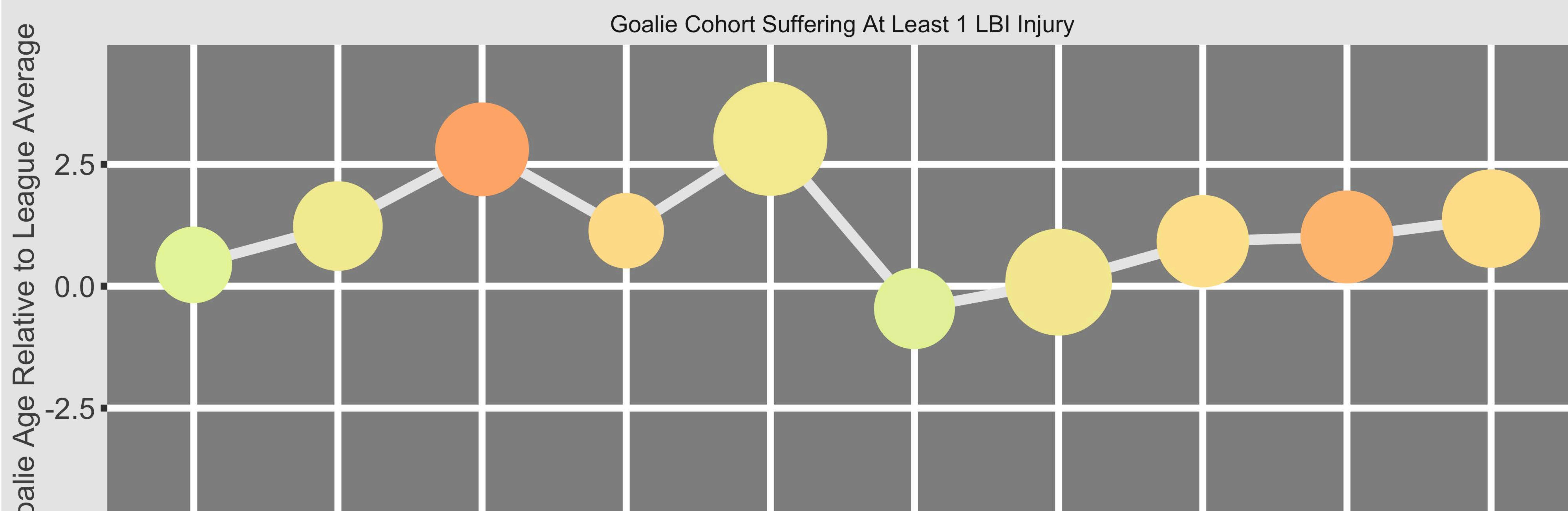
Reported Injury from @NHLInjuryViz

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data

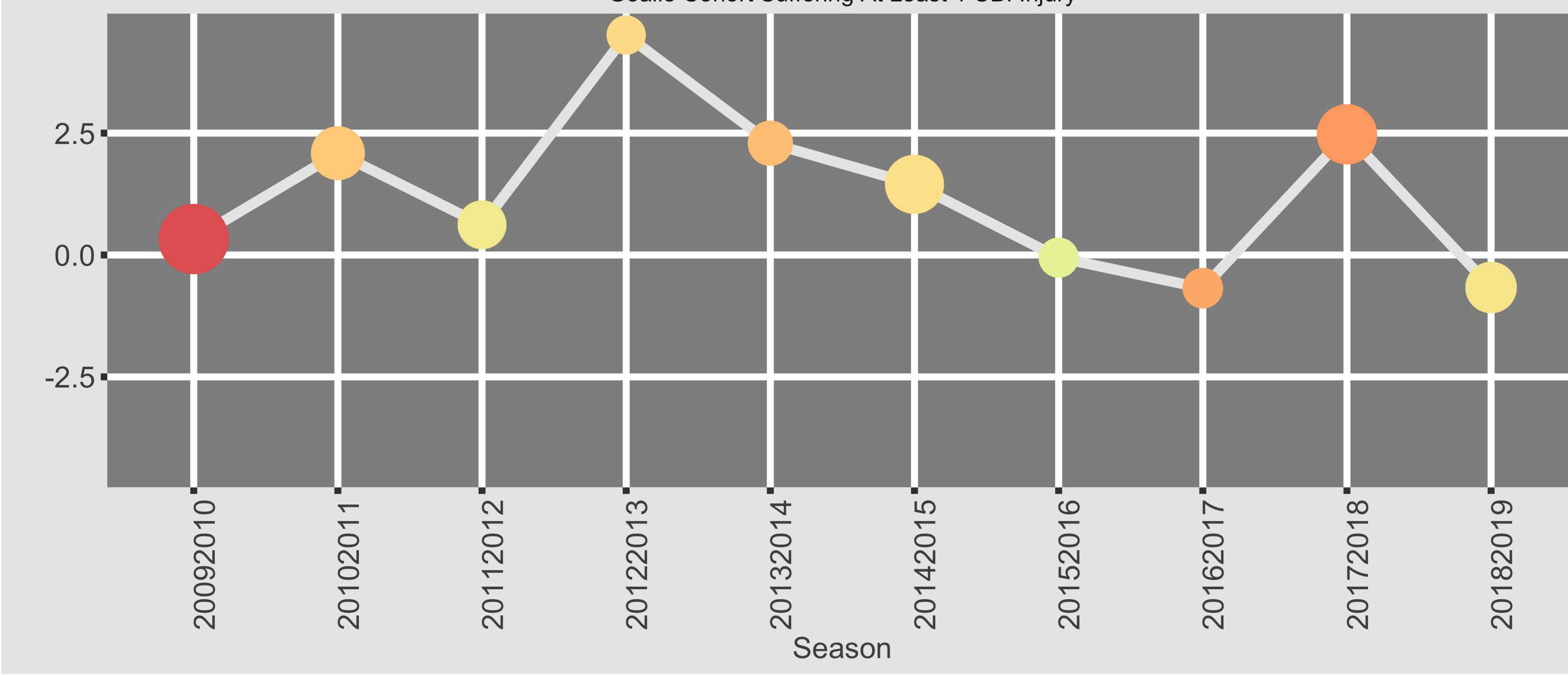
Goalie Cohort Suffering At Least 1 Head Injury



Goalie Cohort Suffering At Least 1 LBI Injury

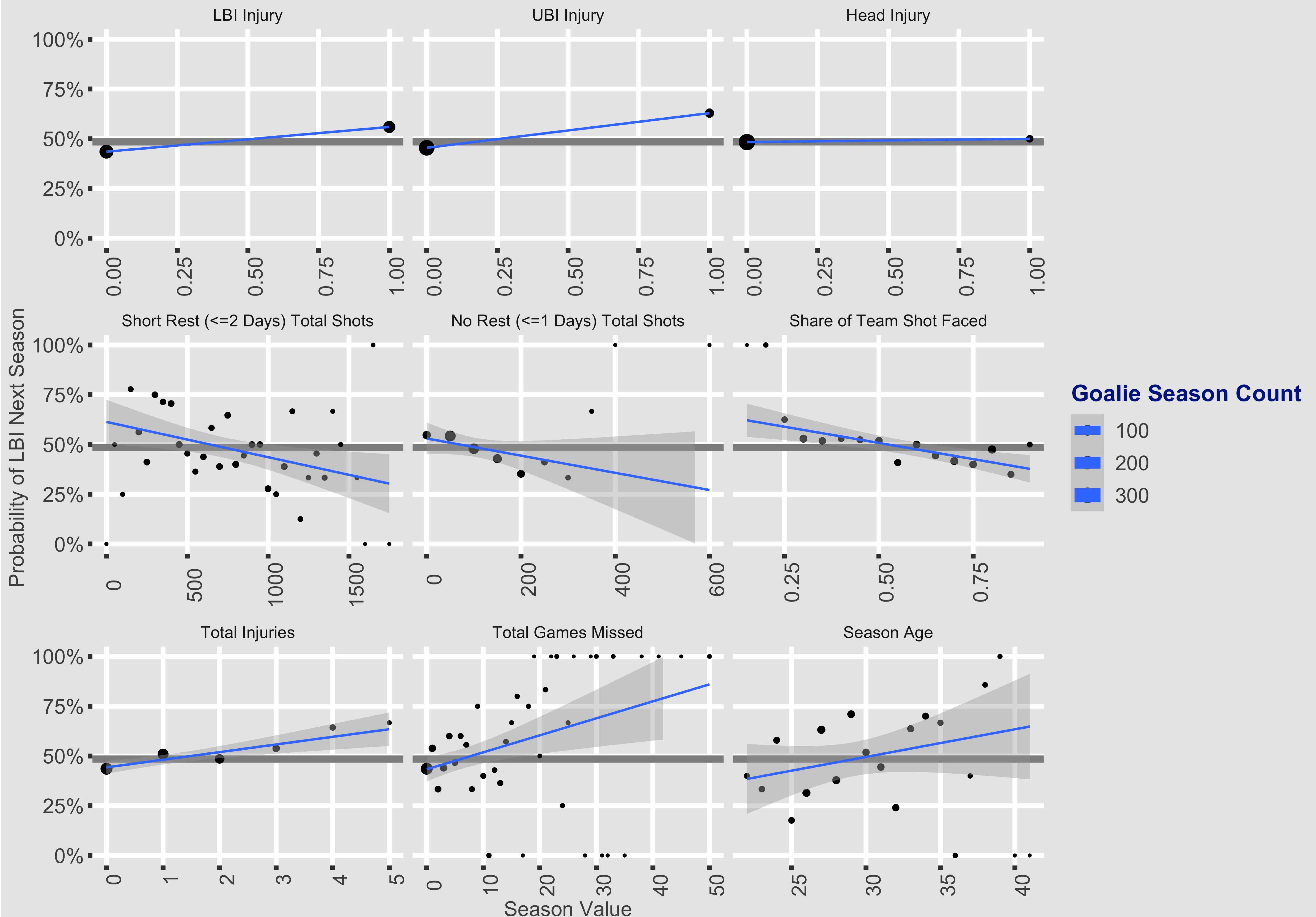


Goalie Cohort Suffering At Least 1 UBI Injury



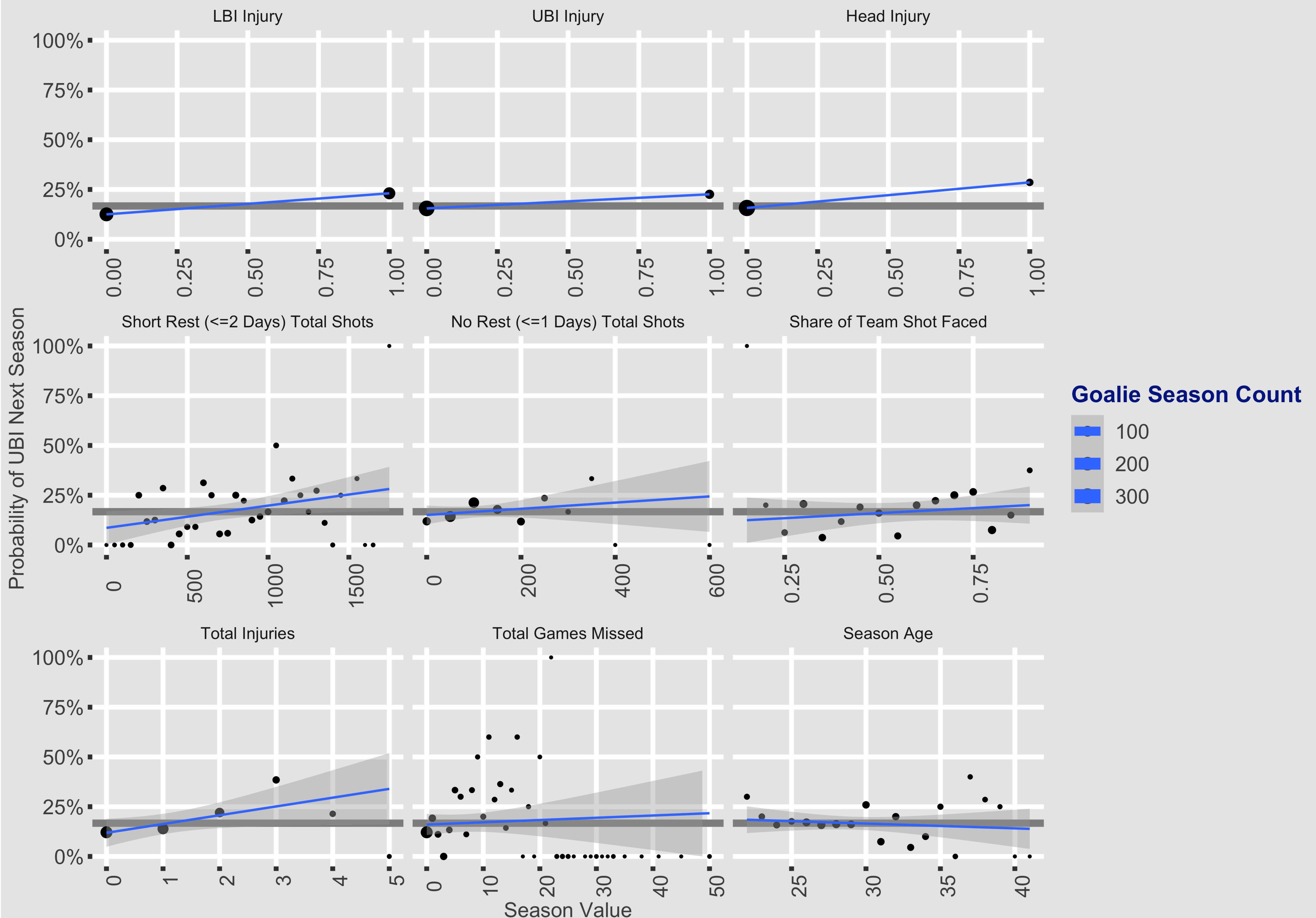
Probability of LBI Next Season Relationship Between Select Metrics

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



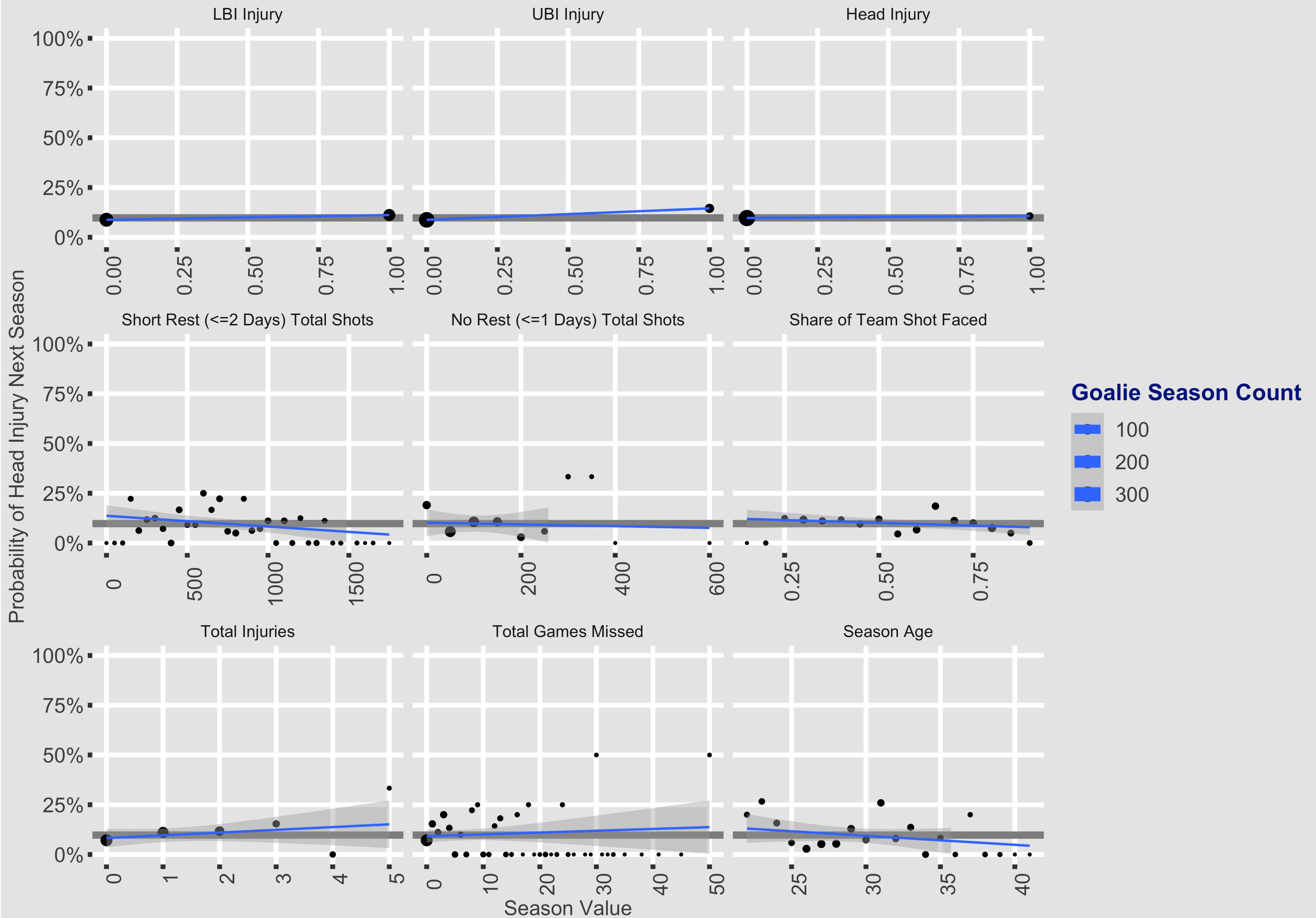
Probability of UBI Next Season Relationship Between Select Metrics

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



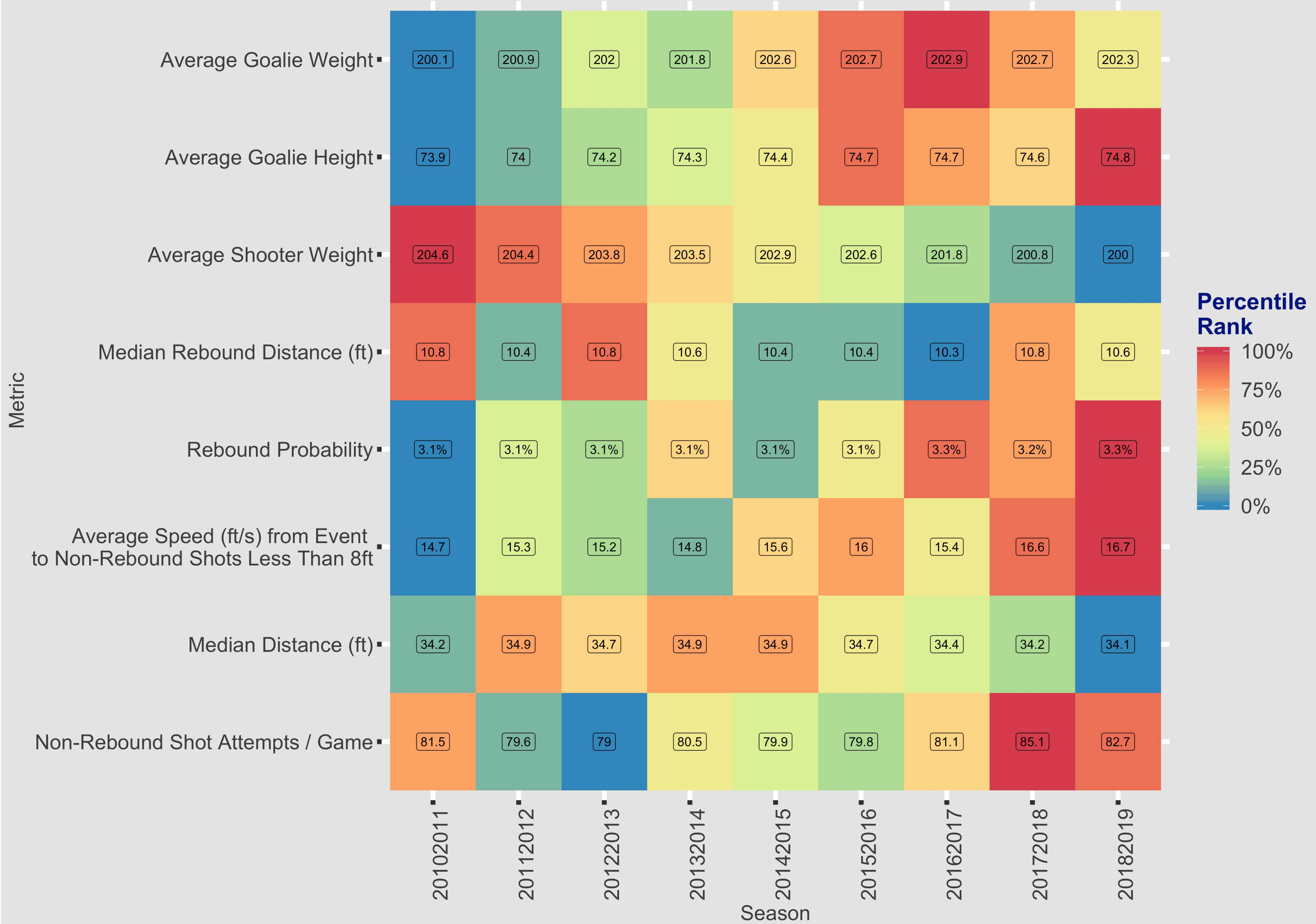
Probability of Head Injury Next Season Relationship Between Select Metrics

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



NHL Seasonal Trends, Select Metrics, 2010-2019

#GGR2019 - Goalie Analytics & Workload - @ice_cole_data



Summary

NHL Season-Level Usage and Injuries

Lower body injuries (reported) on average longer recovery

Age of LBI/UBI generally older than league average,
concussions no clear trend

Since 2010, teams have generally deployed goalies that
haven't increased chance of injury - found data

Speed of game funneling to net likely getting faster

VII. Future

Future

Feedback

Address blind spots - practice, more granular injury data

More granular on-ice data, hypothesis test

Experimental data/statistical inference

Reinforcement learning

Thank you!

*Cole Anderson
@ice_cole_data
cole@sportlogiq.com*