TRACKING INCREASING OFFENSE ON THE PENALTY KILL

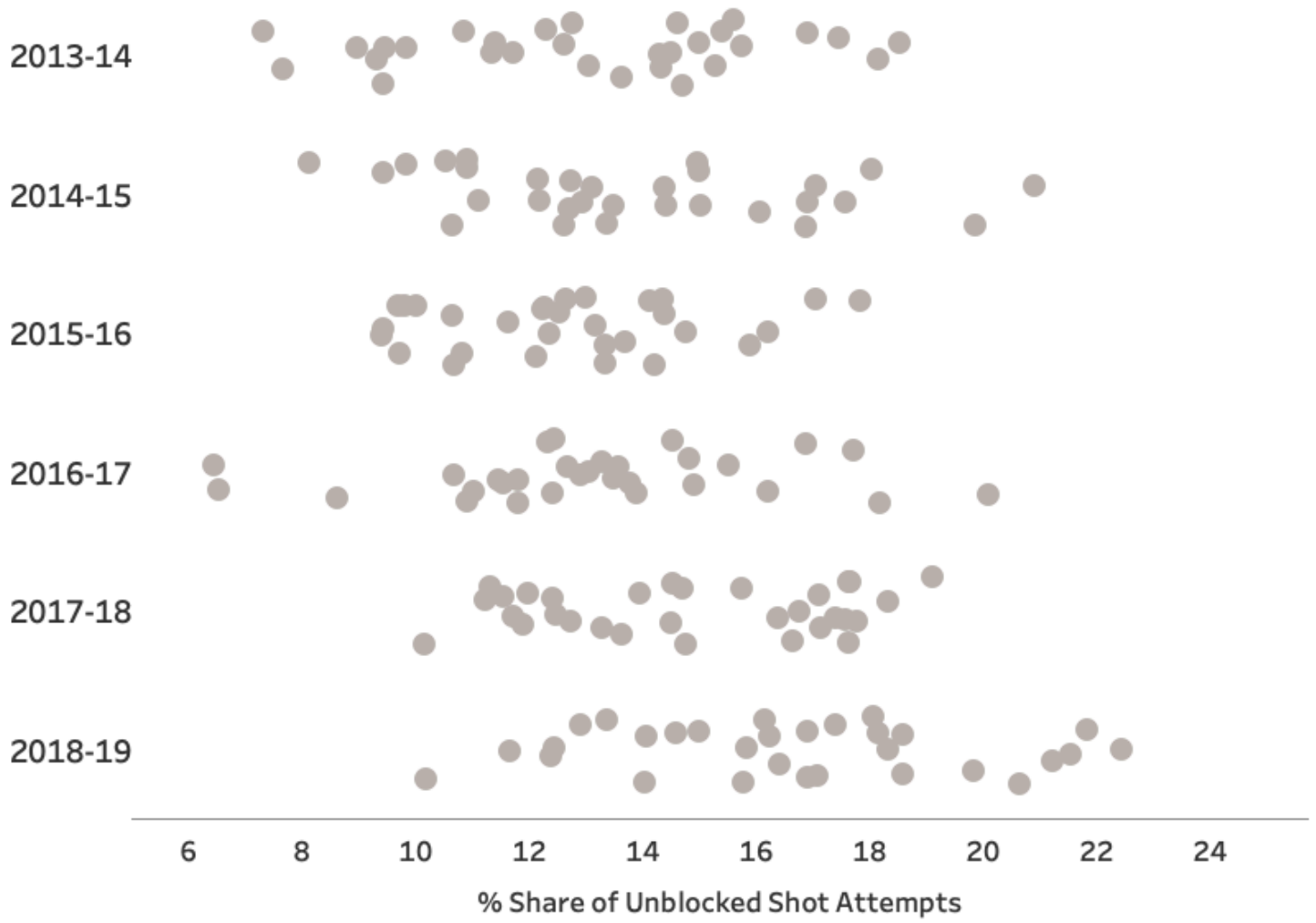
Meghan Hall

RIT Sports Analytics Conference

September 14, 2019

@MeghanMHall

A NEW RECORD



Unblocked Shot Attempt Share

By the penalty kill team over time

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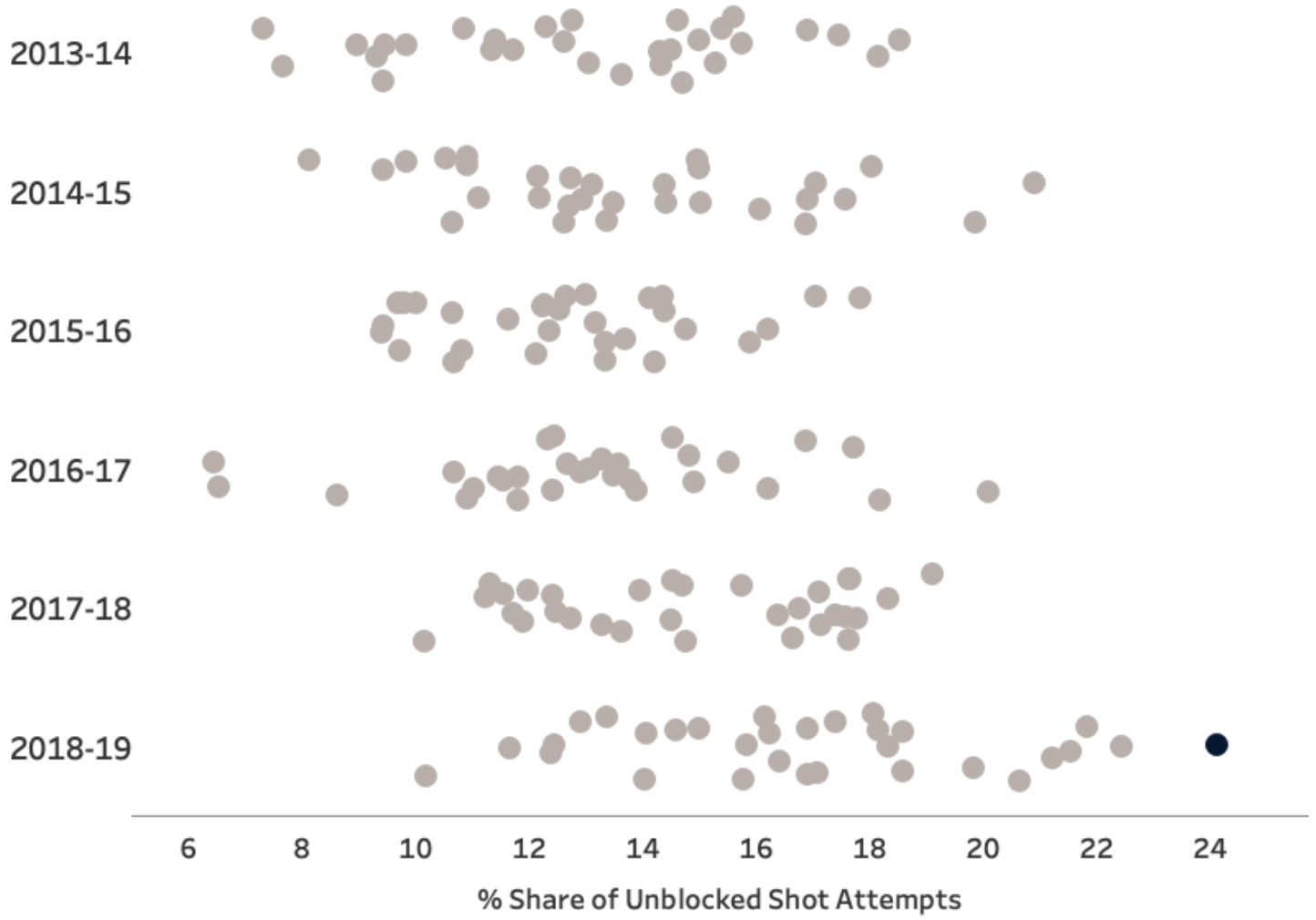

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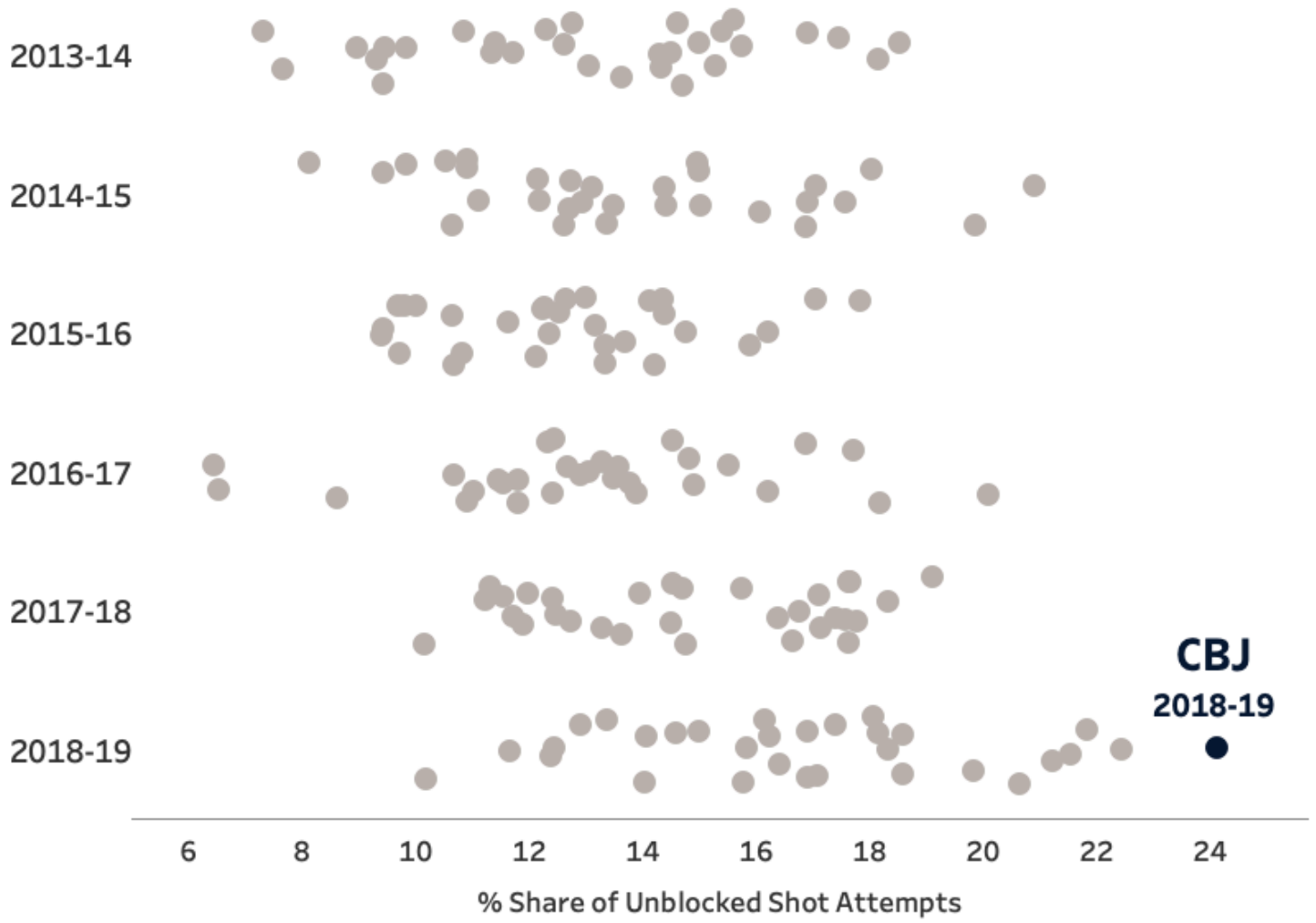


Unblocked Shot Attempt Share

By the penalty kill team over time

WHAT CAN I COVER IN 20 MINUTES?

What's the trend?

Personnel on the penalty kill/power play

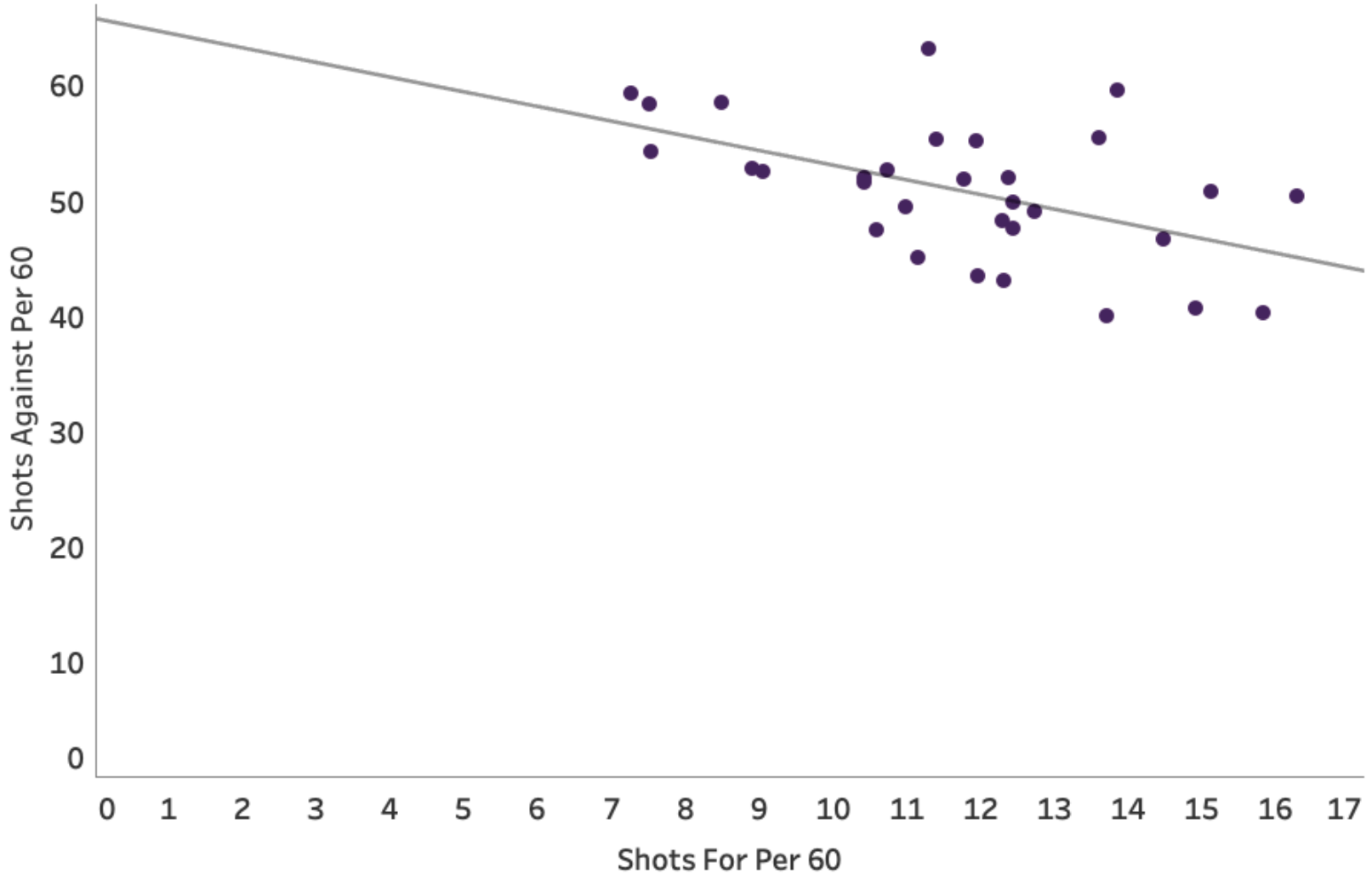
Power play unit structure

Zone entry data

BUT FIRST...

Why does this matter?

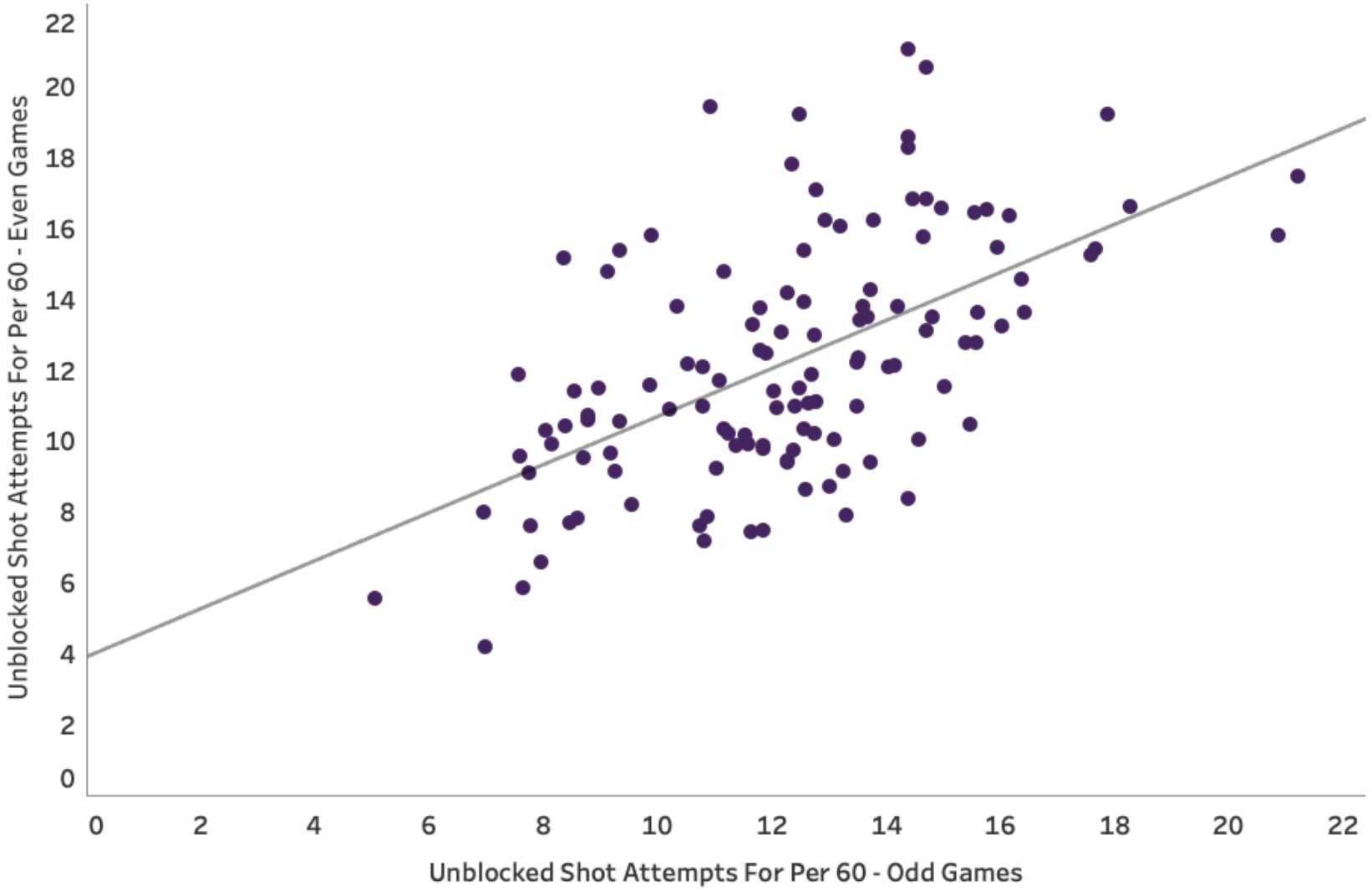
COMPARING SHOTS FOR AND AGAINST



Penalty Kill

Shots for and against
2018-19
r = 0.52

APPEARS TO BE AN ACTUAL SKILL



Penalty Kill

Shots against, even vs. odd
r = 0.57

WHAT CAN I COVER IN 20 MINUTES?

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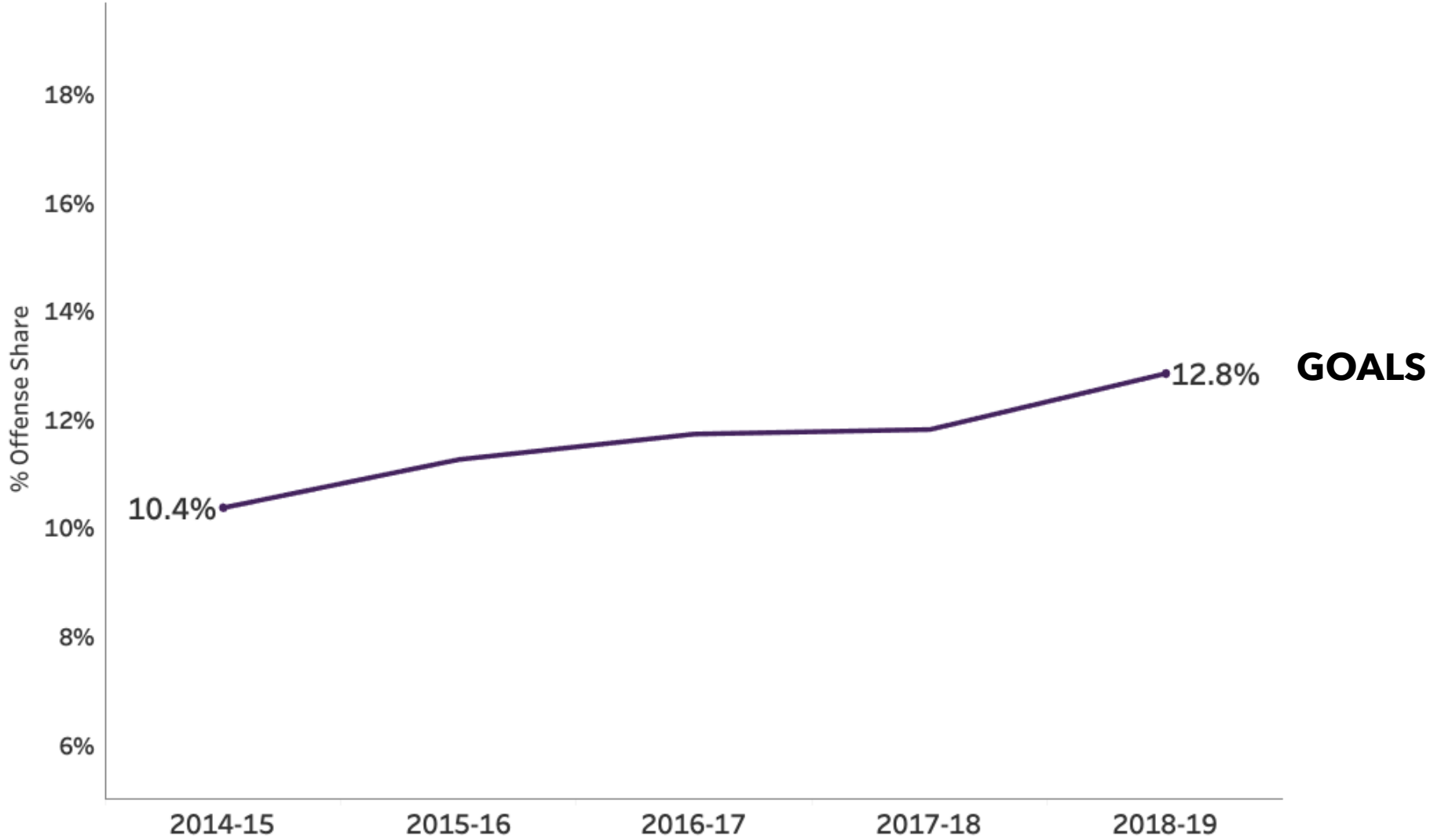
OFFENSE SHARE BY THE PK TEAM



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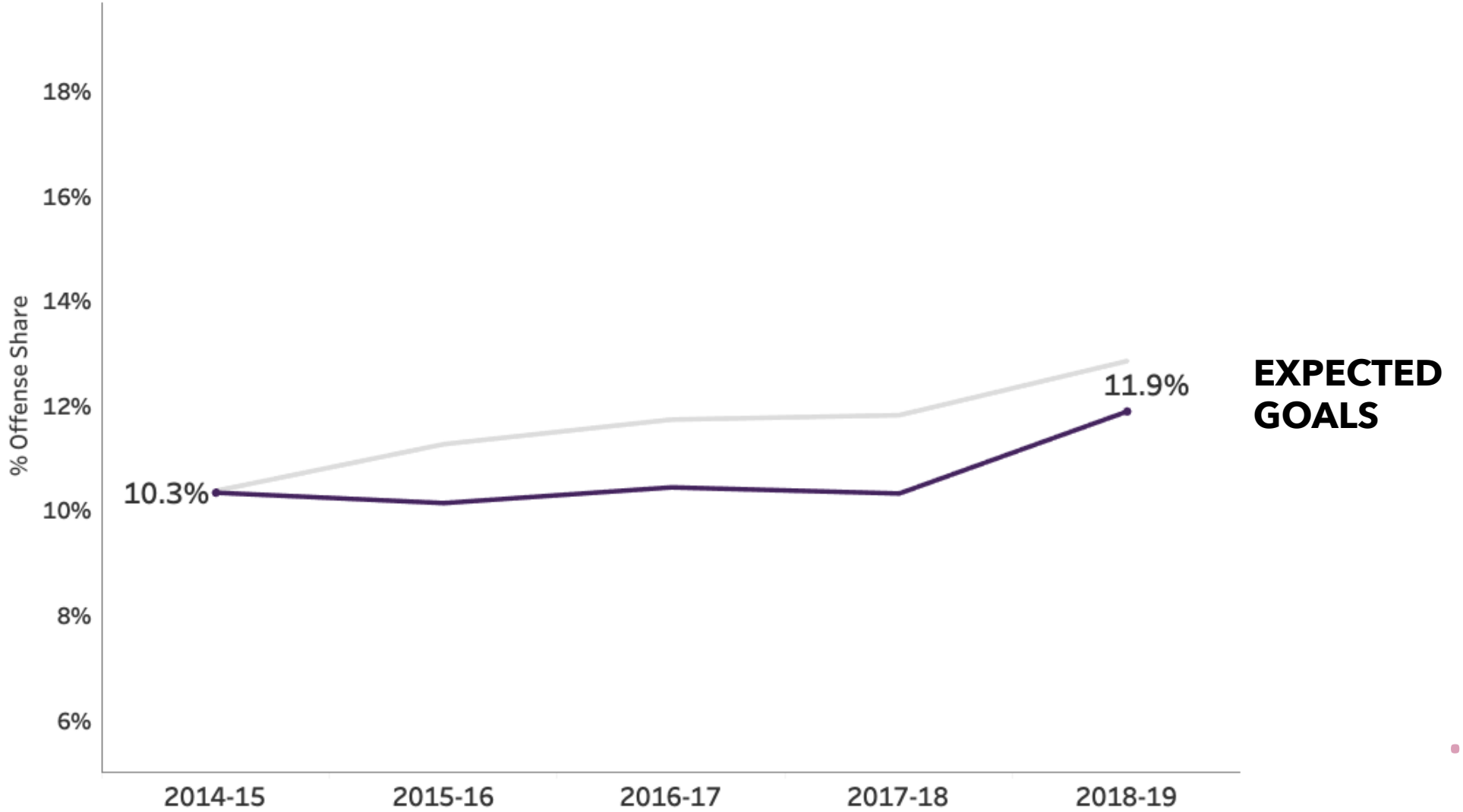

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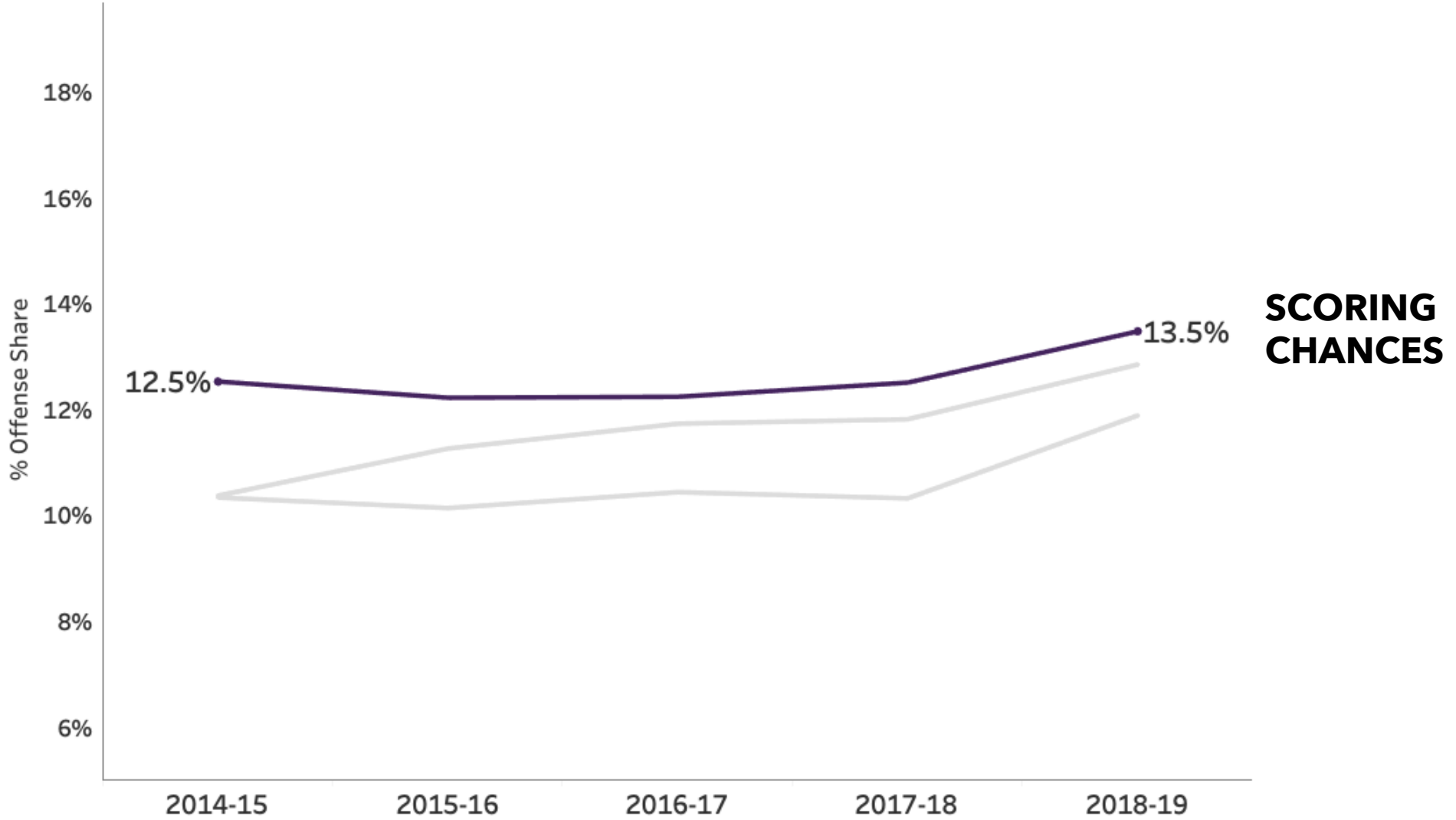

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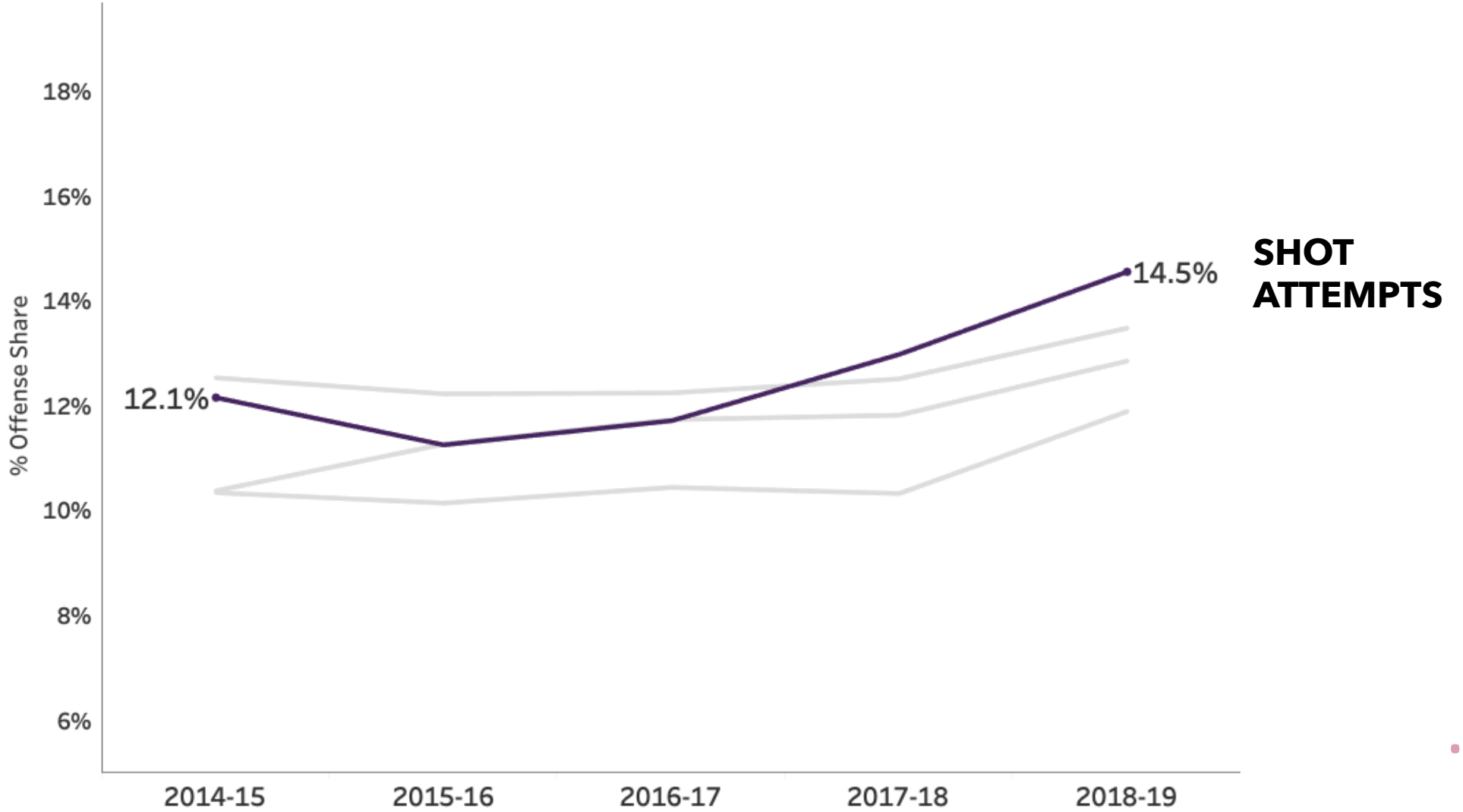

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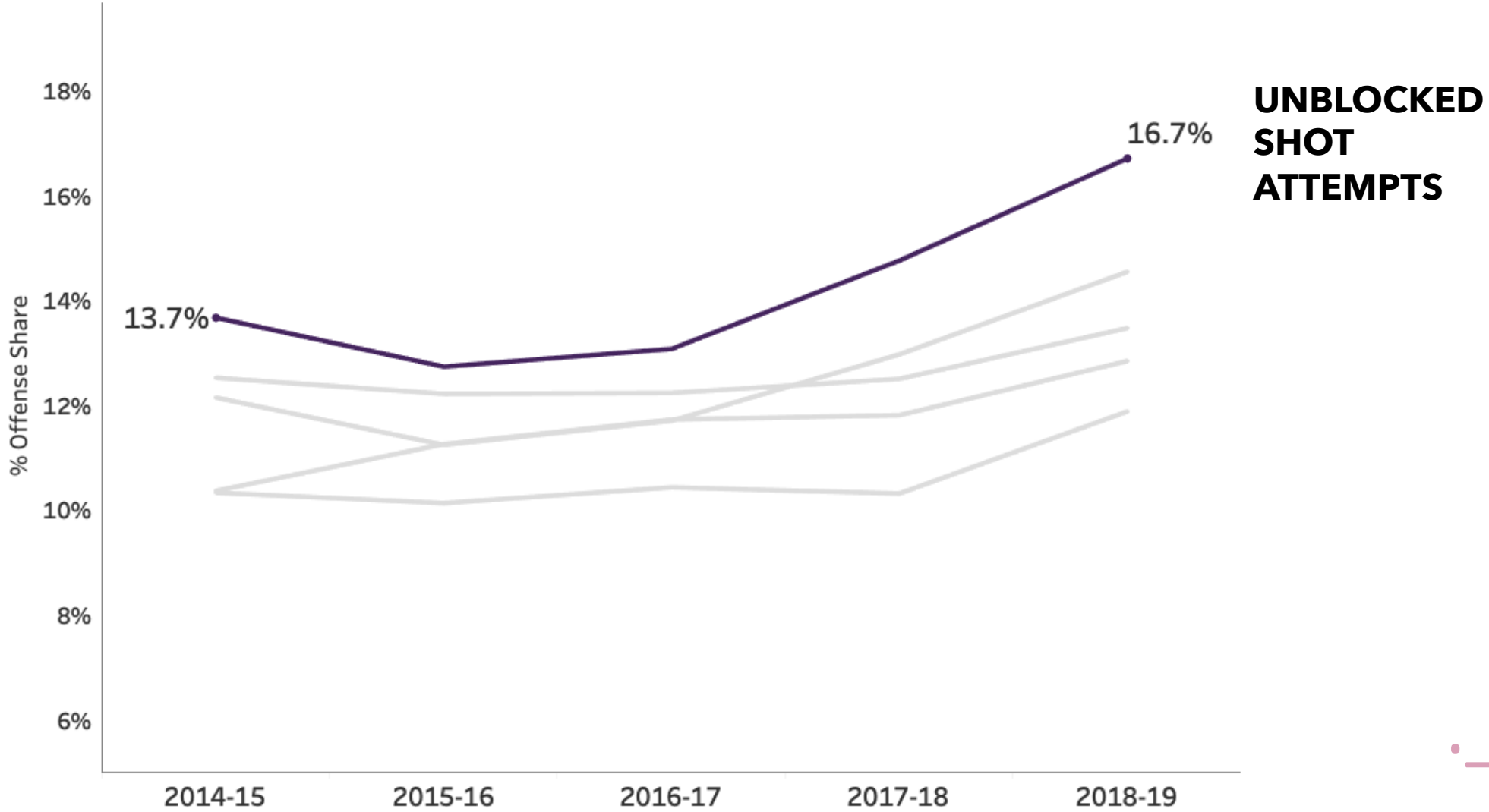
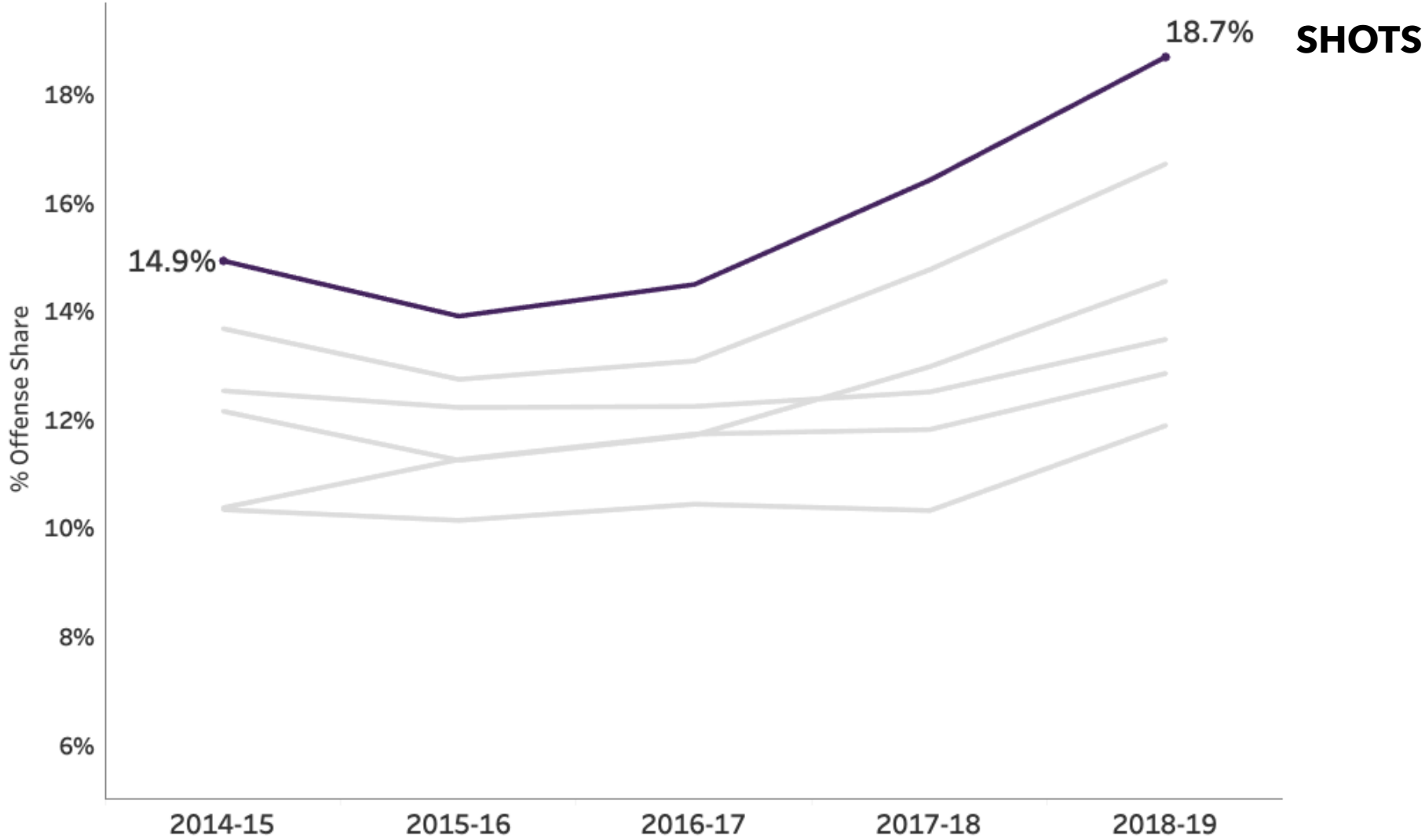
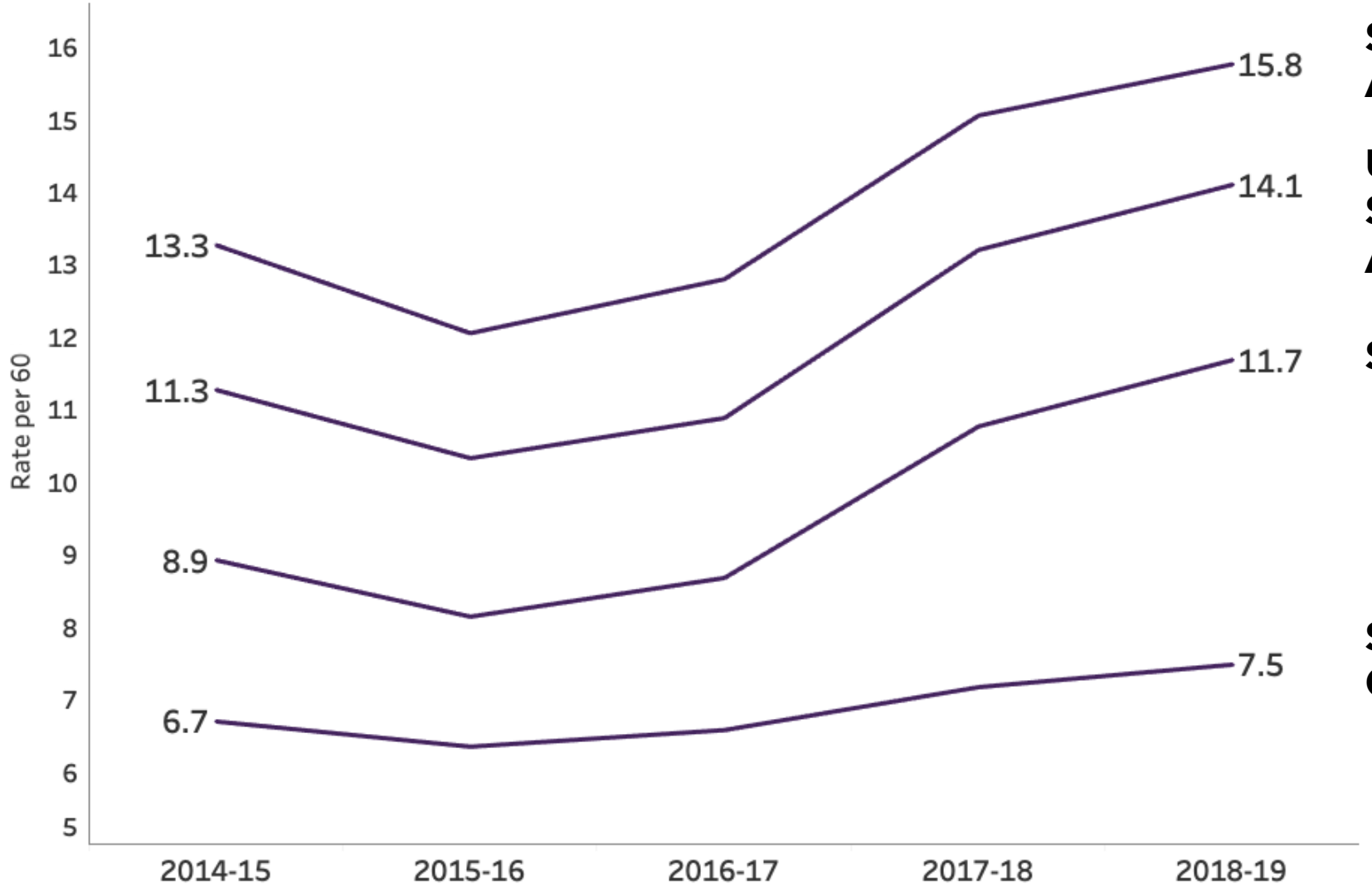


UNBLOCKED SHOT ATTEMPTS

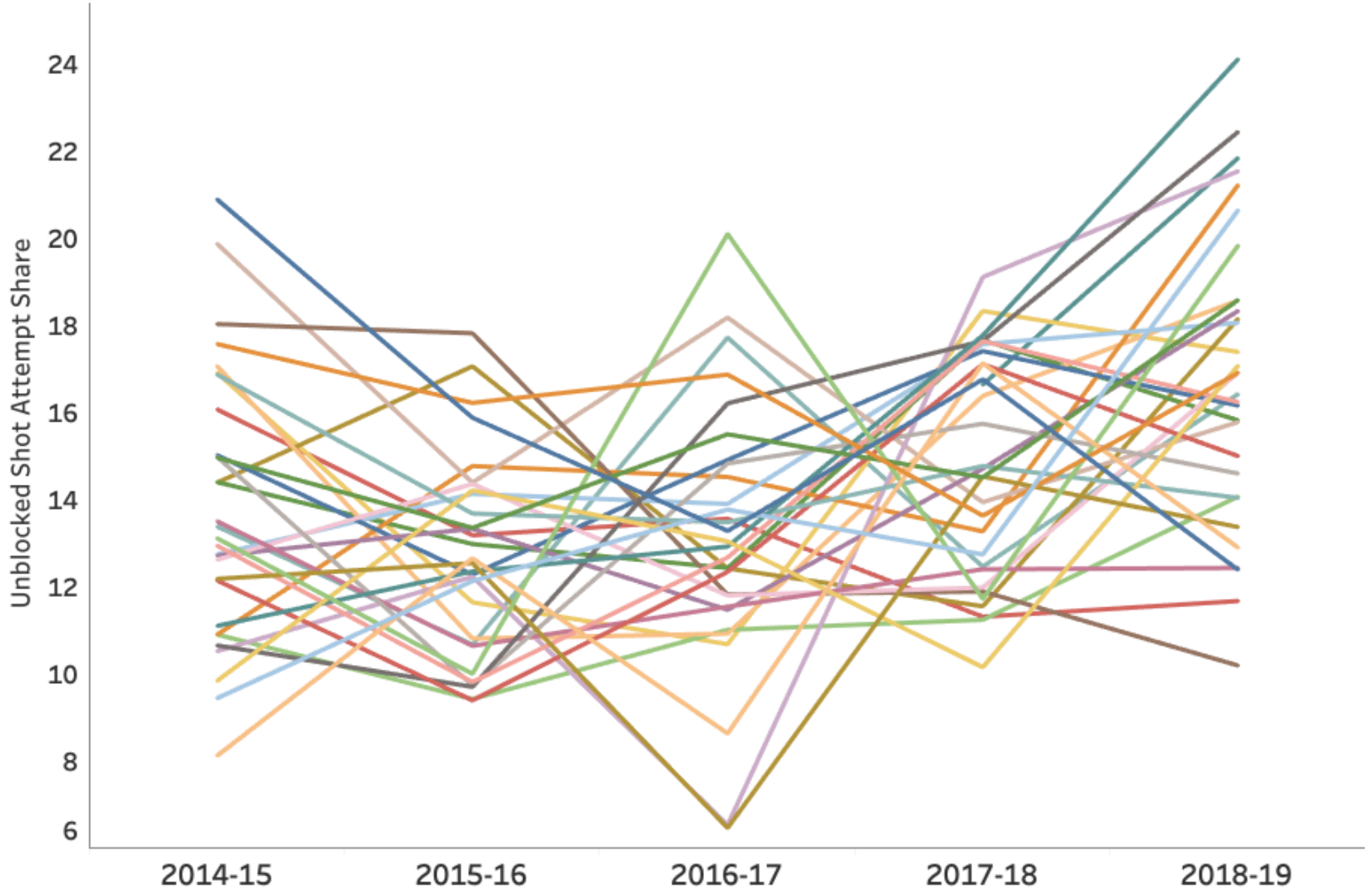
OFFENSE SHARE BY THE PK TEAM



OFFENSE RATE BY THE PK TEAM



OFFENSE SHARE AT THE TEAM LEVEL



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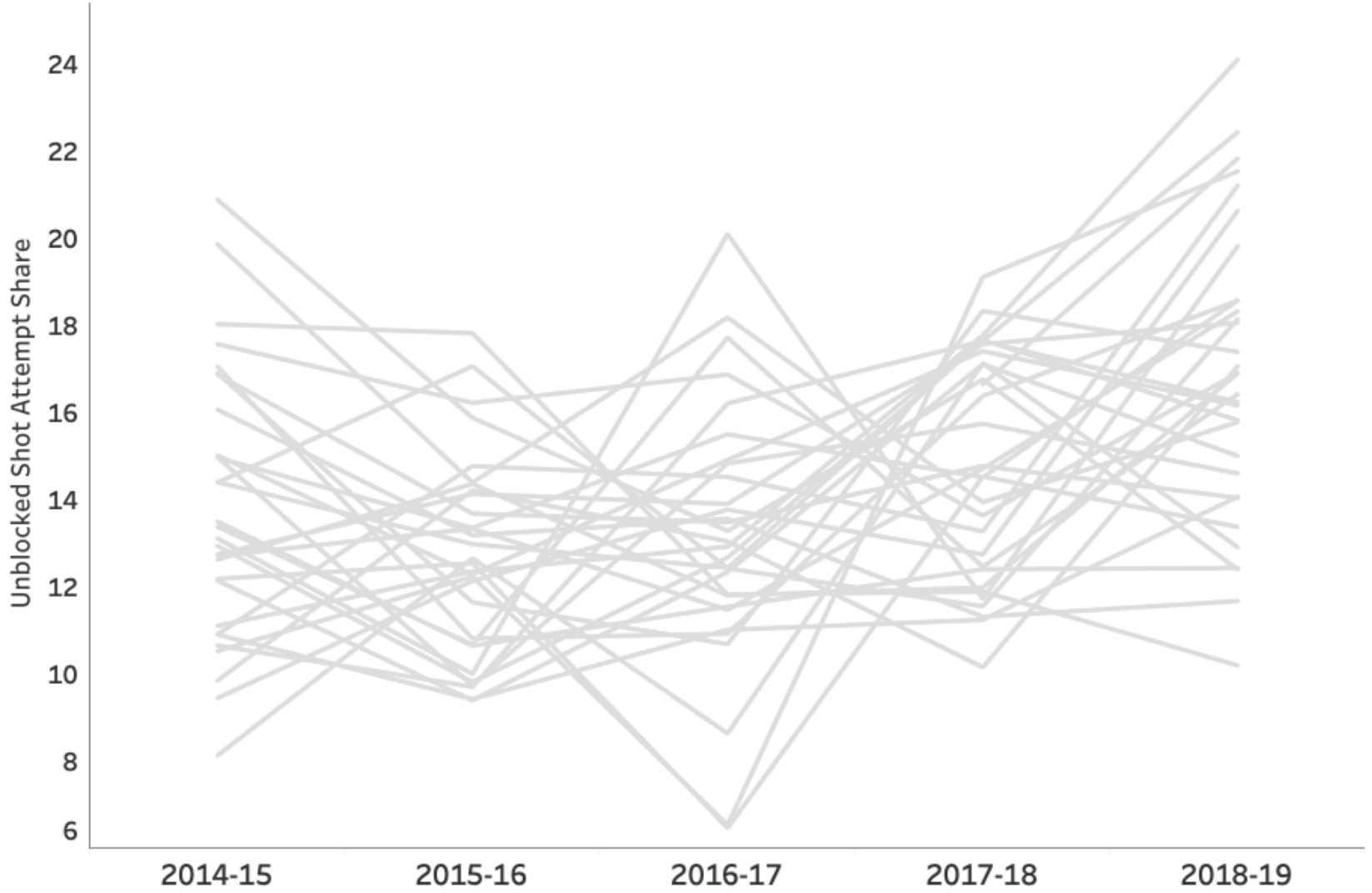

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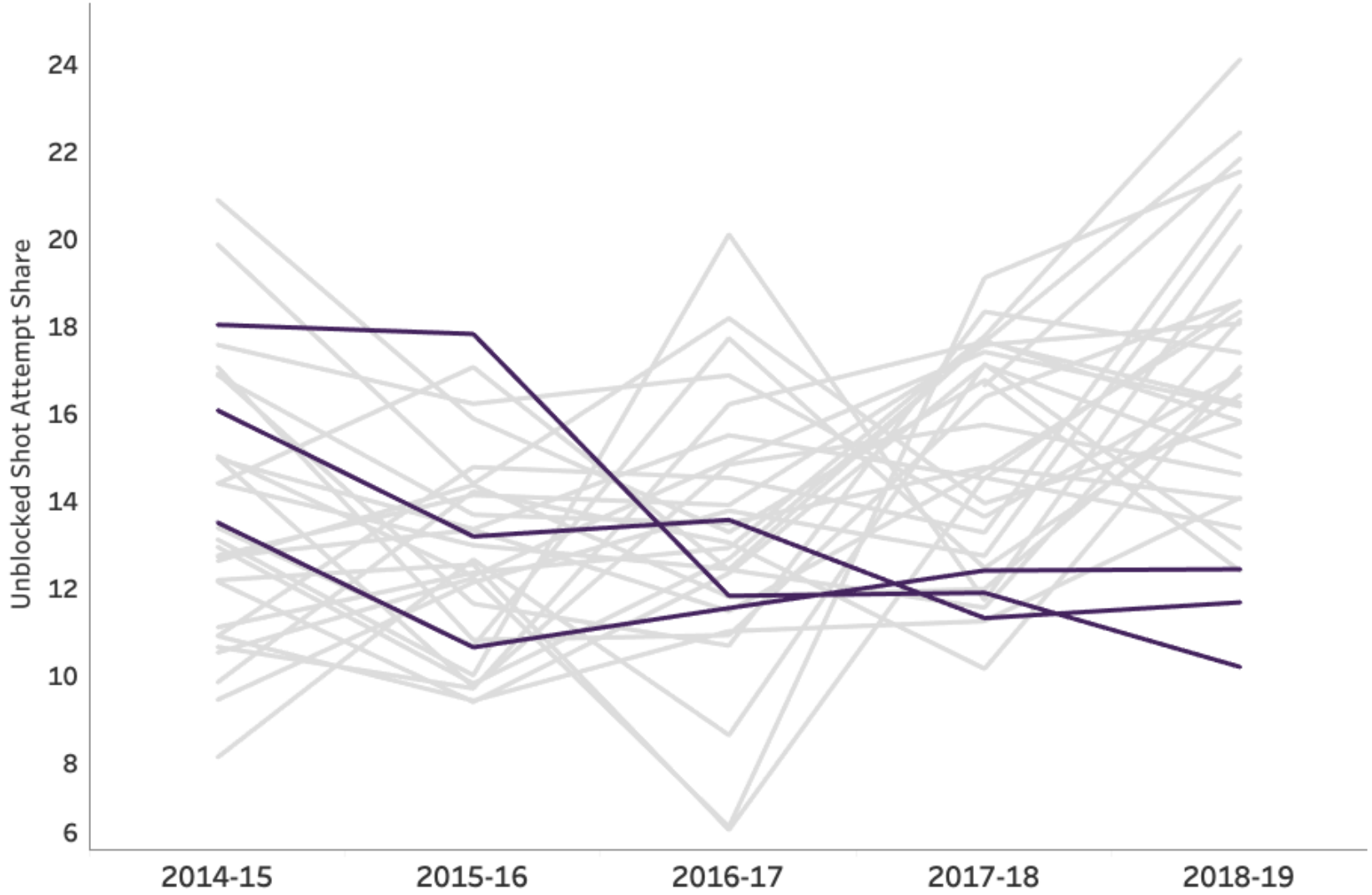
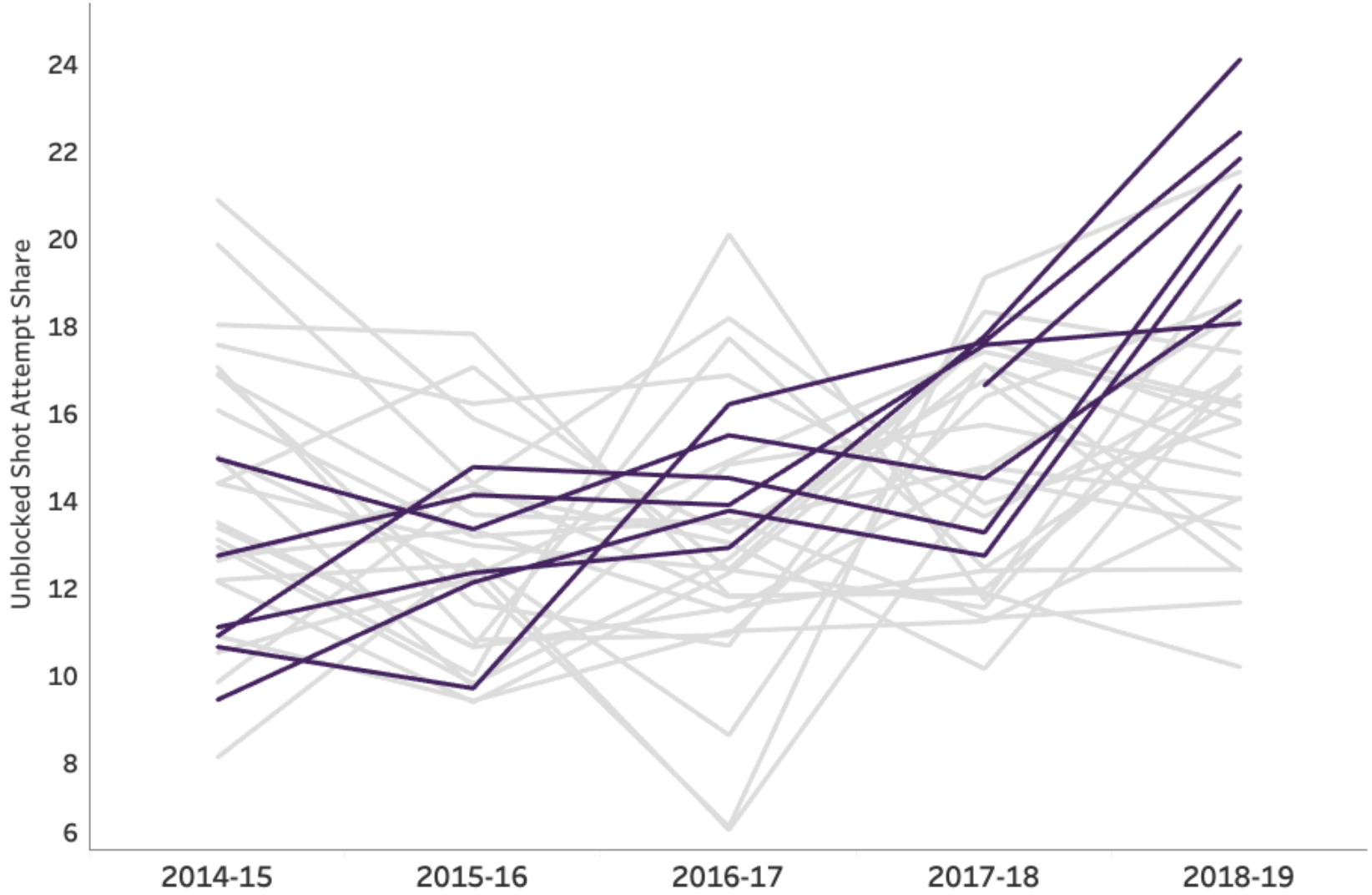


MINNESOTA

WINNIPEG

NY ISLANDERS

OFFENSE SHARE AT THE TEAM LEVEL



COLUMBUS
FLORIDA
VEGAS
PITTSBURGH
ARIZONA
CALGARY
PHILADELPHIA

TAKEAWAYS

Offense on the PK is going up
league-wide,
by both rate and share

WHAT CAN I COVER IN 20 MINUTES?

What's the trend?

Personnel on the penalty kill/power play

Power play unit structure

Zone entry data

RAPM IN 15 SECONDS

Regularized adjusted plus-minus

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Each skater’s impact on the league average while on the ice

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Isolated from: teammates, competition, score, rest, location, zone

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Target variables: expected goals/60 (for and against) **five-on-five**

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Regularized adjusted plus-minus

Each skater's impact on the league average while on the ice

Isolated from: teammates, competition, score, rest, location, zone

Target variables: expected goals/60 (for and against) **five-on-five**

Proxies for general offensive and defensive ability

OFFENSIVE ABILITY ON THE PK

How is the **offensive ability** of **penalty kill** players changing?

WEIGHTED RAPM, BY STRENGTH STATE

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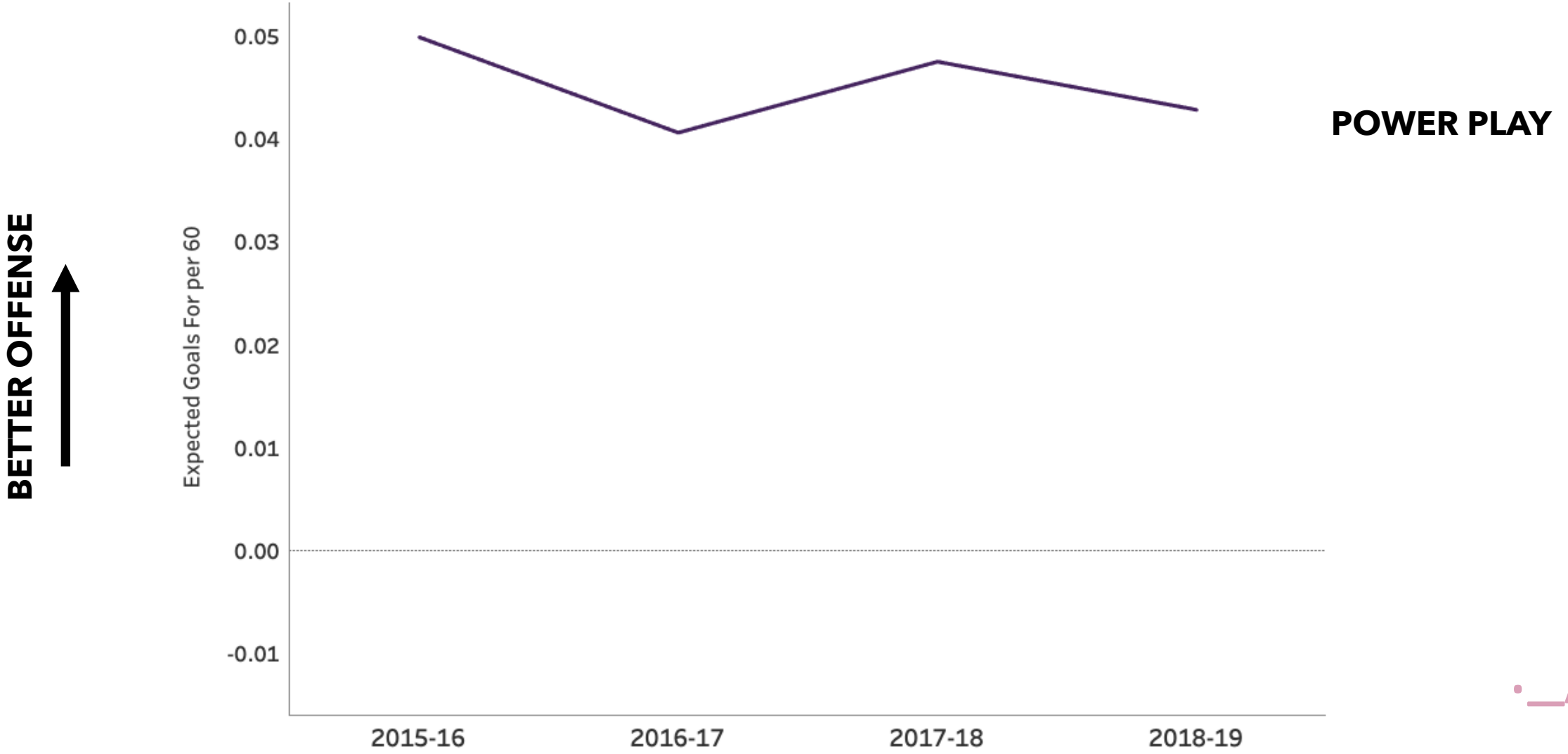

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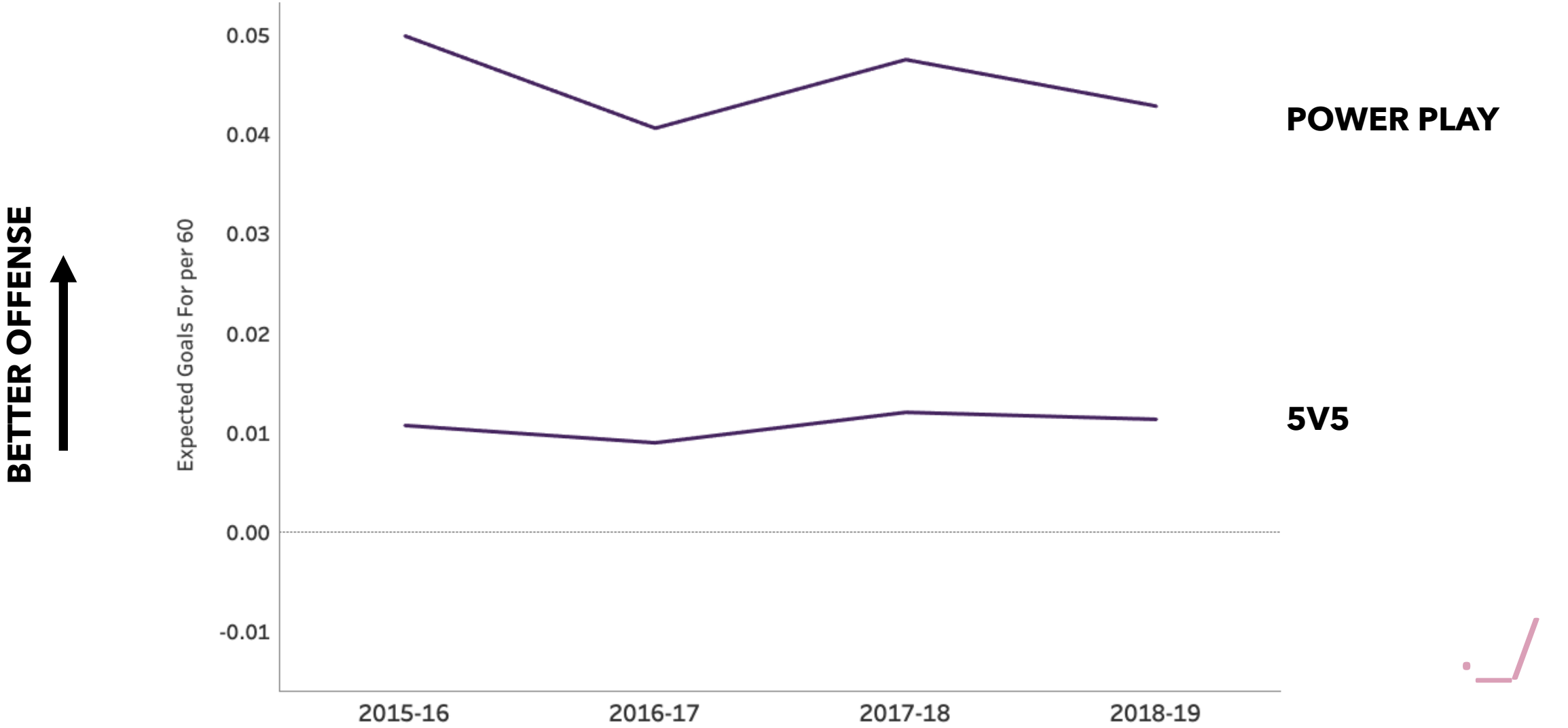

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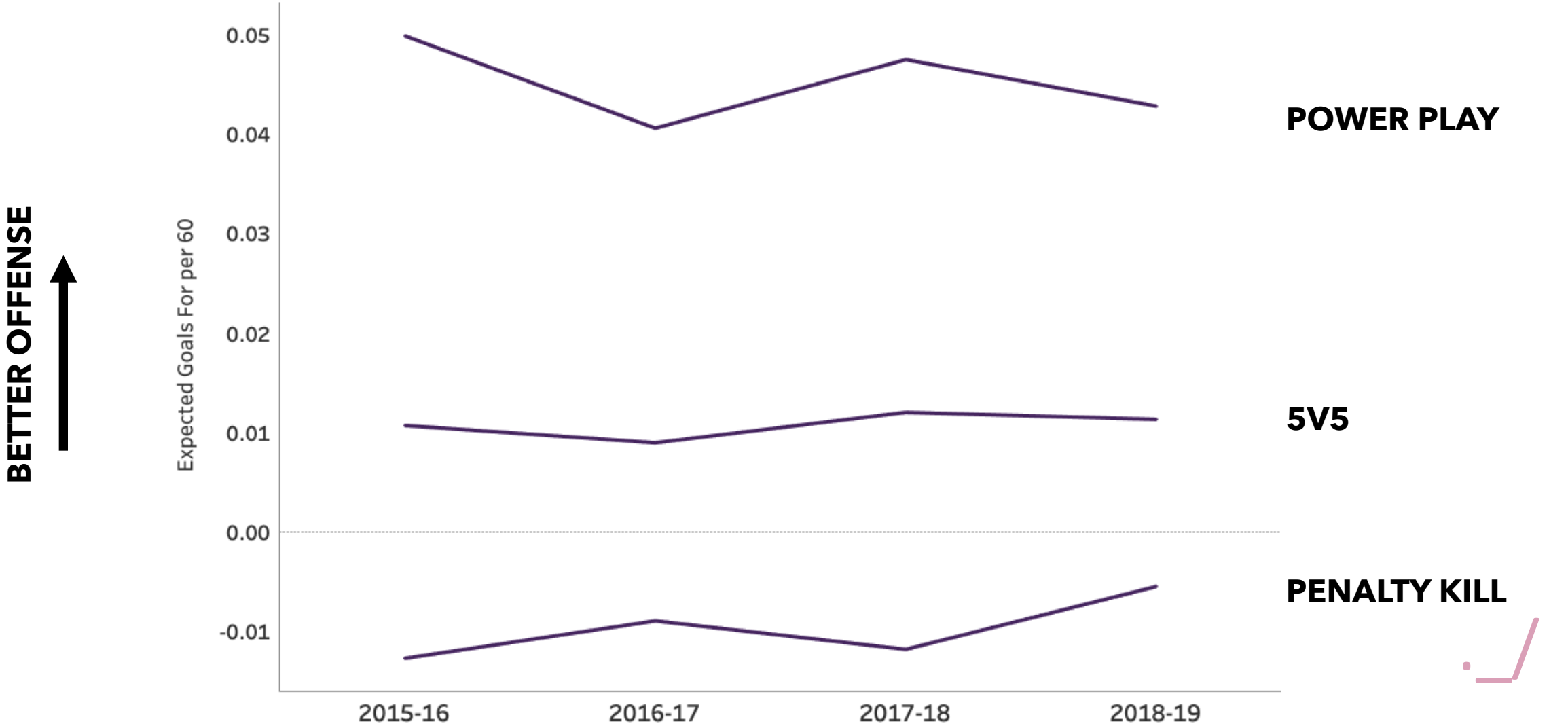
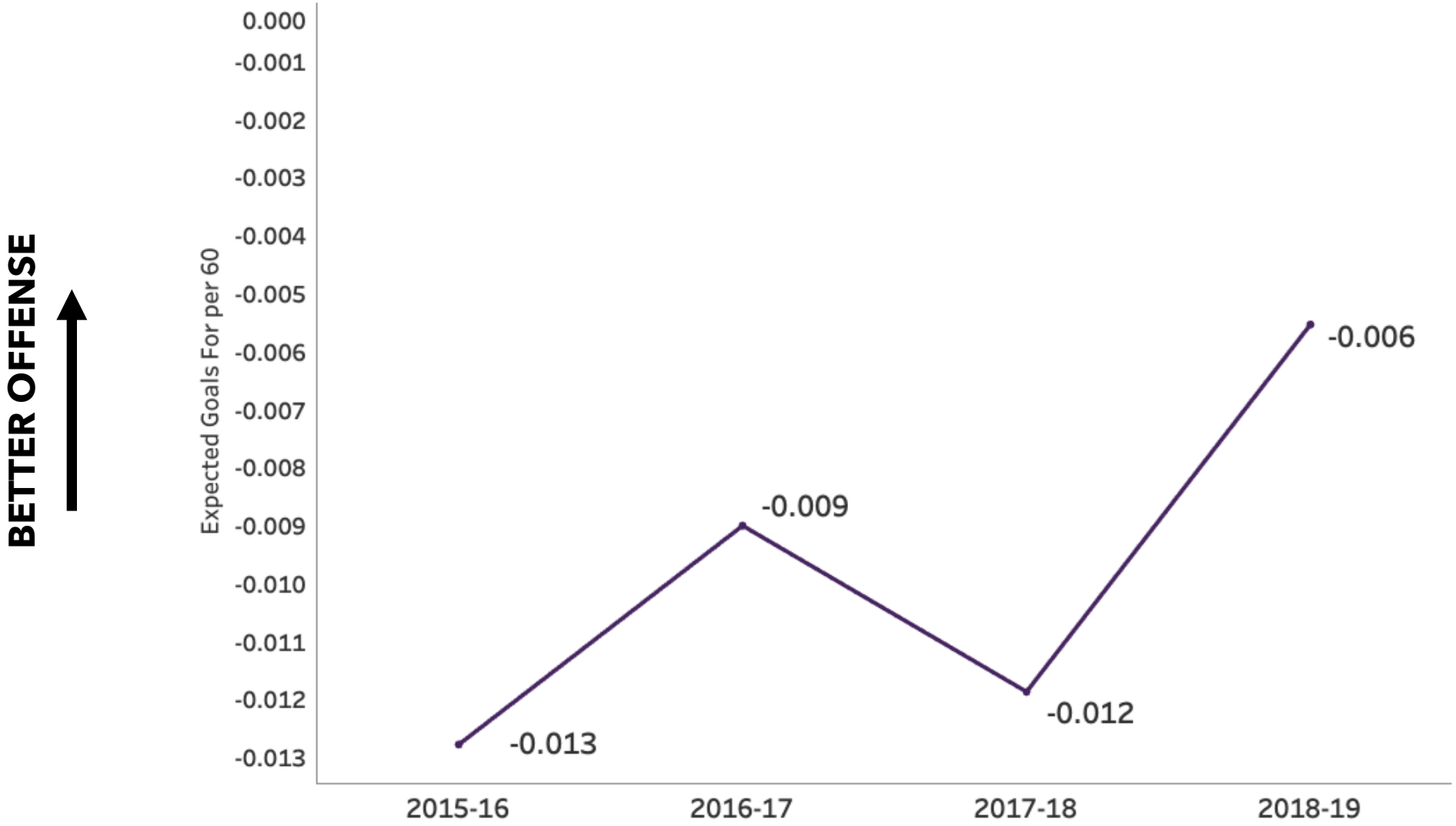


WEIGHTED RAPM, PENALTY KILL



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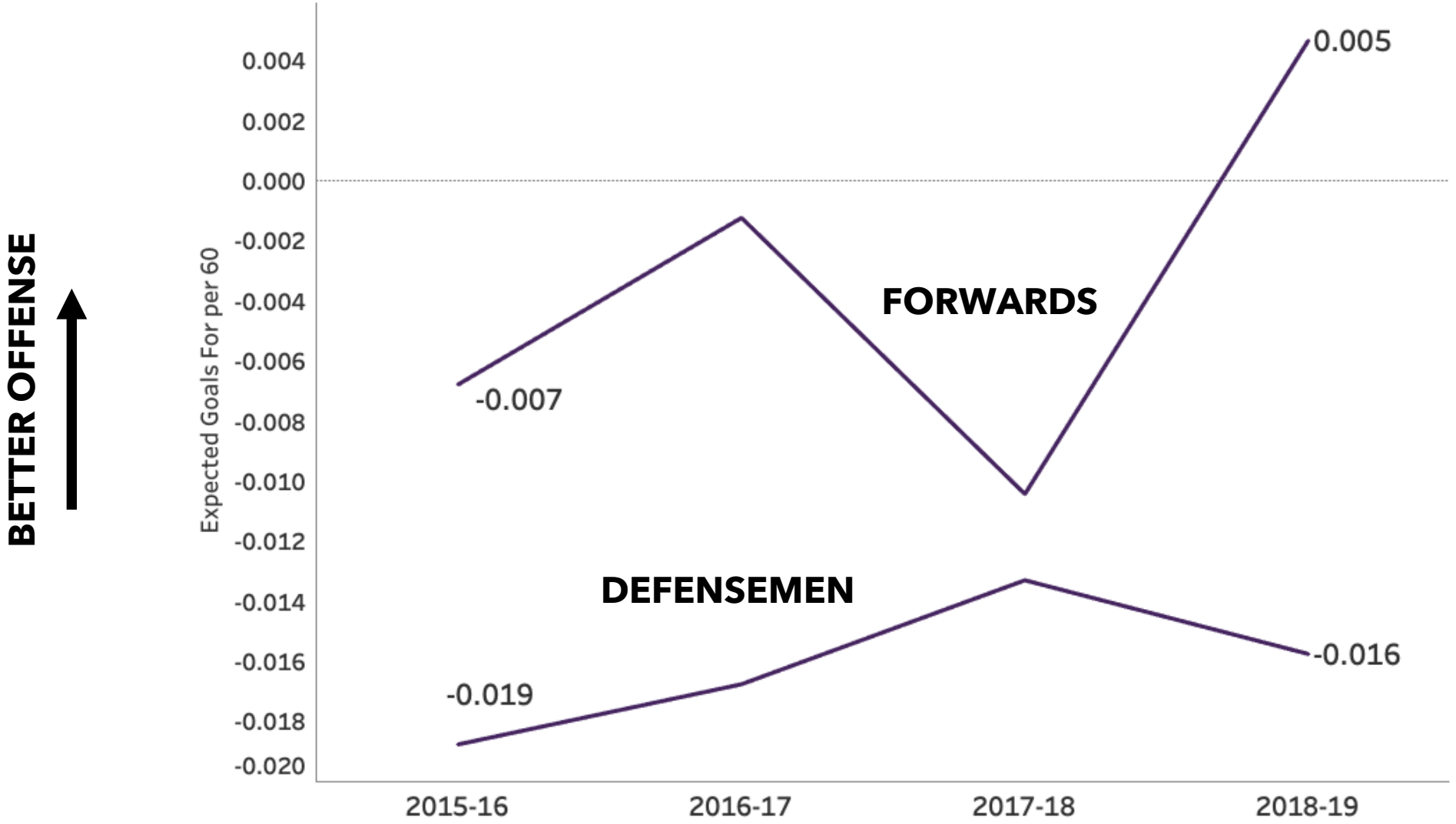
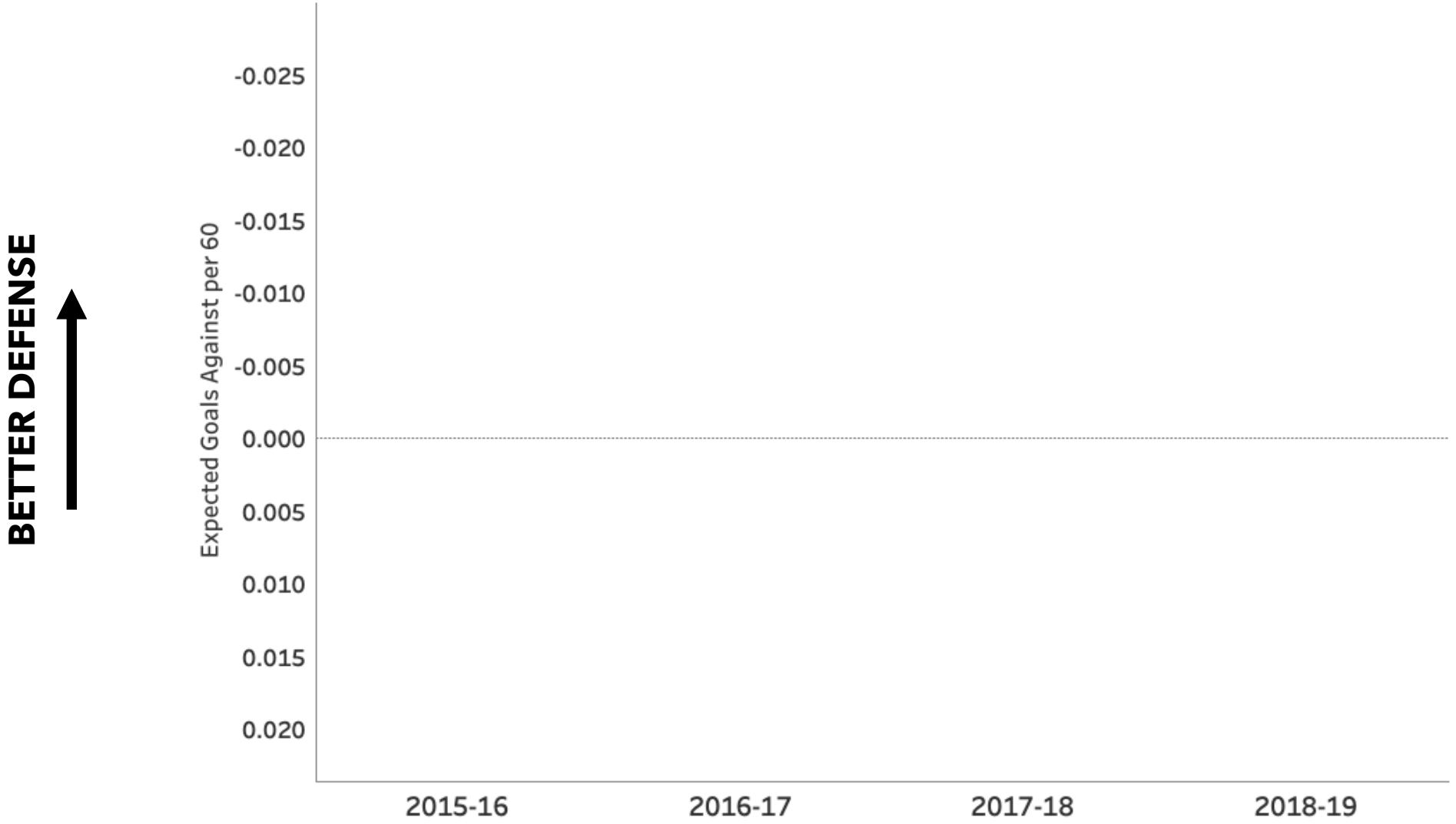


DEFENSIVE ABILITY ON THE PP

How is the **defensive ability** of **power play** players changing?

WEIGHTED RAPM, BY STRENGTH STATE



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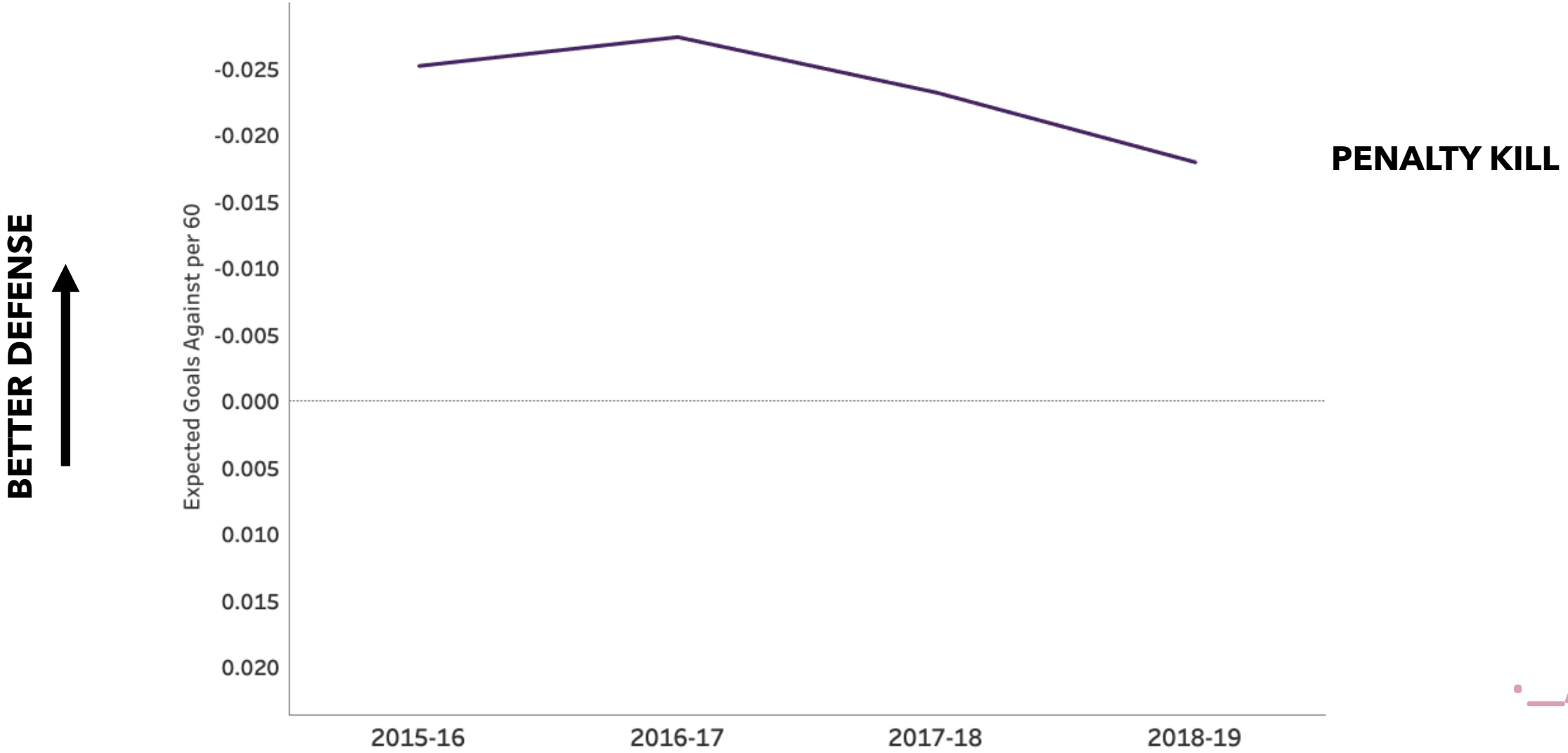

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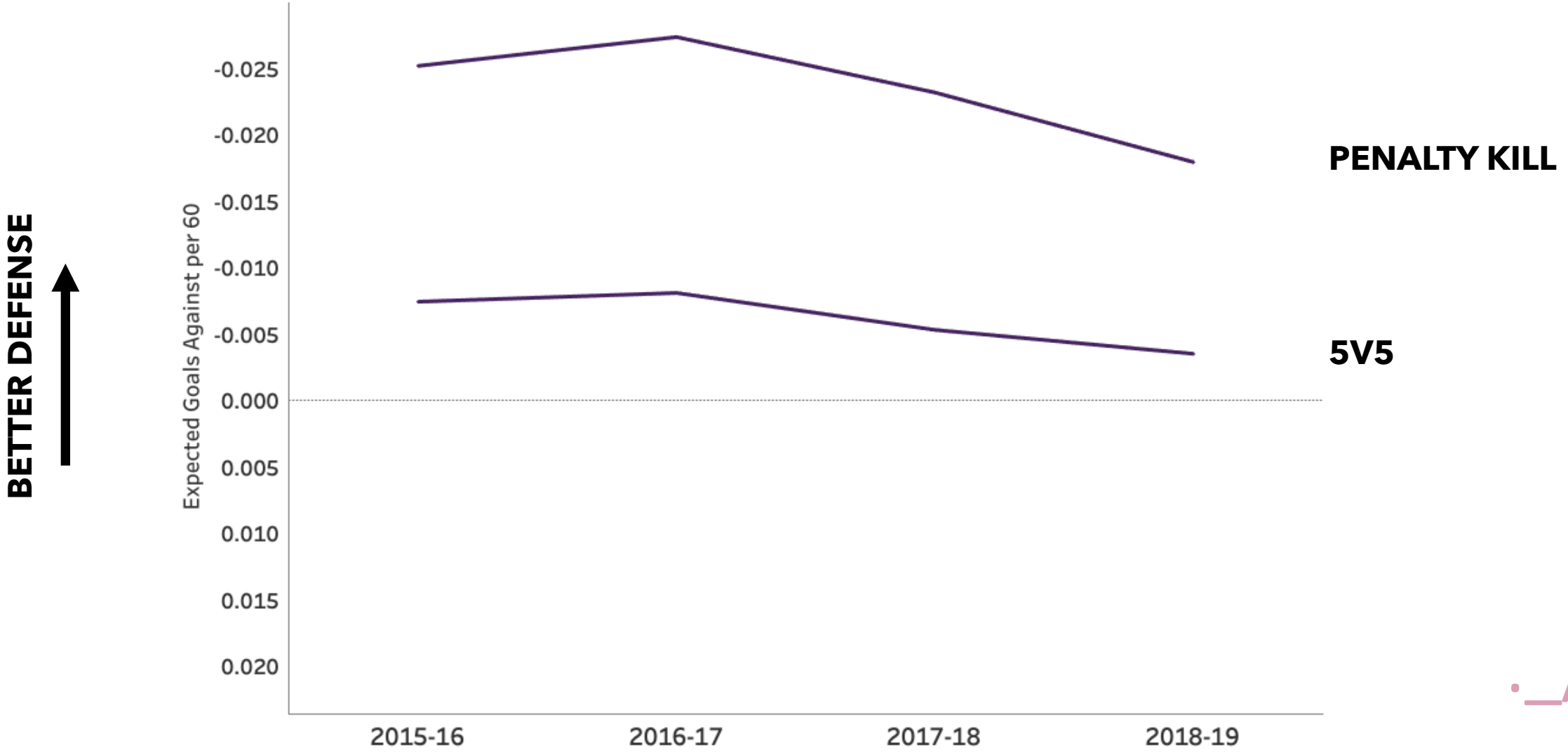

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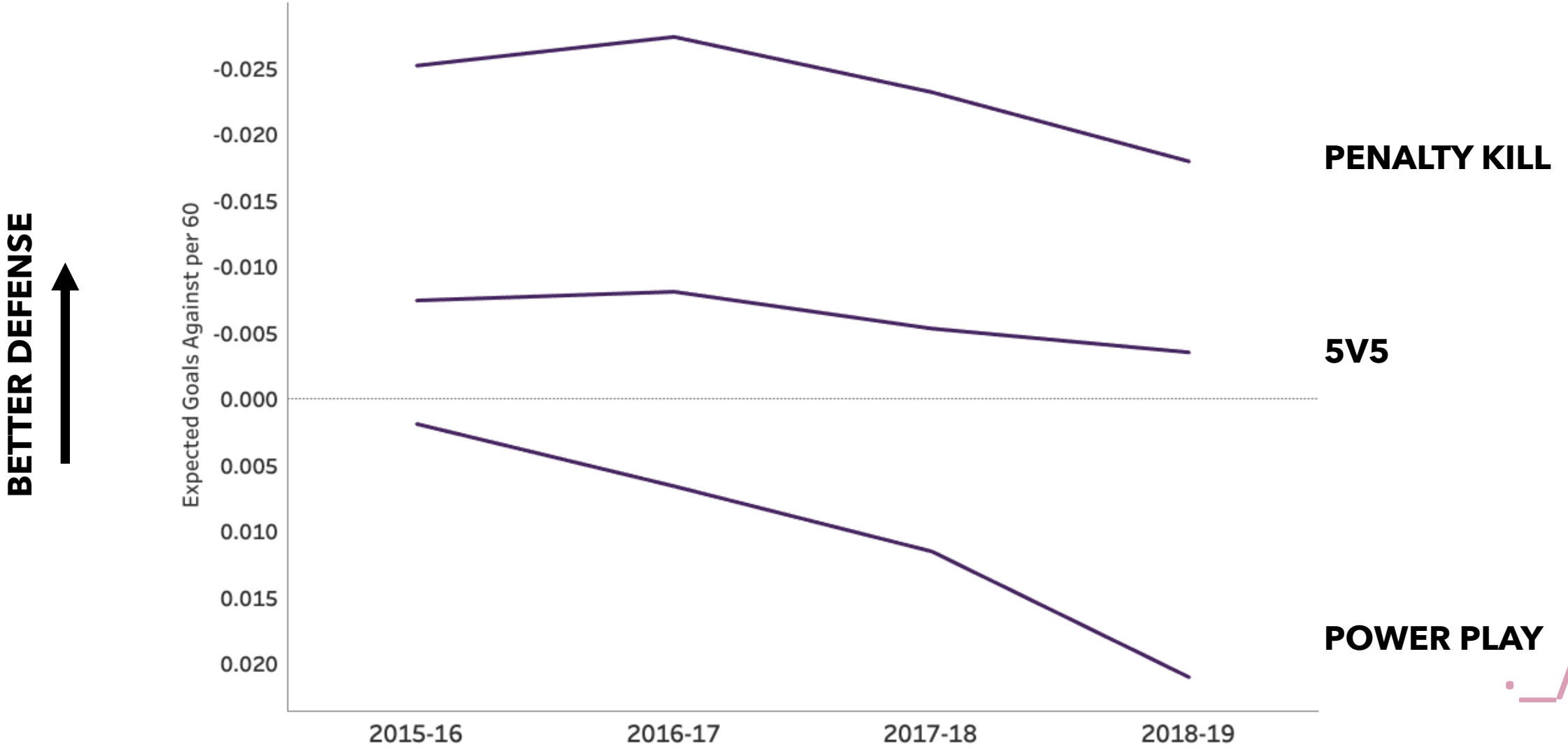
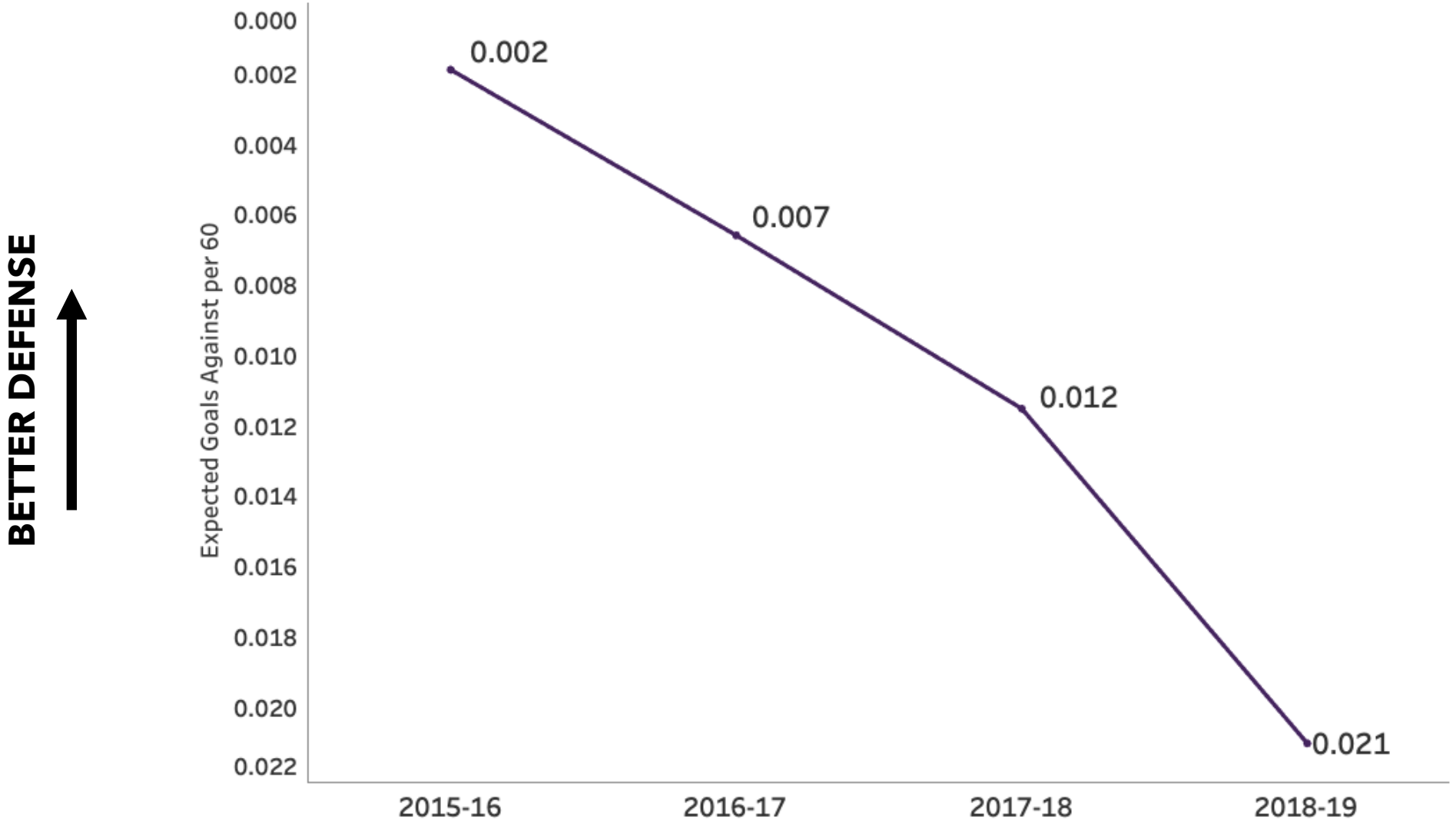


WEIGHTED RAPM, POWER PLAY



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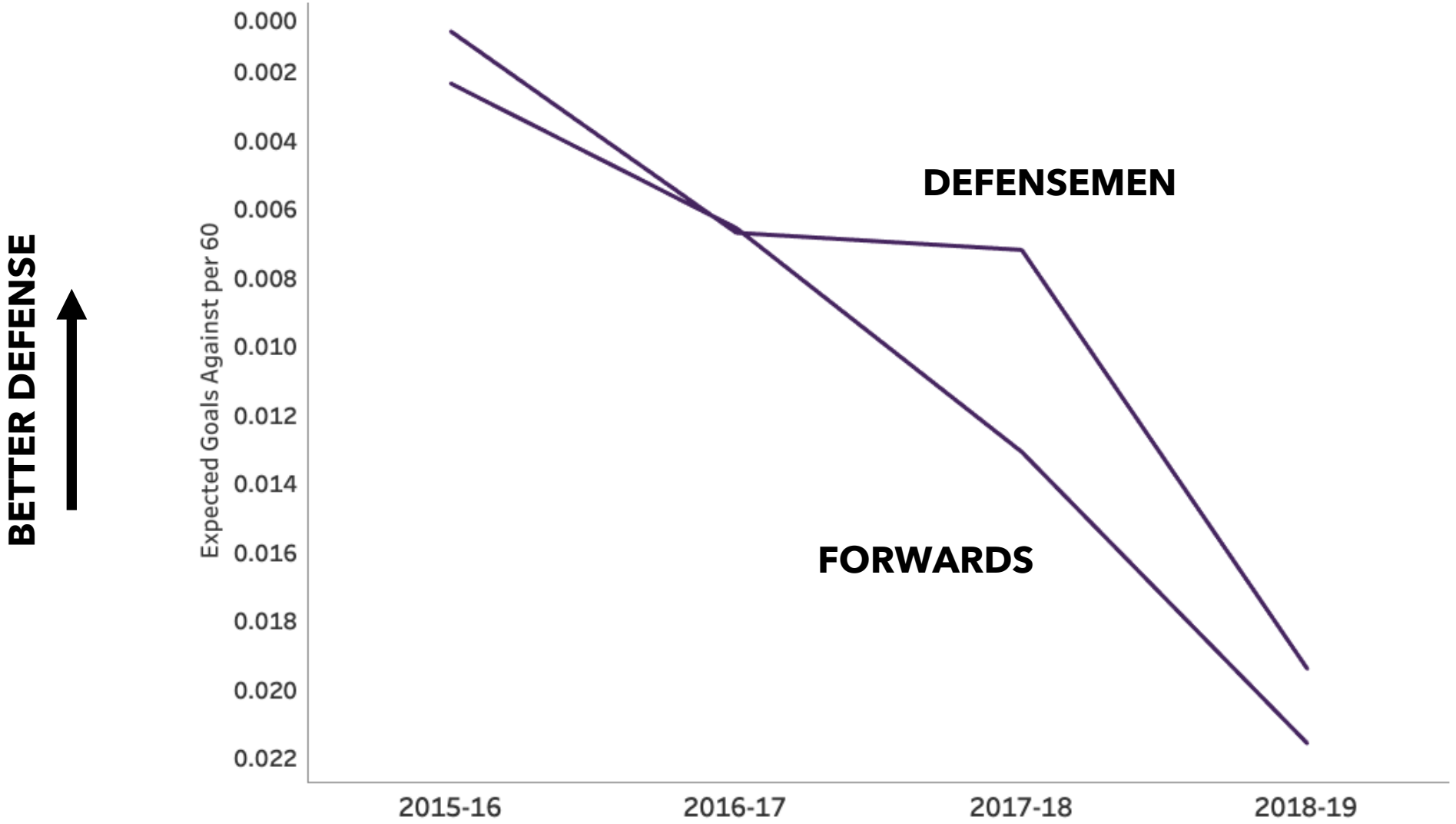


TAKEAWAYS

The general offensive ability of players (driven by forwards) on the penalty kill might be trending upward

TAKEAWAYS

The general defensive ability of players on the power play is trending downward

WHAT CAN I COVER IN 20 MINUTES?

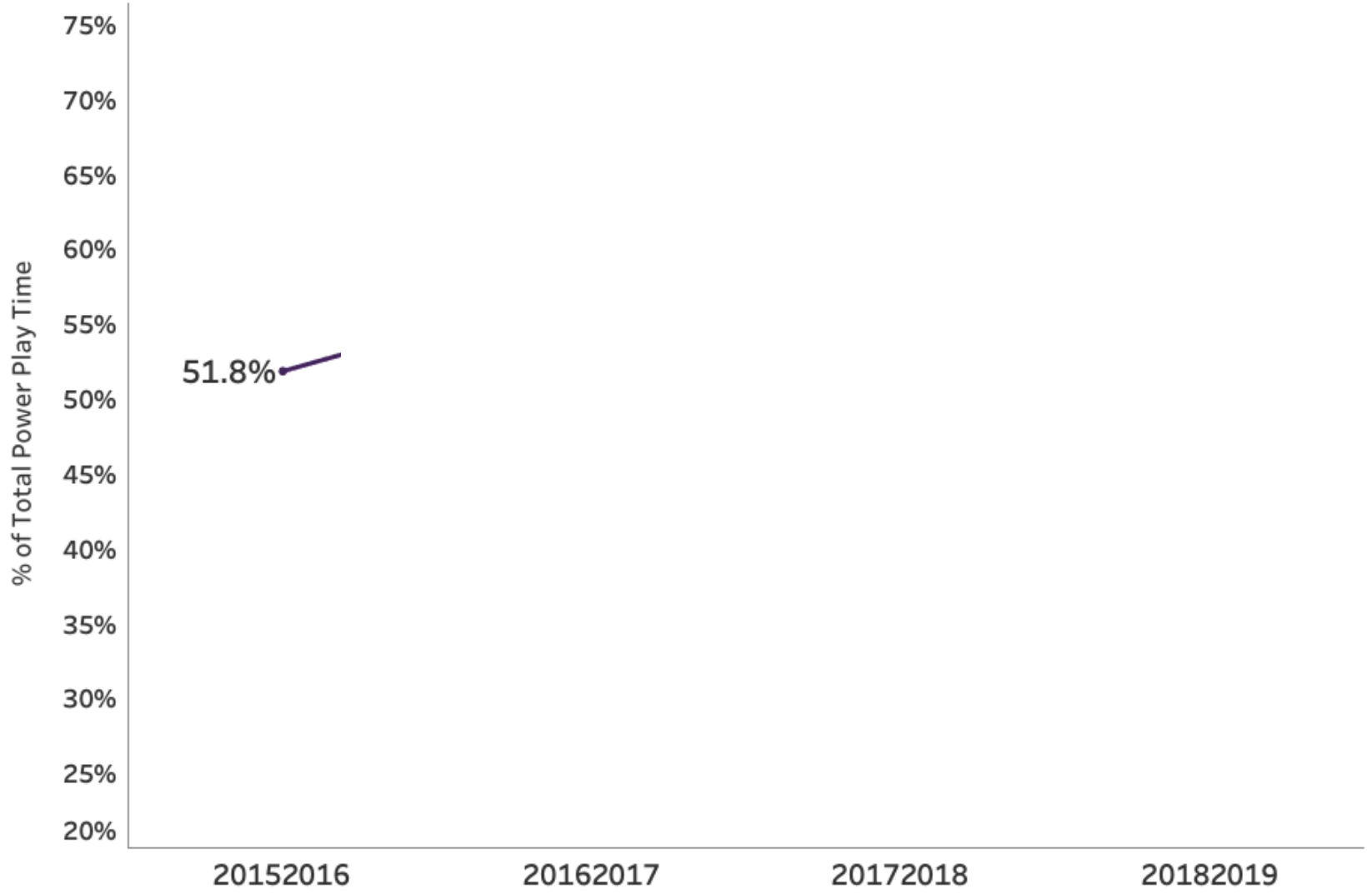
What's the trend?

Personnel on the penalty kill/power play

Power play unit structure

Zone entry data

RISE OF THE FOUR-FORWARD POWER PLAY



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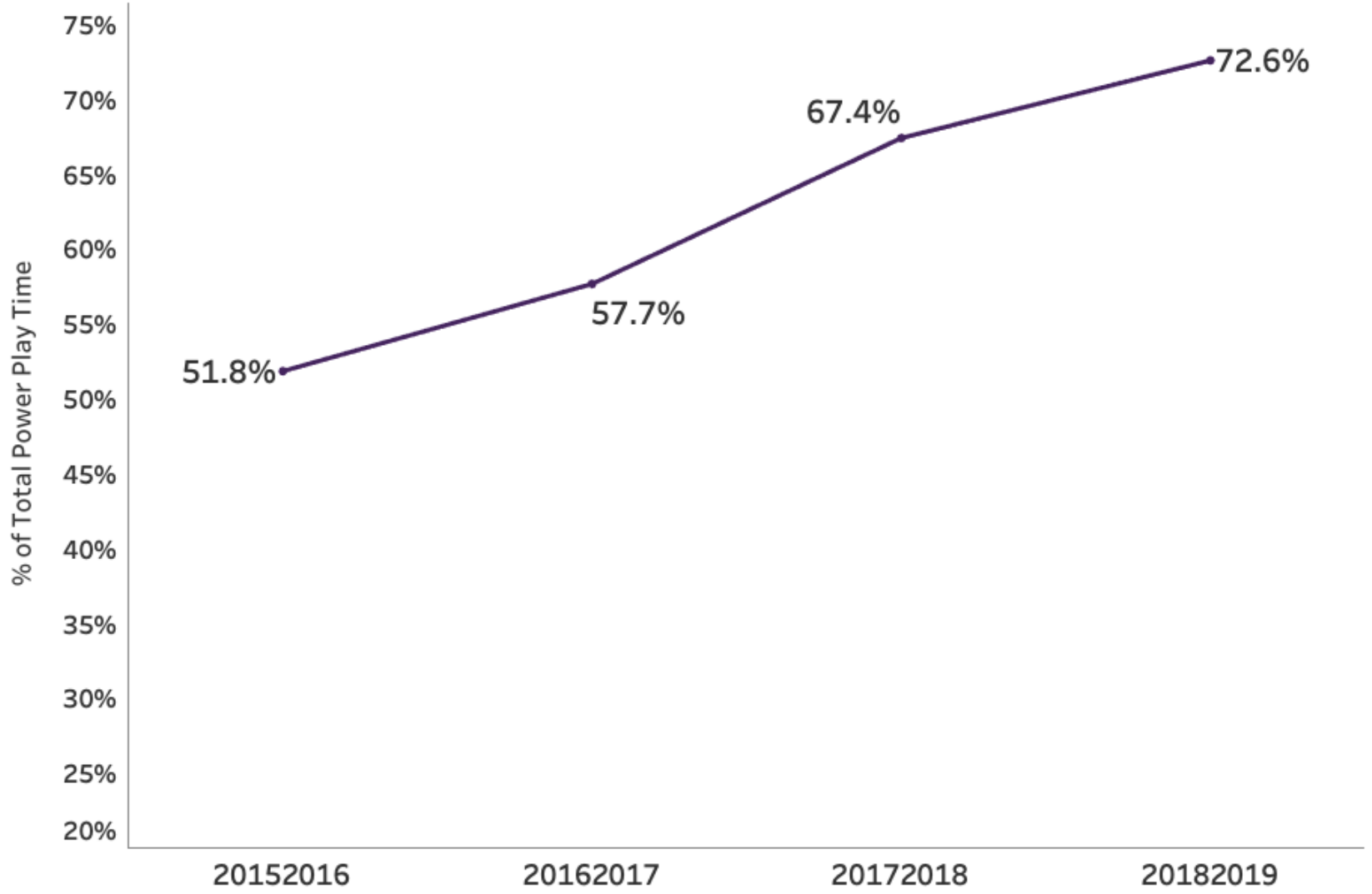
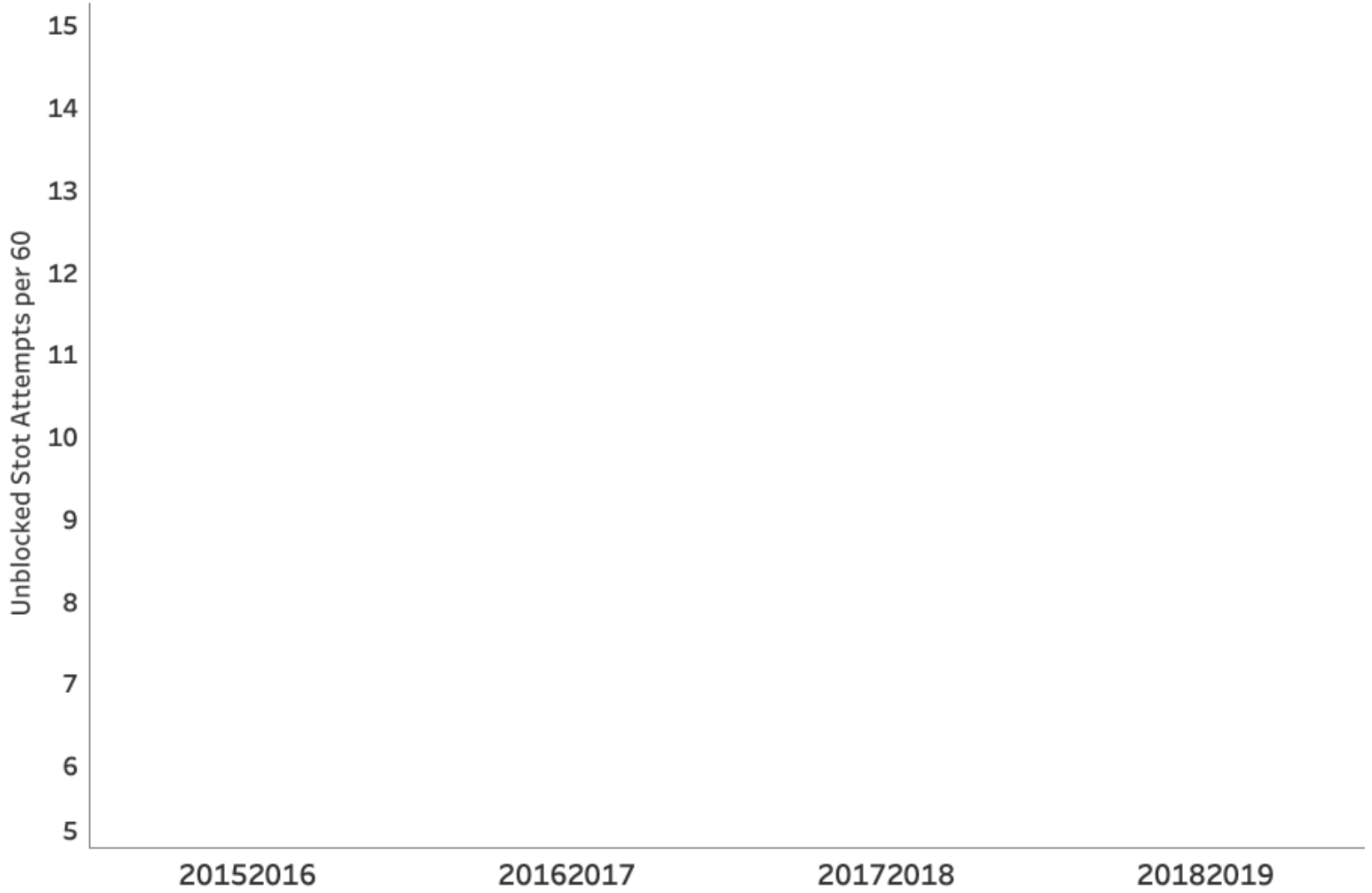


OFFENSE RATE BY OPPONENT'S PP STRUCTURE



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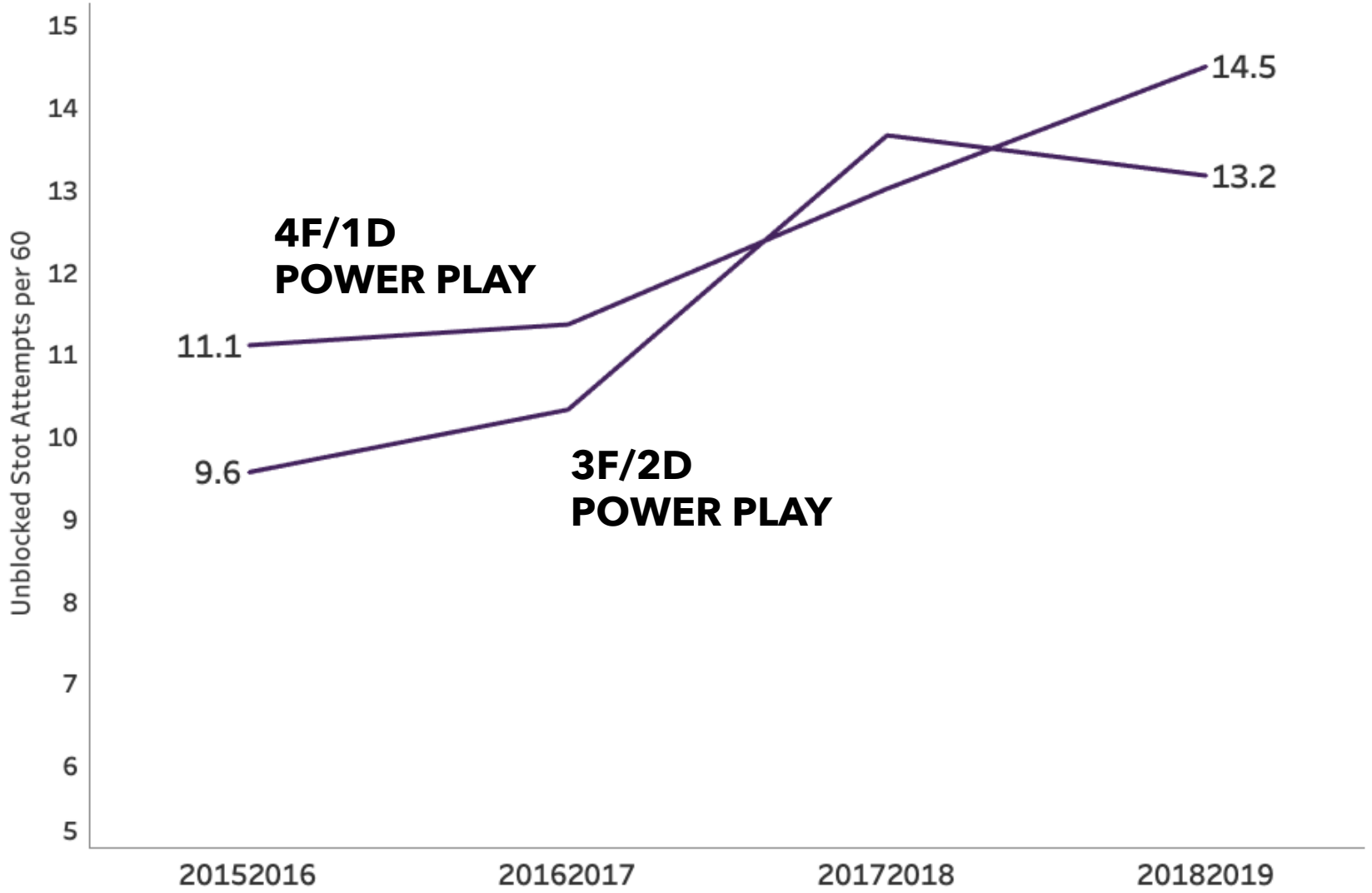
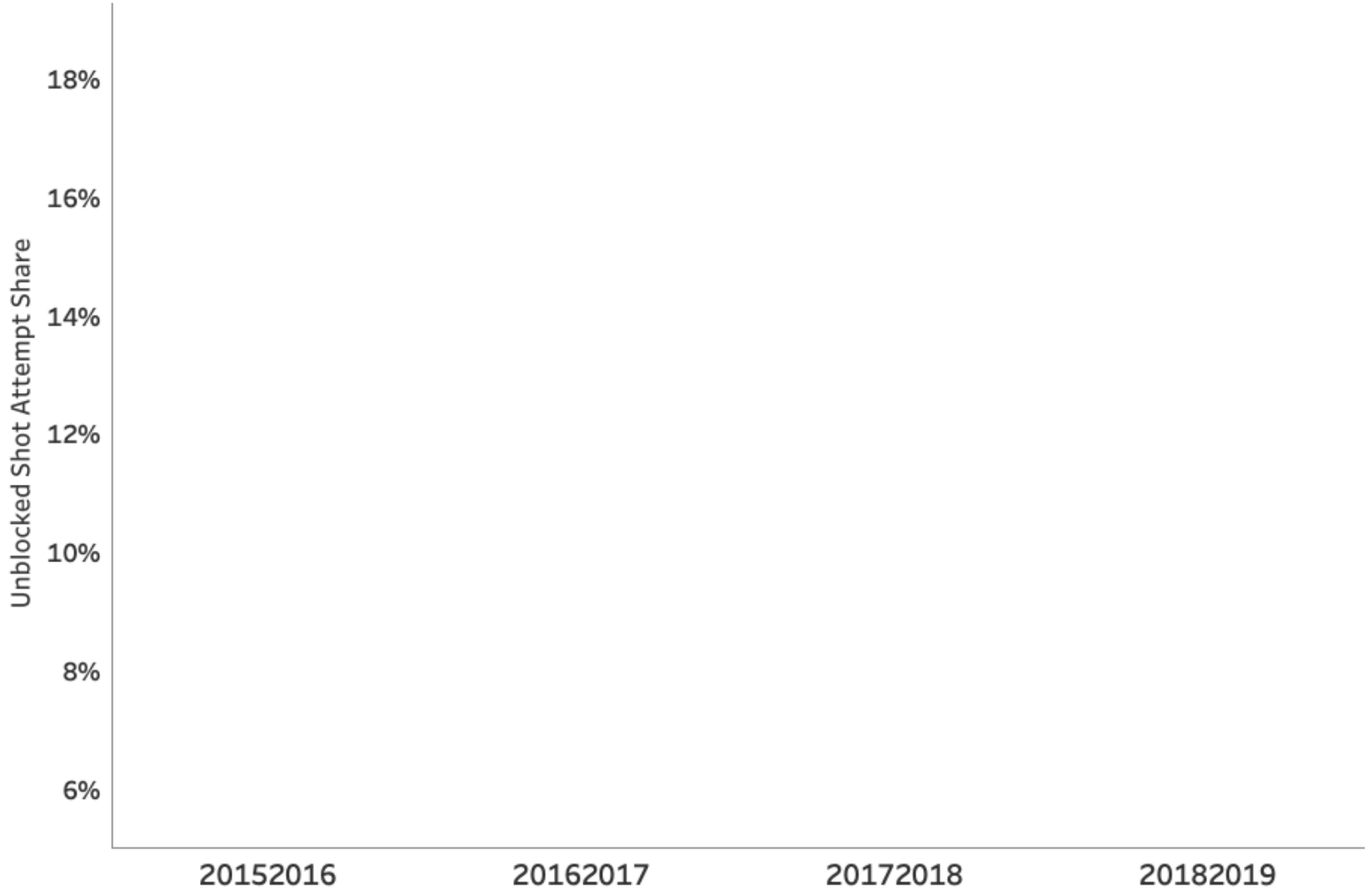


OFFENSE SHARE BY OPPONENT'S PP STRUCTURE



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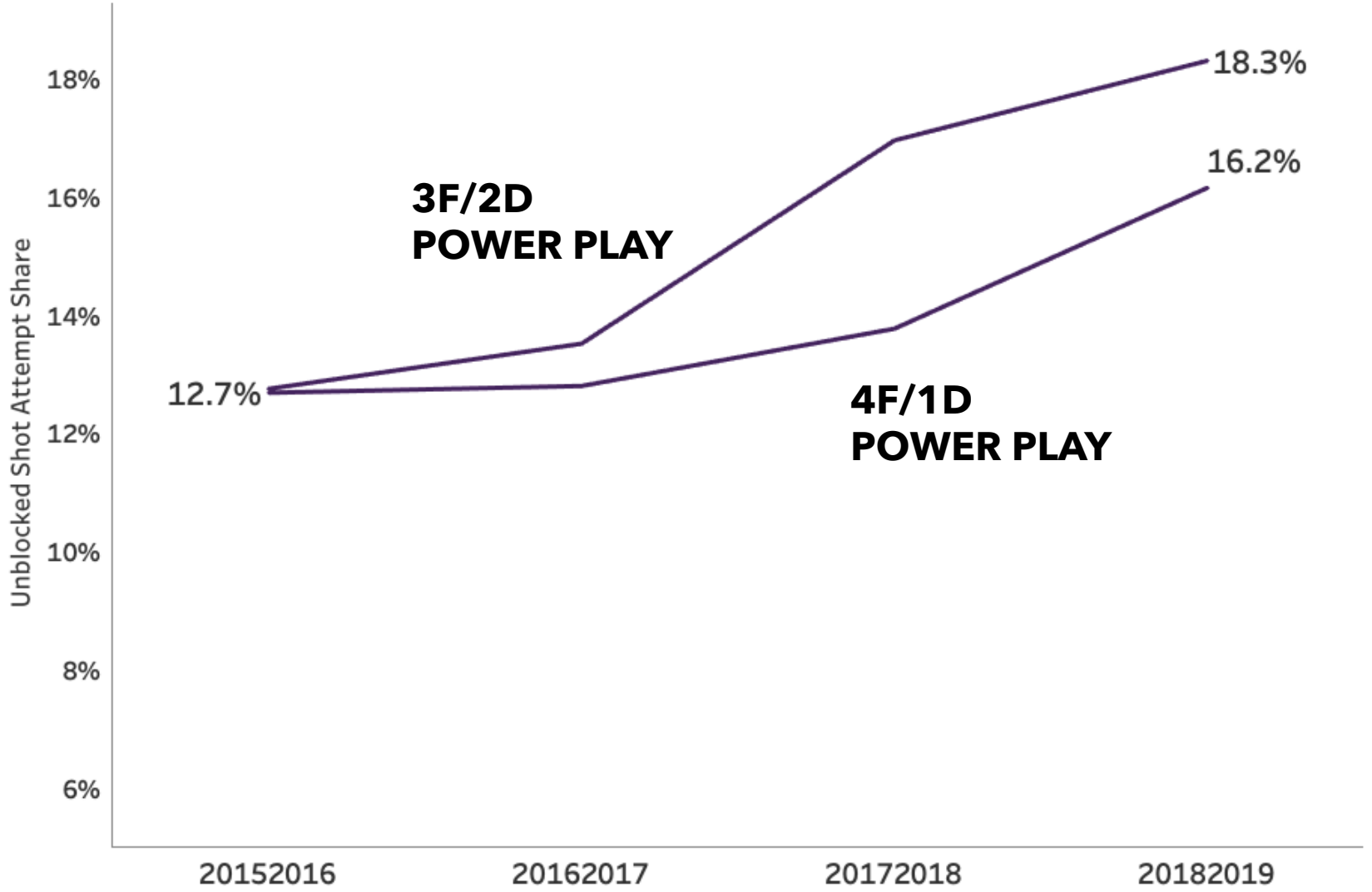
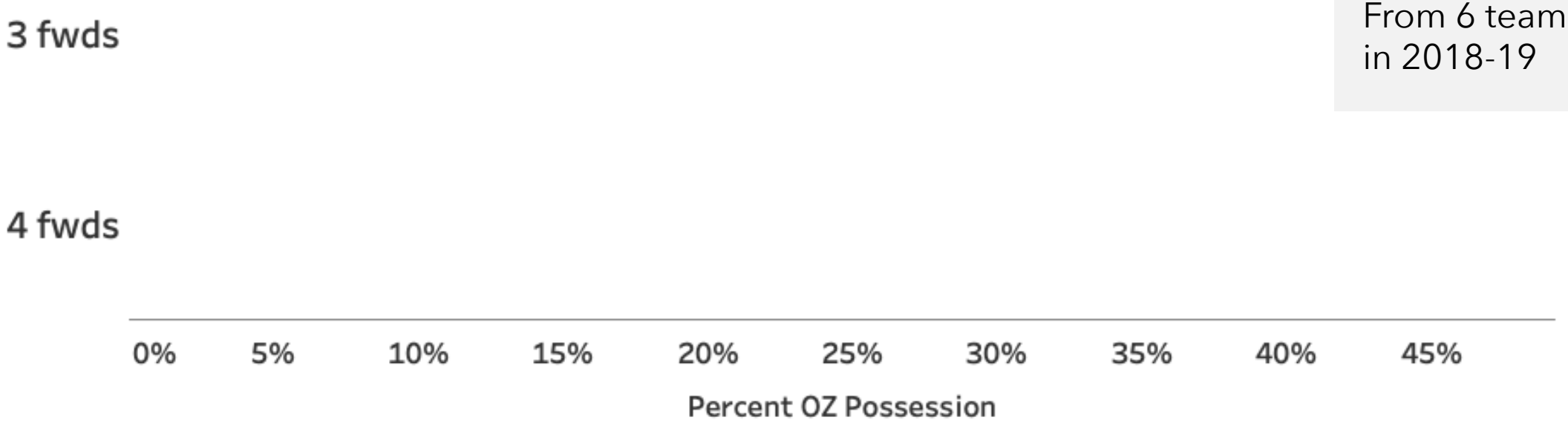


POSSESSION ON THE POWER PLAY

450 PK min. tracked

From 6 teams in 2018-19



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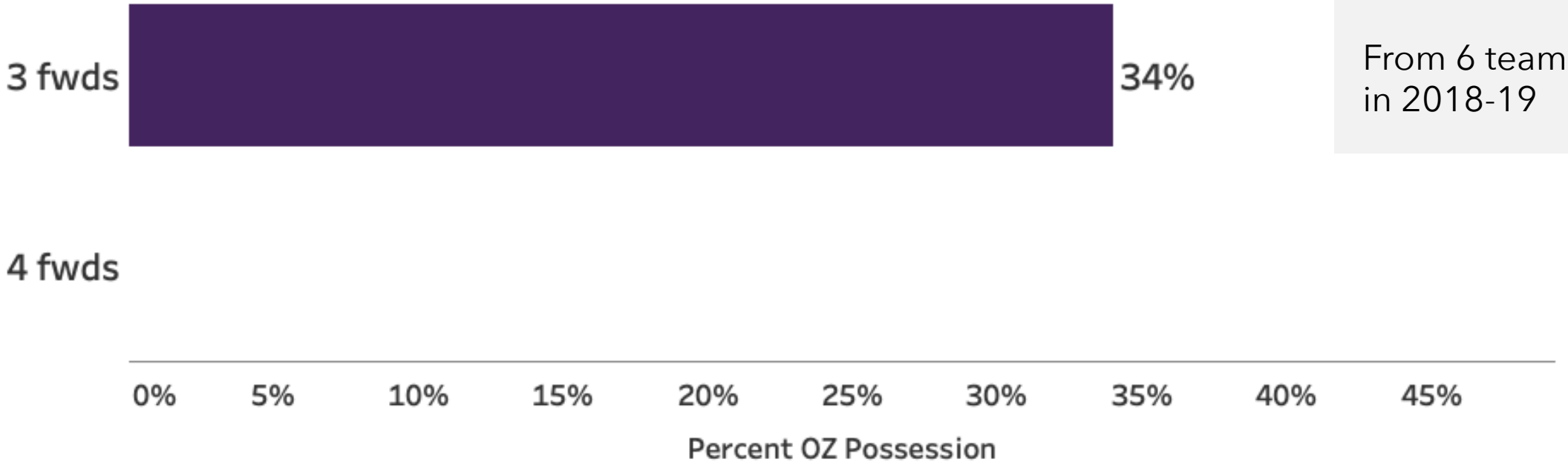

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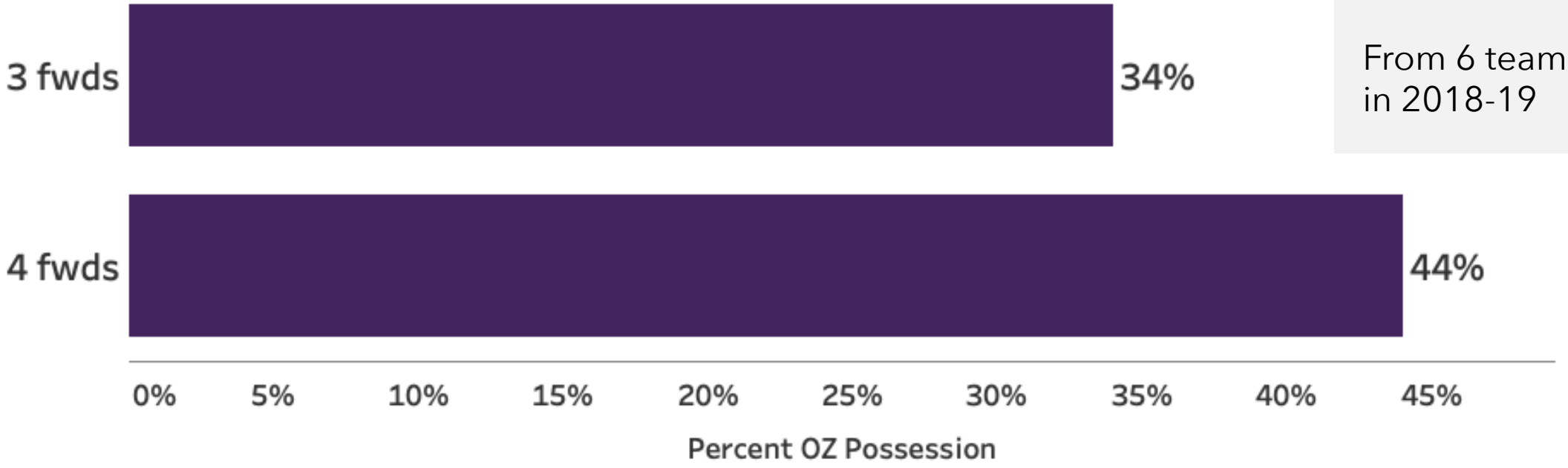

450 PK min. tracked

From 6 teams in 2018-19

TAKEAWAYS

4-forward power plays are more common,
result in a higher shot rate
(but lower shot share) for the PK,
and lead to more OZ time

WHAT CAN I COVER IN 20 MINUTES?

What's the trend?

Personnel on the penalty kill/power play

Power play unit structure

Zone entry data

PENALTY KILL AGGRESSIVENESS

Metric developed by Matt Cane in 2016

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Measure of how often the PK team attempted to enter their opponent's zone with possession

PENALTY KILL AGGRESSIVENESS

Metric developed by Matt Cane in 2016

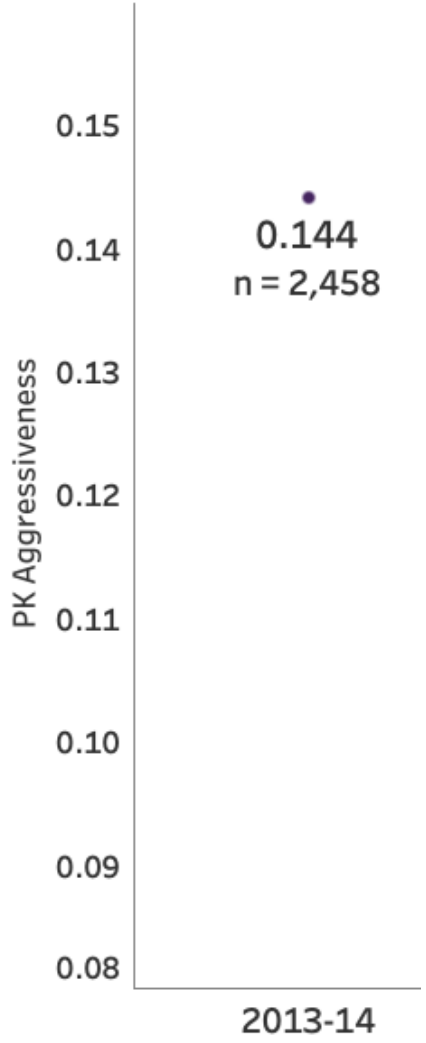
Measure of how often the PK team attempted to enter their opponent's zone with possession

Higher number = more aggressive

PENALTY KILL AGGRESSIVENESS

$$\frac{\text{PK Controlled Entries For} + \text{PK Failed Entries For}}{\text{PK Entries Against}}$$

PENALTY KILL AGGRESSIVENESS



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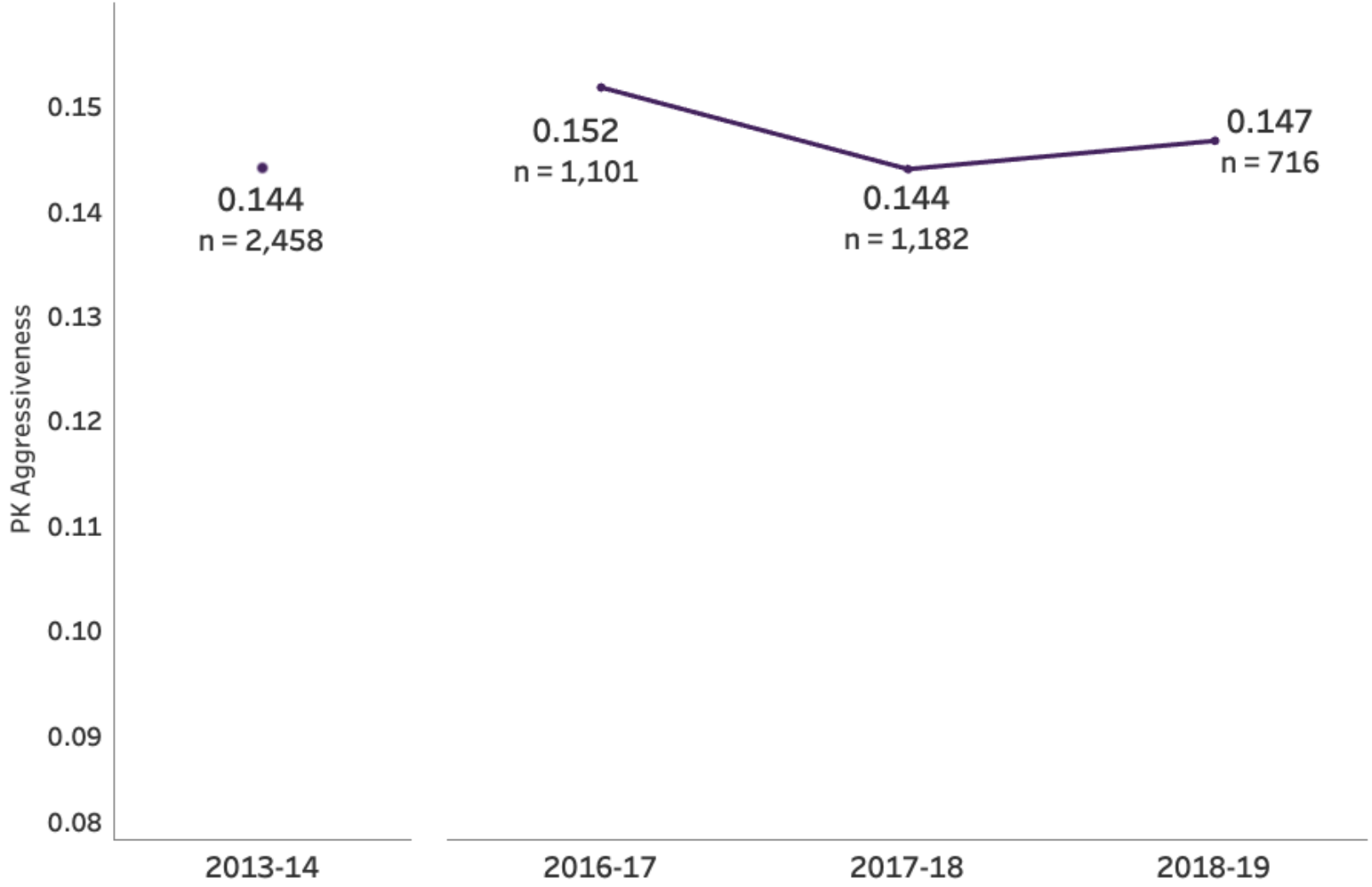

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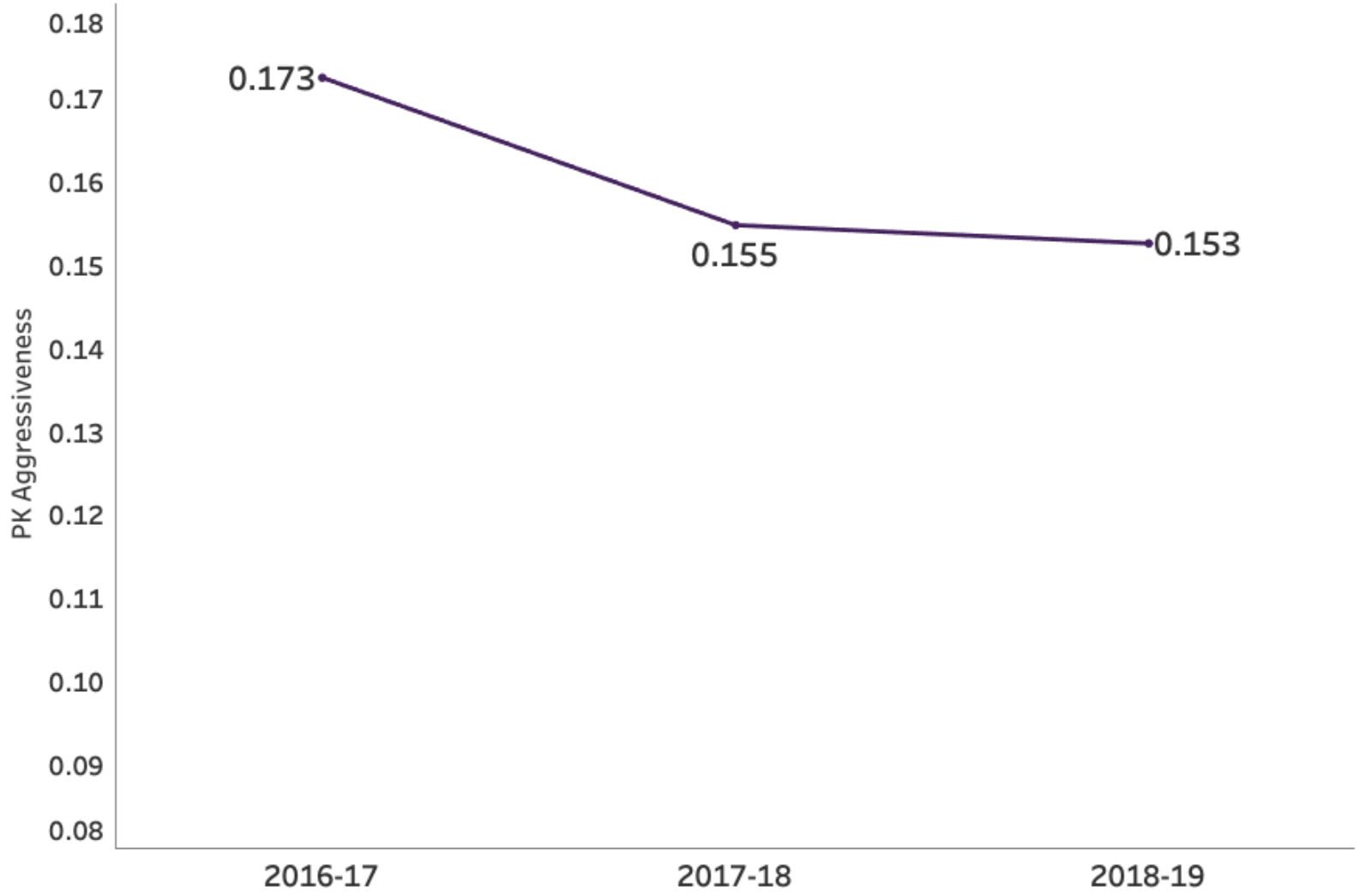
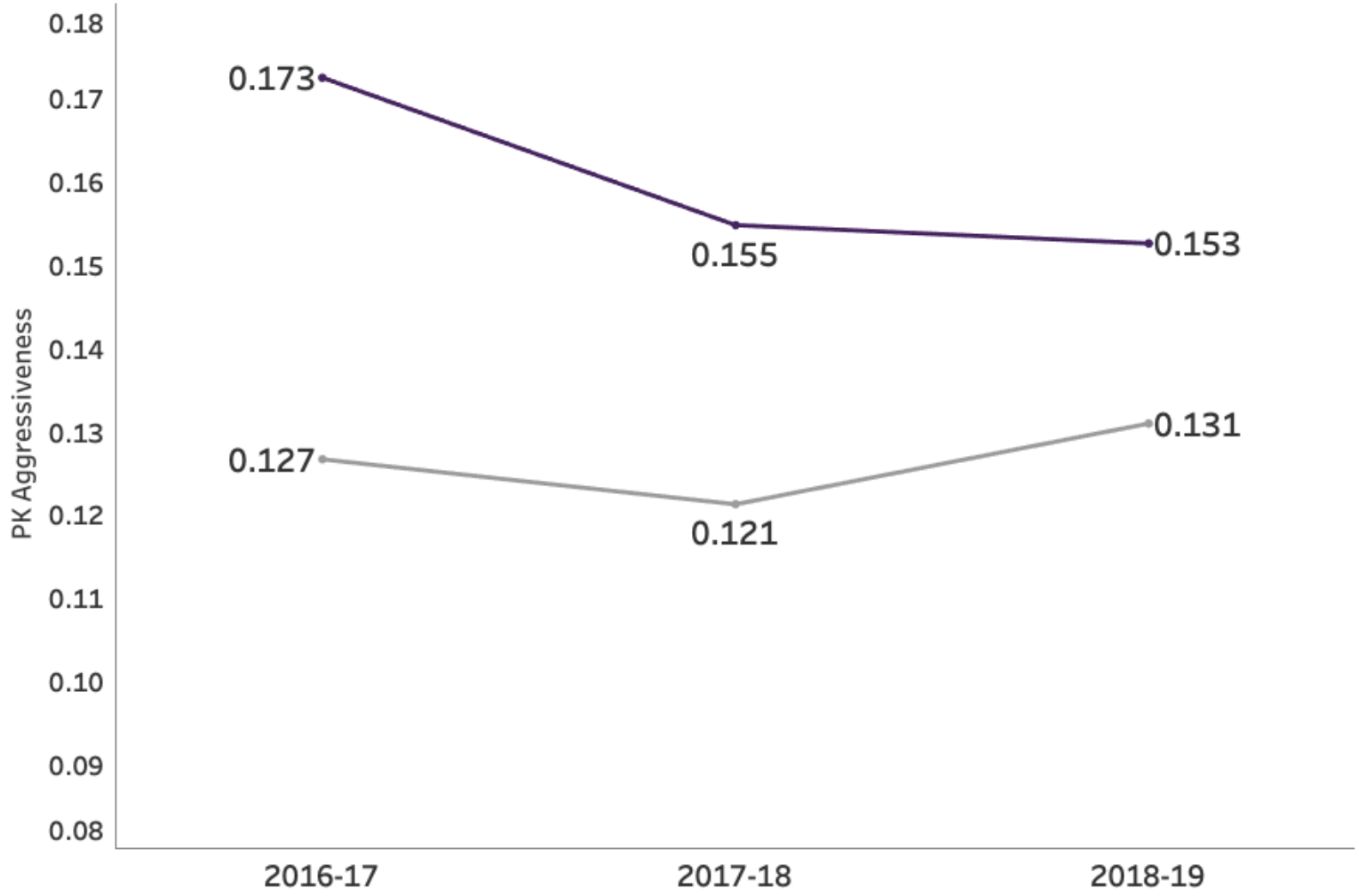


OPPONENT PP STRUCTURE:

4F/1D

PENALTY KILL AGGRESSIVENESS

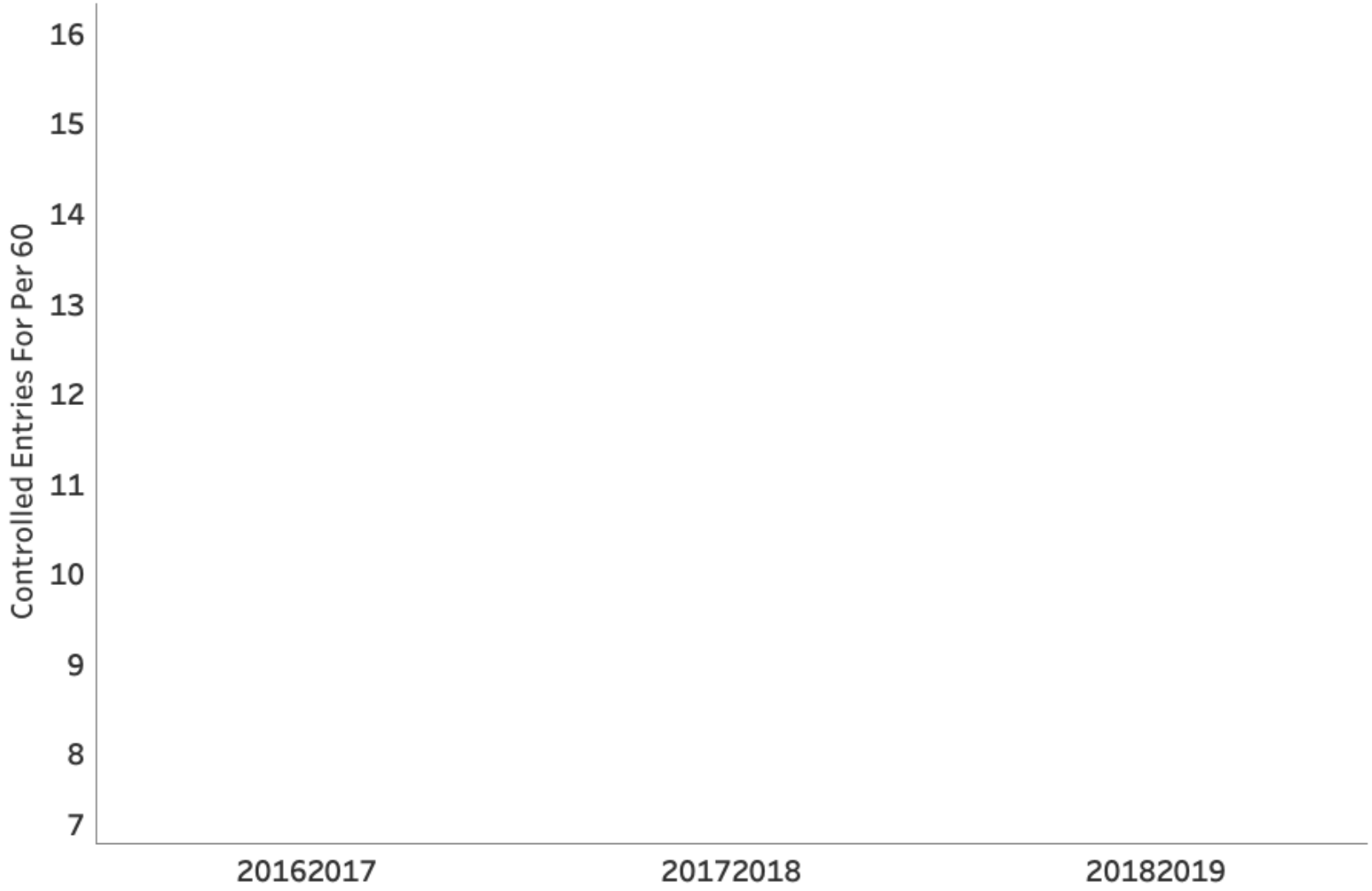


OPPONENT PP STRUCTURE:

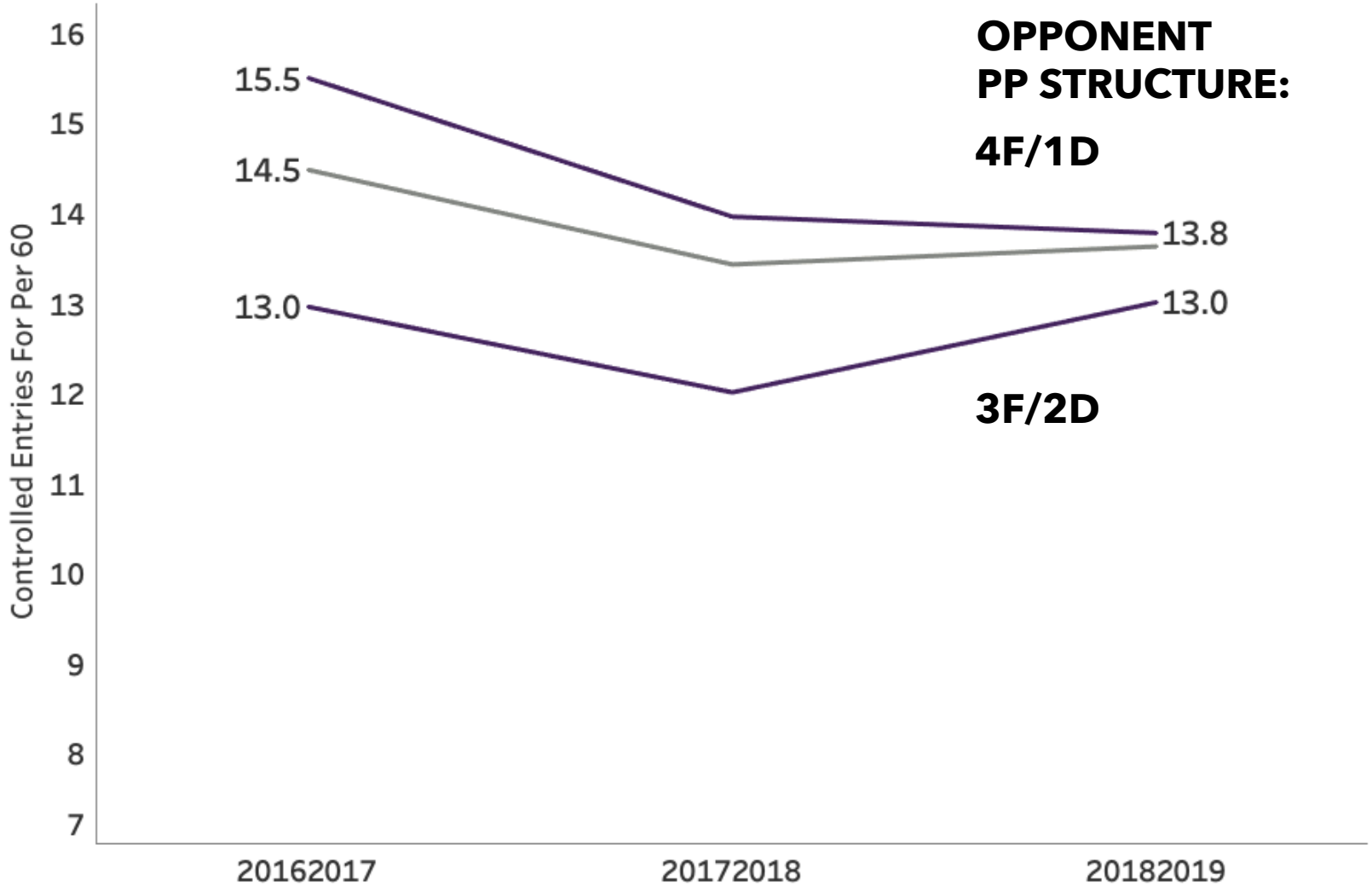
4F/1D

3F/2D

CONTROLLED ZONE ENTRIES FOR



CONTROLLED ZONE ENTRIES FOR



TAKEAWAYS

4-forward power plays result in more aggressiveness (and more controlled entries) for the PK

THE END

Do we have an answer?

AREAS OF FUTURE STUDY

Penalty kill structure/strategy

Team-level personnel decisions

Possession on the power play

Shot selection

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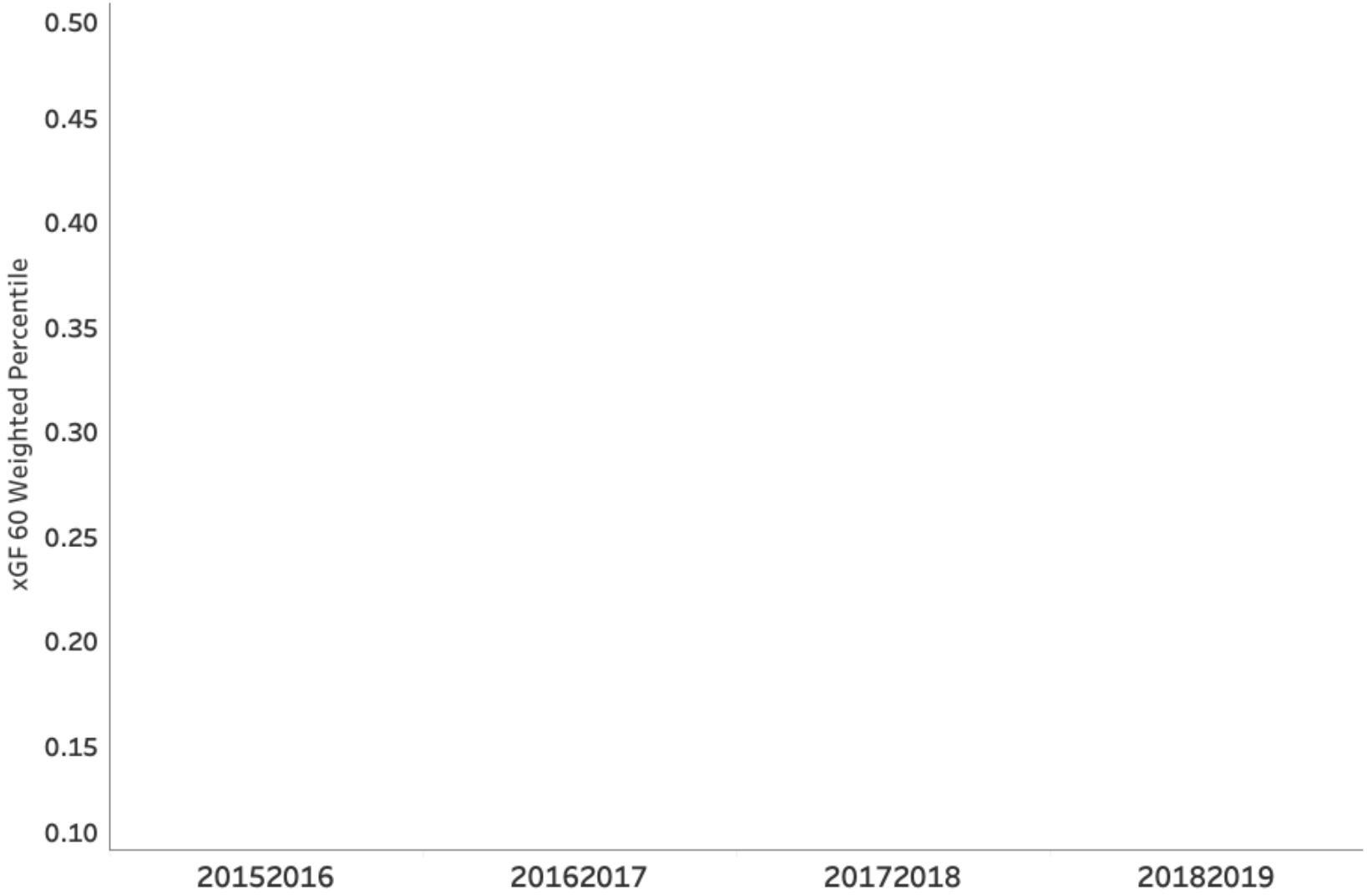
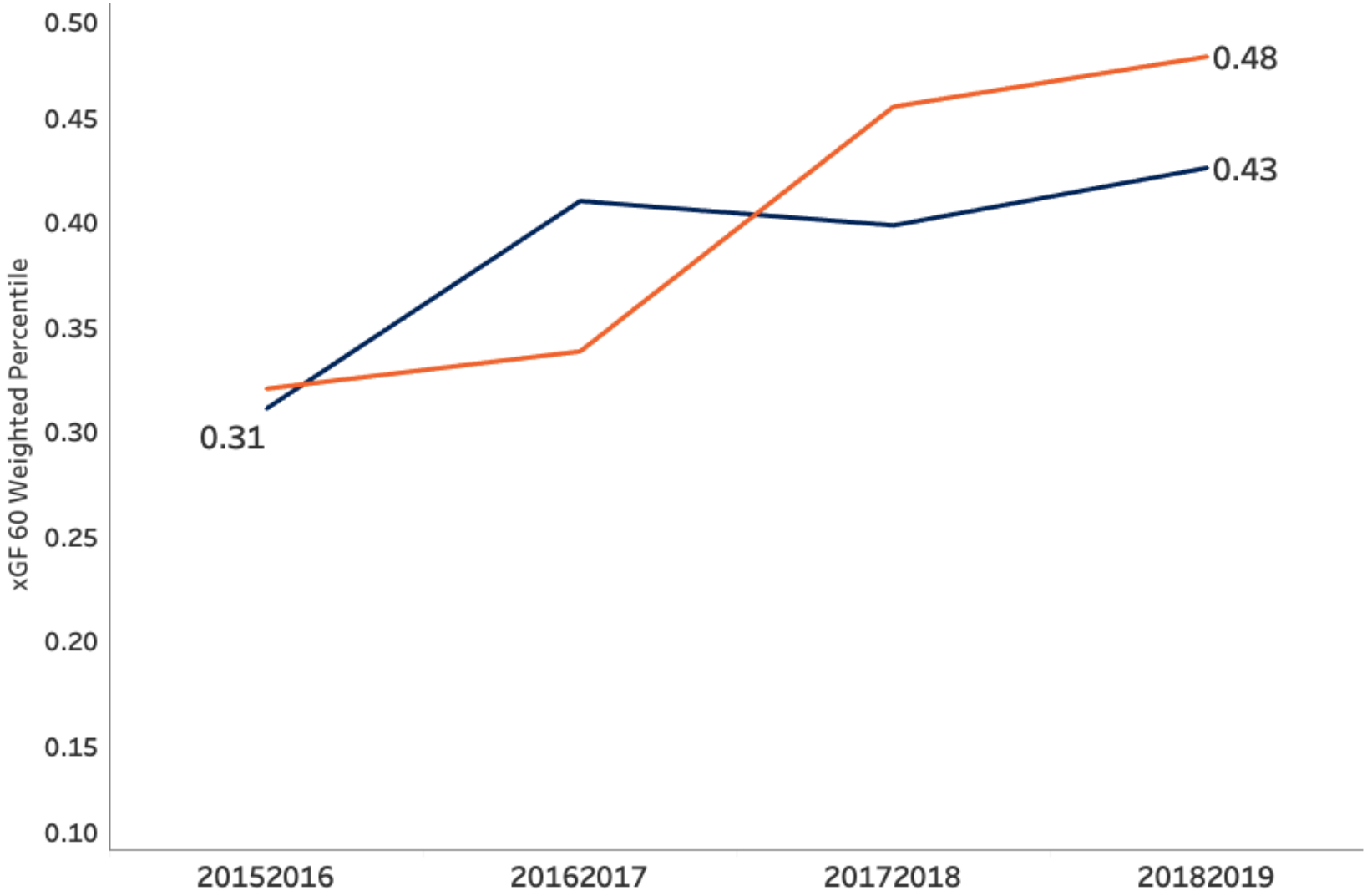
TEAM-LEVEL STUDIES



Forwards on the penalty kill

Team-weighted percentile of xGF/60

TEAM-LEVEL STUDIES



EDMONTON

TORONTO

Forwards on the penalty kill

Team-weighted percentile of xGF/60

AREAS OF FUTURE STUDY

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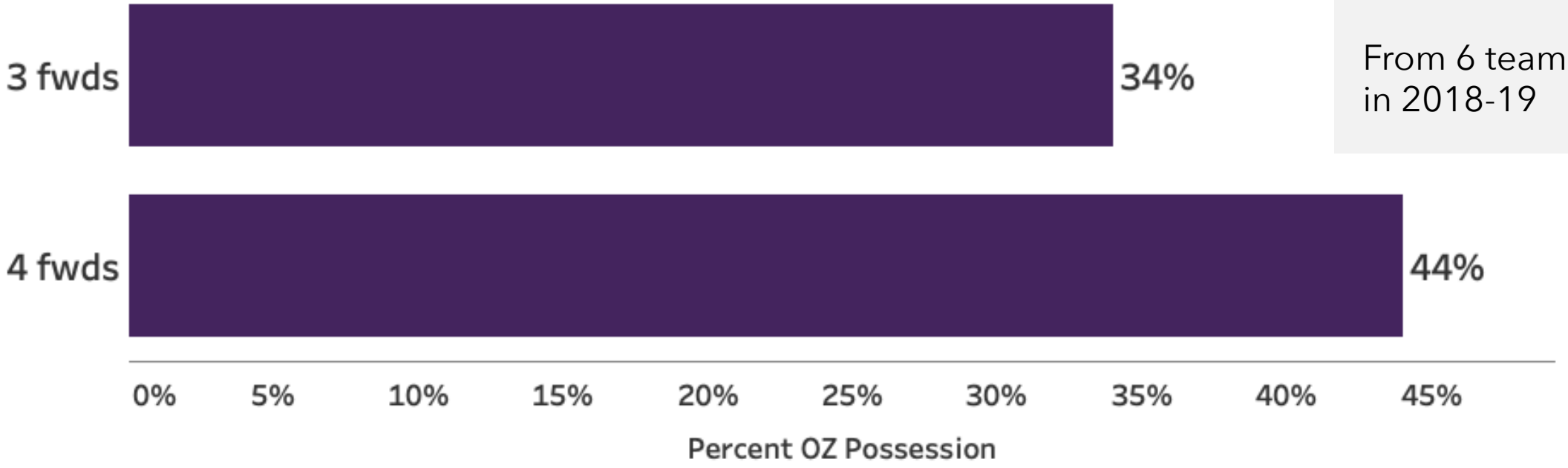
Shot selection

POSSESSION ON THE POWER PLAY



450 PK min. tracked

From 6 teams in 2018-19

AREAS OF FUTURE STUDY

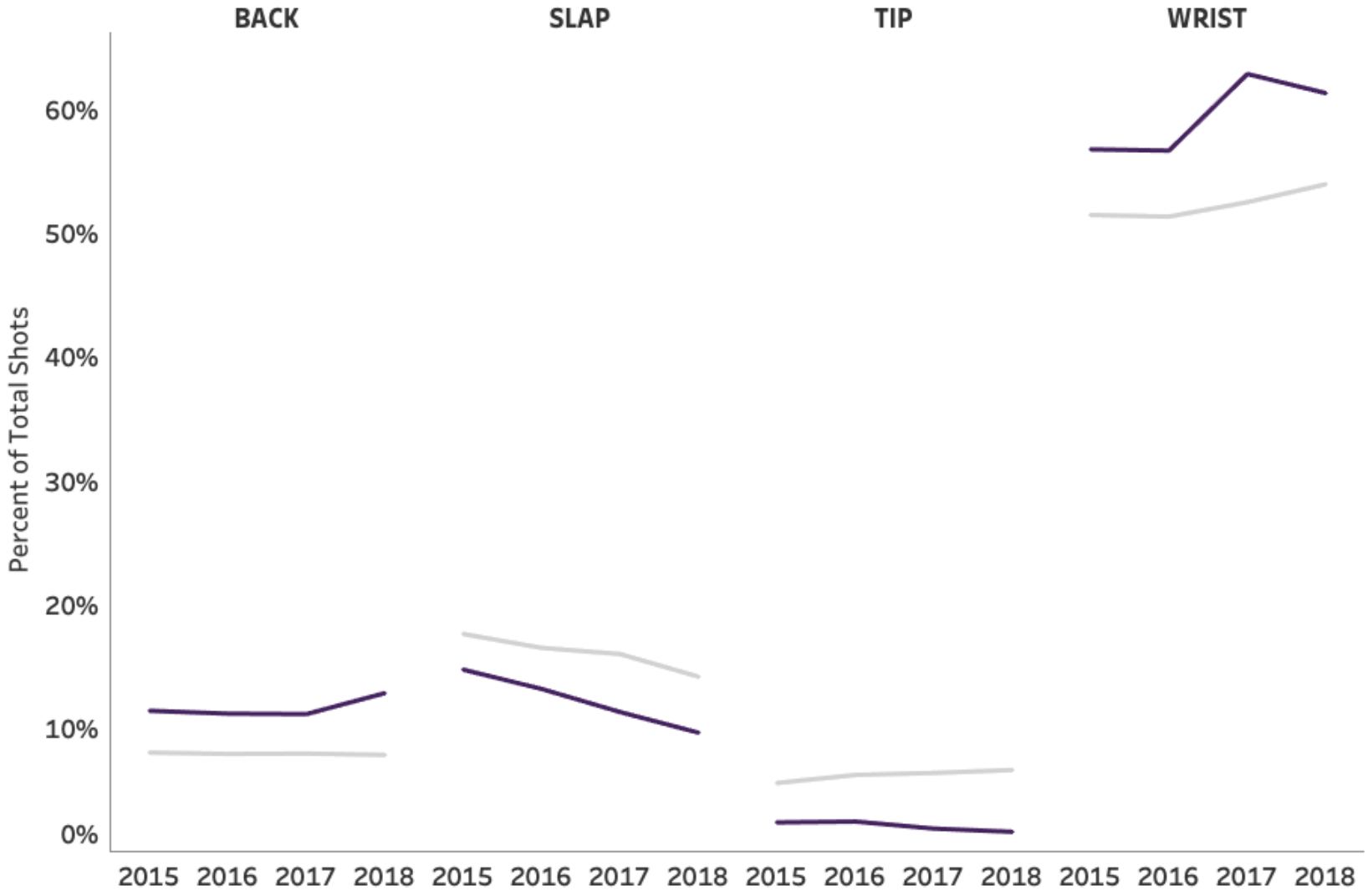
Penalty kill structure/strategy

Team-level personnel decisions

Possession on the power play

Shot selection

SHOT SELECTION



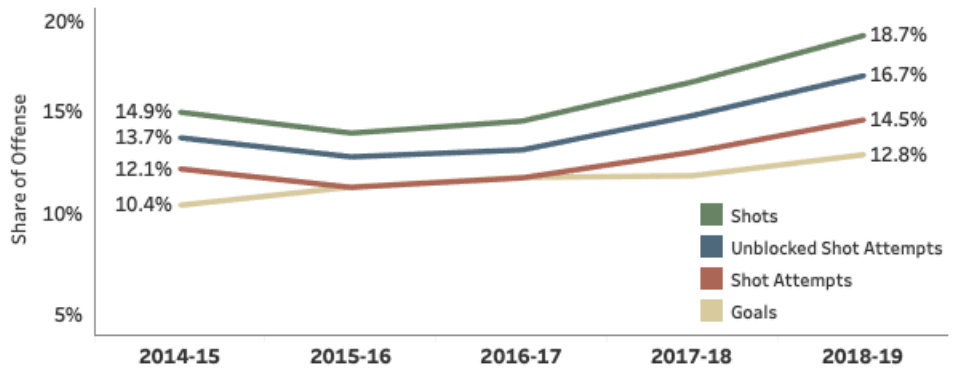
ALL DATA IS AVAILABLE!

Viz by Meghan Hall
@MeghanMHall
September 2019
Data sources linked below

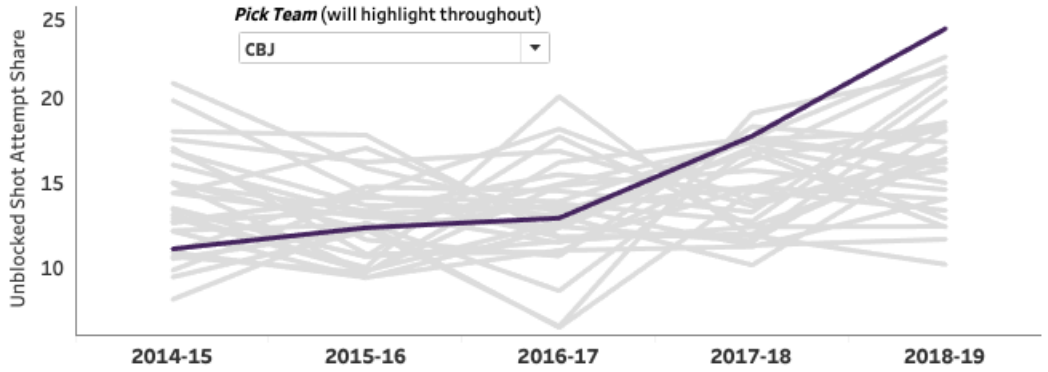
TRACKING INCREASING OFFENSE ON THE PENALTY KILL

From a presentation at the RIT Sports Analytics Conference, 9/14/2019
Slides available at the link

Over the past several seasons, offense has been increasing on the 5v4 penalty kill. This is true whether you look at the ***share*** of offense or the ***rate*** of offense (per 60 minutes) for the penalty killing team.



This change is not solely being driven by a small handful of teams. Looking at the unblocked shot attempt share over time, only a few teams have been dropping, while several have been rising. Last season, Columbus set a new recent-era record at 24%.



THANK YOU!

THANK YOU!

Mike Pfeil

Corey Sznajder

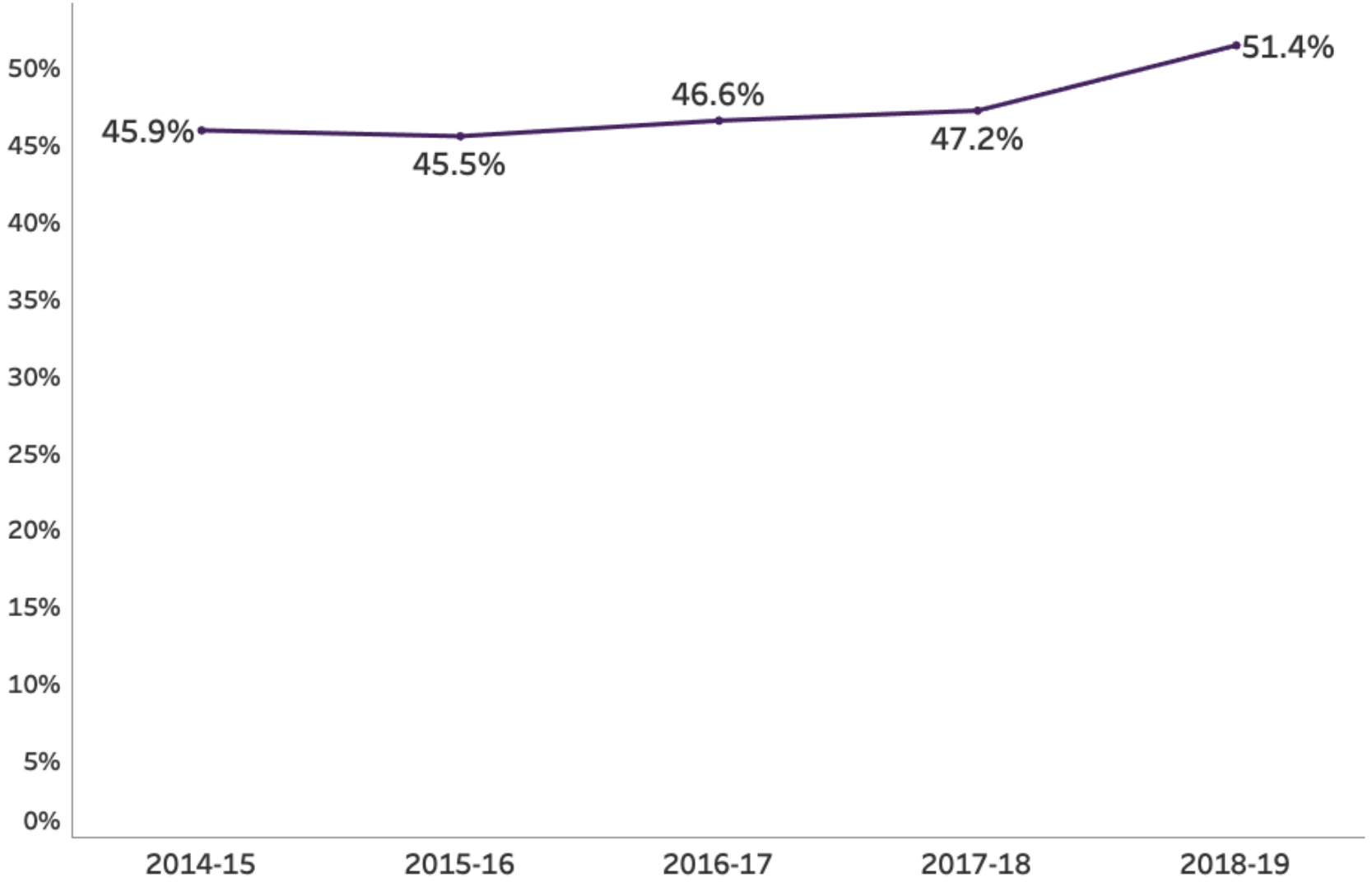
Alex Novet

The Twins™

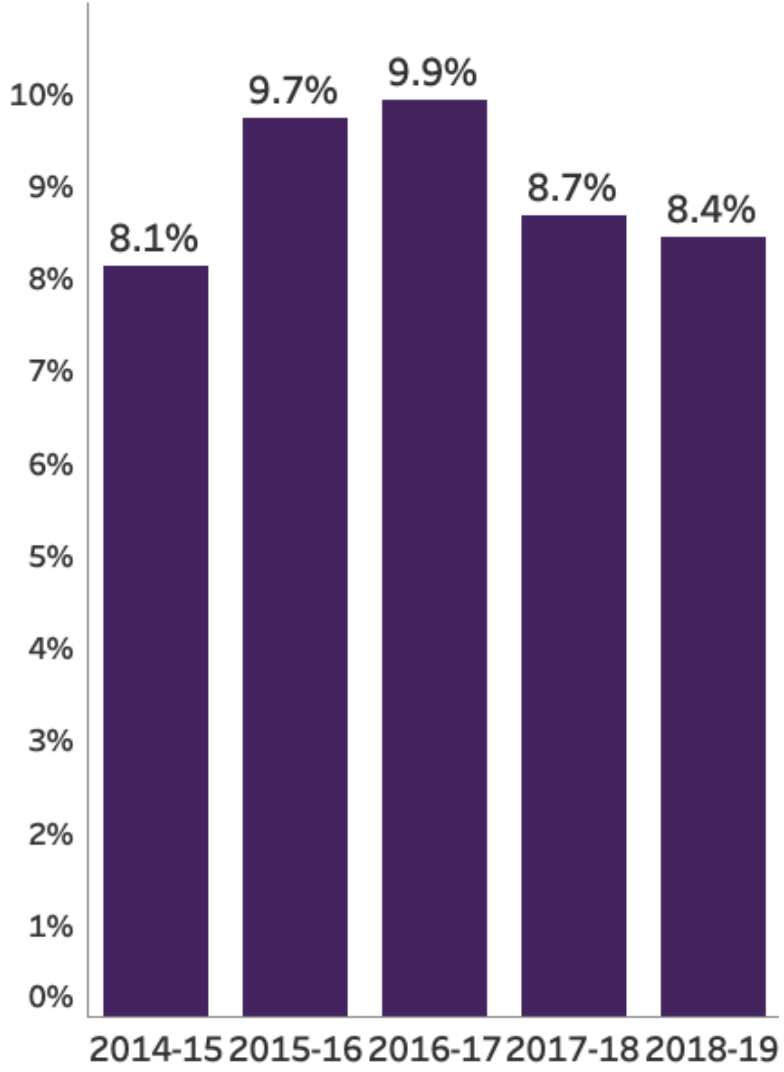
Matt Cane

NaturalStatTrick

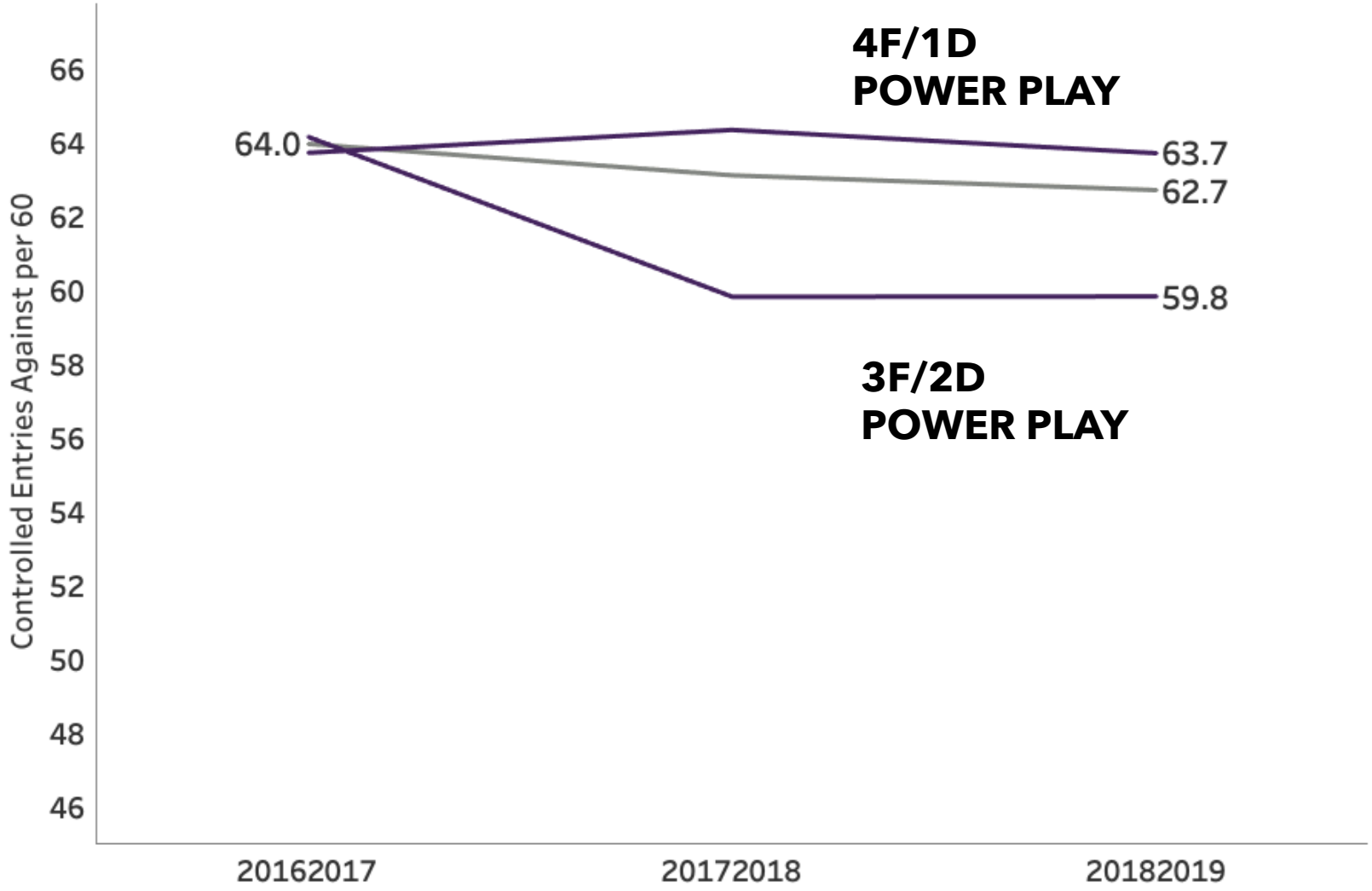
% SHOTS THAT ARE HIGH-DANGER



SHOOTING %AGE ON THE PK



CONTROLLED ZONE ENTRIES AGAINST



CALCULATING WEIGHTED RAPM

2018-19 EXAMPLE

PLAYER	RAPM: xGF/60	PK TOI	WEIGHTED
MARK STONE	0.41	83	0.41 * 83 = 33.87
SEBASTIAN AHO	0.35	87	0.35 * 87 = 30.45
		170	64.32

$$\frac{64.32}{170} = 0.38$$