

**THE *IMPACT* OF TRAVEL
ON TEAM PERFORMANCE
IN THE *NBA***



CONTENTS

1. Background: The NBA's Travel Schedule
2. Research Questions and Literature Review
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NBA Travel Compared to Other U.S. Sports



82 games in 5.5 months



46,000 miles (average)



150% more than NFL /
50% more than MLB



Travel Engrained in Basketball Culture and Terminology

“Magic Not Making Any Excuses After Playing Four Games in Five Nights” —

By John Denton
Jan. 1, 2015

The NBA schedule turns teams into the sleepwalking dead



Baxter Holmes
ESPN Senior Writer

Oct 21

ESPN+

EXCLUSIVE CONTENT

GET ESPRESSO

NBA's dreaded 4-in-5 schedule



Tom Haberstroh
ESPN Staff Writer

Sep 17, 2014





Change in NBA Schedule

Schedule Change

- Increase the calendar by a week
- Increase games on Monday, Saturday, and Sunday

Effects on Travel

- Decrease travel of over 15k miles by 20%
- Eliminate all 4 games in 5 nights
- Reduce back-to-back games

Back-to-back share

23.5% → 16.7%



Mean flight distance

558 mi → 553 mi





Research Questions

1. How are flight distance, rest, and directional time-zone movement associated with team performance?
 2. Do those associations differ between the 2014–15 and 2018–19 seasons?
 3. Do travel conditions relate differently to scoring outcomes, shot selection, and team movement?
- Literature review: Prior research links travel and schedule congestion to sleep, circadian disruption, recovery, and athletic performance. NBA player-tracking evidence remains limited.

Defining Travel and Team Performance

Travel exposures

- Flight distance since prior game (per 1,000 miles)
- Rest category: back-to-back, 1 day, 2 days, 3+ days
- Eastward and westward time-zone movement

Performance outcomes

- Point differential
- Team on-court distance (miles per 48 minutes)
- Three-point-attempt share
- Free-throw rate

Controls

- Home-court status
- Opponent travel and rest
- Team fixed effects
- Opponent fixed effects
- Calendar-week fixed effects

Multiple Linear Regression Model

$$\text{Performance} = b_0 + \text{Predictor}_1 * x_1 + \text{Travel burden} * x_2 + \text{Opponent travel burden} * x_3 + \text{Home court} * x_4 + \text{Team/Opponent/Week fixed effects} * x_5$$

Methods

Data construction

- NBA.com box scores and player-tracking records
- Player records aggregated to team-game level
- Travel, rest, time-zone, and opponent variables added
- Season openers excluded because prior-game travel is undefined

Final cleaned samples

Outcome	2014-15	2018-19
Point diff / shooting	2,270 / 1,135	2,282 / 1,141
Team distance	2,270 / 1,135	2,276 / 1,138

Cells show team-games / games.

NBA.com																			
Games Schedule Watch News Standings Teams Stats Players All-Star Fantasy NBA Official																			
NBA TV League Pass Store Tickets																			
Mon, Apr 05																			
7:00 PM ET NBA TV 7:00 PM ET LEAGUE PASS 7:00 PM ET LEAGUE PASS 7:00 PM ET LEAGUE PASS 7:00 PM ET LEAGUE PASS 7:00 PM ET LEAGUE PASS 8:00 PM ET LEAGUE PASS																			
NYK 25 - 25 WAS 17 - 31 UTA 38 - 11 SAC 22 - 28 DET 14 - 35 CLE 17 - 32 PHX 34 - 14																			
BKN 34 - 16 TOR 19 - 30 DAL 27 - 21 MIN 12 - 38 OKC 20 - 29 SAS 24 - 23 HOU 13 - 36																			
Traditional All Periods																			
Range Filter																			
Orlando Magic																			
Click on any linked stat to view the Video and/or Shot Chart																			
PLAYER	MIN	FGM	FGA	FG%	3PM	3PA	3P%	FTM	FTA	FT%	OREB	DREB	REB	AST	STL	BLK	TO	PF	PTS
Tobias Harris F	36:32	9	18	50.0	1	2	50.0	6	6	100	2	6	8	0	1	0	4	2	25
Kyle O'Quinn F	21:22	2	8	25.0	0	1	0.0	0	0	0.0	0	2	2	5	1	3	1	4	4
Nikola Vucevic C	35:03	7	15	46.7	0	0	0.0	1	2	50.0	5	18	23	1	1	4	1	2	15
Evan Fournier G	32:15	3	11	27.3	2	4	50.0	3	3	100	1	2	3	2	0	0	4	2	11
Elfrid Payton G	30:46	2	8	25.0	0	0	0.0	0	0	0.0	3	2	5	7	1	0	2	5	4
Aaron Gordon	28:27	5	8	62.5	1	2	50.0	0	0	0.0	2	1	3	0	1	1	3	3	11
Ben Gordon	23:01	1	8	12.5	0	2	0.0	3	4	75.0	0	4	4	1	0	0	0	3	5
Luke Ridnour	17:14	0	3	0.0	0	0	0.0	2	2	100	0	2	2	1	0	0	2	2	2
Dewayne Dedmon	8:14	1	2	50.0	0	0	0.0	1	2	50.0	2	1	3	0	0	1	1	1	3
Willie Green	4:07	0	1	0.0	0	0	0.0	0	0	0.0	1	1	2	0	0	0	0	0	0
Devyn Marble	2:59	2	2	100	0	0	0.0	0	2	0.0	0	1	1	0	0	0	0	1	4
Maurice Harkless	DNP - Coach's Decision																		
Andrew Nicholson	DNP - Coach's Decision																		
TOTALS		32	84	38.1	4	11	36.4	16	21	76.2	16	40	56	17	5	9	18	25	84
New Orleans Pelicans																			
Click on any linked stat to view the Video and/or Shot Chart																			
PLAYER	MIN	FGM	FGA	FG%	3PM	3PA	3P%	FTM	FTA	FT%	OREB	DREB	REB	AST	STL	BLK	TO	PF	PTS

$$(x-2)^2 = \int_1^2 \frac{1}{x^2} (2)^{x^2-1} dx$$



Building Regression Models

Common specification across both seasons

Performance = Travel + Opponent Travel +
Home Court + Team FE + Opponent FE +
Week FE

- Distance scaled per 1,000 miles
- Rest modeled with categories
- Time-zone movement split eastward/westward
- Standard errors clustered by team and game
- Pooled interaction tests compare 2014–15 with 2018–19

$$\frac{1}{x^2} = x^{-2}$$
$$\frac{d}{dx} x^{-2} = -2x^{-3}$$
$$= -\frac{2}{x^3}$$





Hypothesis

1. Travel will not have a large association with point differential or shot-selection rates.
2. In 2014-15, greater flight distance and back-to-backs will be associated with lower team on-court distance.
3. In 2018-19, the distance-movement relationship will be weaker after NBA schedule changes reduced compression.

A weaker post-reform coefficient is consistent with schedule mitigation but does not prove the schedule change caused the difference.

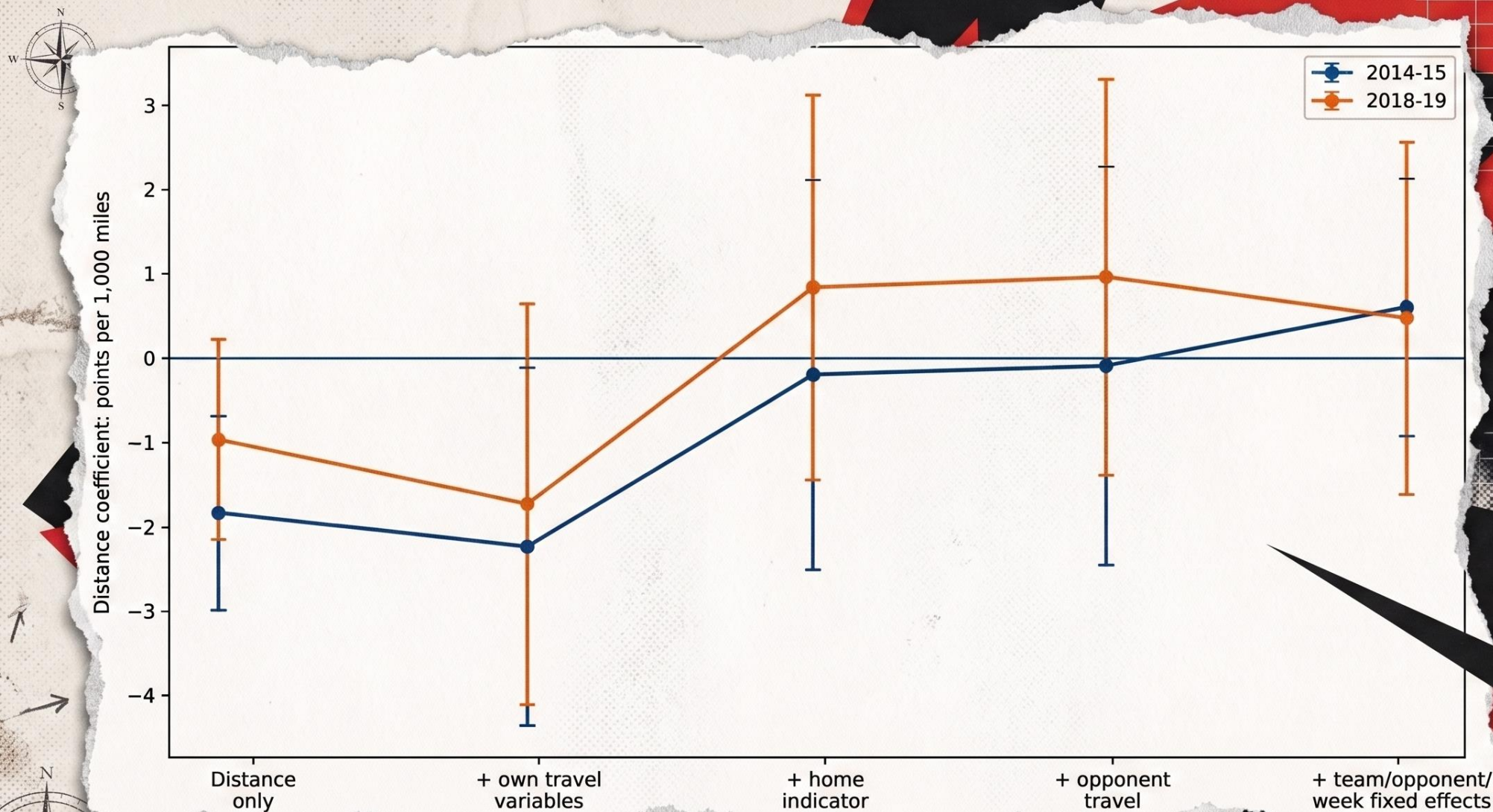


Regressions and Analysis

Regression Analysis

Shooting box score:

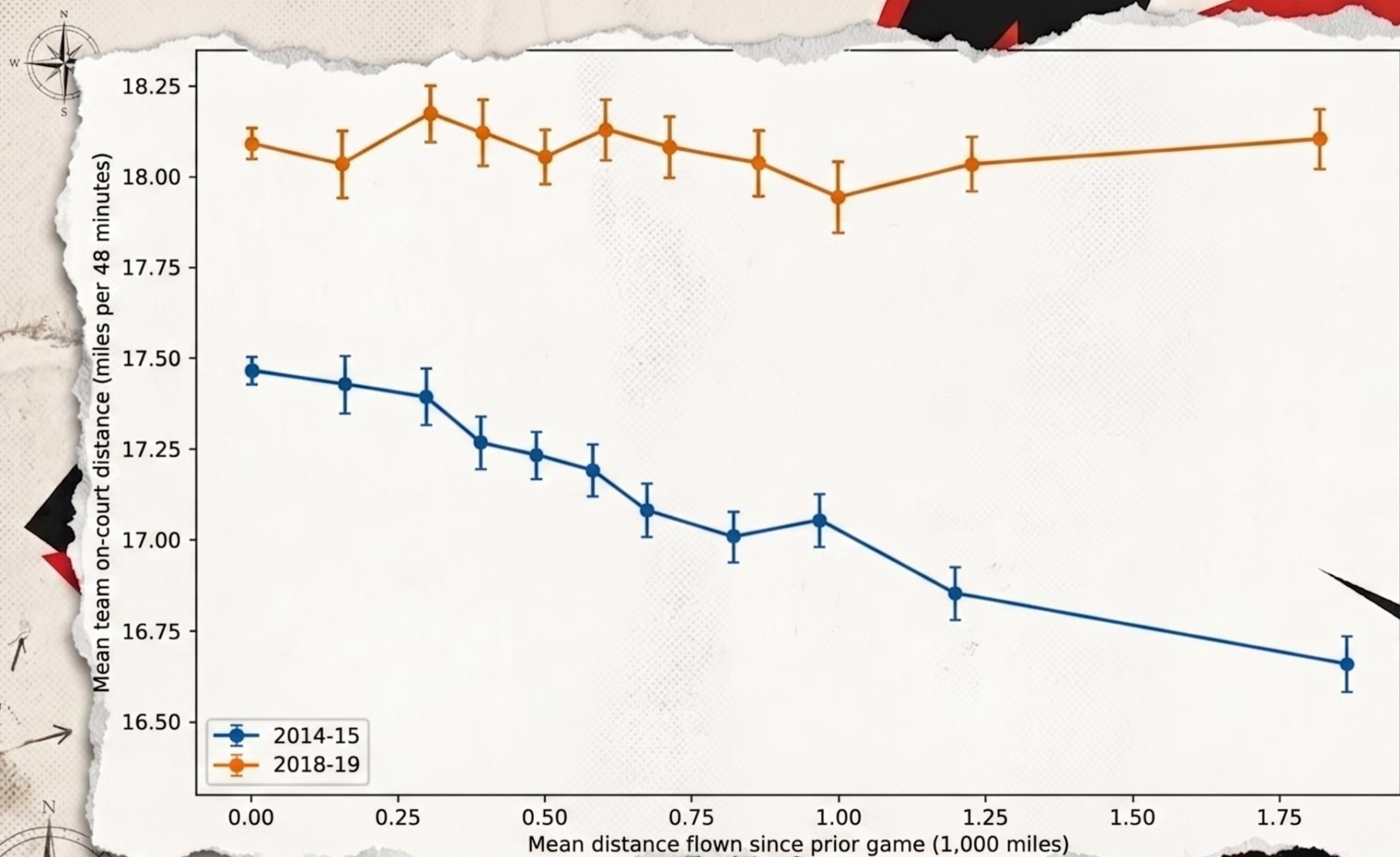
Home-court adjustment eliminates the raw point-differential relationship



Regression Analysis

Player tracking:

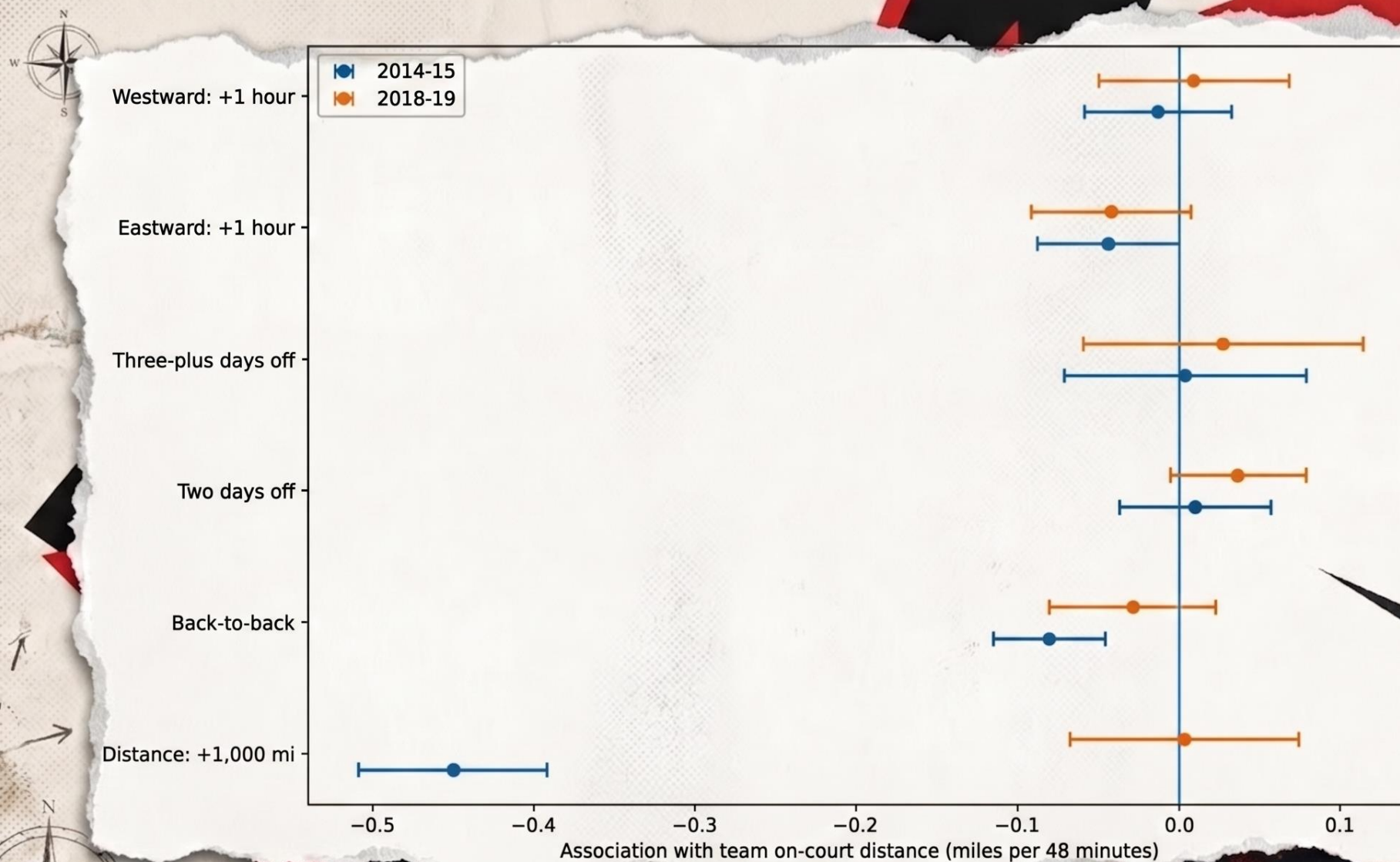
Flight distance was associated with less team movement in 2014-15



Regression Analysis

Player tracking:

The cross-season change is specific to flight distance



Results and Implications

Scoring margin:



Flight distance was not independently associated with point differential in either season

Shot selection:



No robust relationship was found with three-point-attempt share or free-throw rate.

Team movement:



Greater flight distance was strongly associated with lower on-court movement in 2014–15, but not in 2018–19.

Implications and Future Research

Plausible explanations

- Fewer back-to-backs and compressed sequences
- Improved sleep, nutrition, and recovery practices
- Load management and playing-style changes

Evidence needed for causality

- » Multiple seasons before and after reforms
- » Team-level variation in schedule changes
- » Flight timing, sleep, and player availability data

