What Effect Do Injuries Have on NFL Teams

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I. ABSTRACT

This study examines the impact of player injuries on NFL team win probabilities over the seasons 2013 to 2019. The research dissects the data by the number of injuries, overall team influence, and the effect at each position. The findings suggest that injuries have a variable impact on win probabilities, with certain positions showing a more pronounced effect.
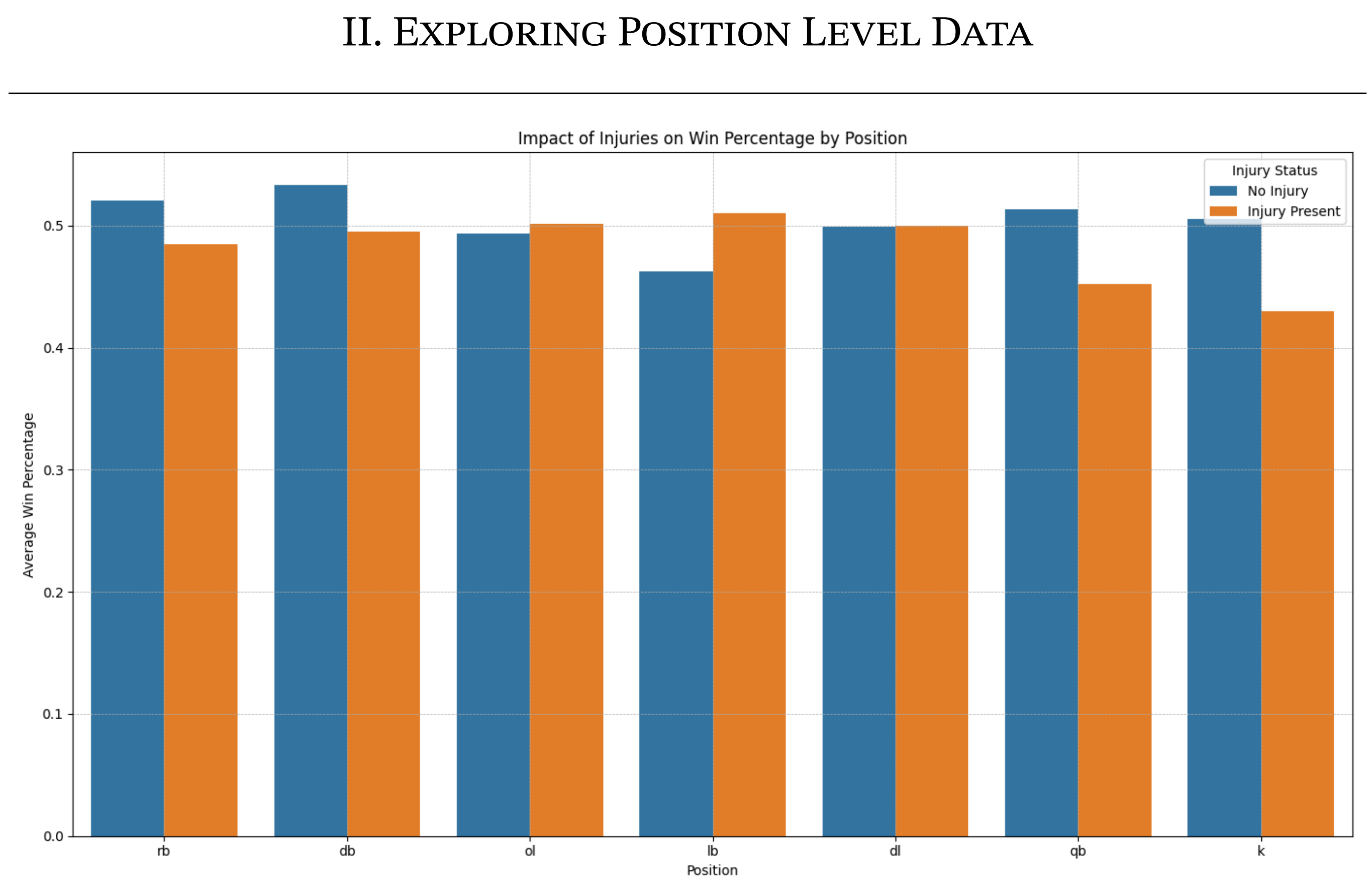
II. EXPLORING POSITION LEVEL DATA

Figure 1: Positional Injury Impact on Win Probability

Position	Coefficient	P-value	95% CI Lower	95% CI Upper
rb	-0.1436	0.0341	-0.2764	-0.0107
db	-0.1519	0.1391	-0.3532	0.0494
lb	0.1933	0.0179	0.0333	0.3532
dl	0.0036	0.9619	-0.1435	0.1506
te	0.1444	0.031	0.0132	0.2757
wr	-0.2033	0.0063	-0.3491	-0.0575
p	0.1981	0.3218	-0.1938	0.5899
ol	0.0332	0.6962	-0.1334	0.1997
ls	-0.2847	0.0717	-0.5946	0.0252
qb	-0.2468	0.0022	-0.4049	-0.0887
k	-0.304	0.0183	-0.5565	-0.0515

Figure 2: Weights and Statistical Significance by Positions

i. Key Findings on Position Impact
- Significant Impact: QBs, RBs, WRs, and Kickers correlate strongly with win probabilities.
- Positive Surprises: TEs and LBs show unexpected positive effects on wins.
- Insight: Positions traditionally seen in support roles may have underrated contributions to team success.

All findings are statistically significant, highlighting areas for strategic team development.

III. MODEL

To investigate the impact of injuries on team performance, we employed a logistic regression model. This model allowed us to control for team-specific effects and incorporate dummy variables for each position, indicating whether an injury was present.

The logistic regression equation can be represented as follows:

$$\log\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n \tag{1}$$

Where: - $P(Y=1)$ is the probability of a team winning given the set of predictors. - β_0 is the intercept. - $\beta_1, \beta_2, ..., \beta_n$ are the coefficients for each predictor $X_1, X_2, ..., X_n$, including team effects and injury status for each position.

This model allows us to quantify the impact of injuries across different positions on the likelihood of a team's win, adjusting for inherent team strengths and weaknesses.

IV. TEAM OBSERVATIONS

- Worst Performers: Cleveland, Jacksonville, Tampa Bay, and Washington, New York (G) were the lowest performing teams
- QB Injuries: Cincinnati, Minnesota, Cleveland, Carolina, and Pittsburgh had the most injuries at QB
- Worst Ranked: Top five in losses also show high ranks in injuries occurance across most significant positions.

team	qb_rank	rb_rank	wr_rank	k_rank
Cleveland Browns	3	2	4	7
Jacksonville Jaguars	24	4	3	18
Tampa Bay Buccaneers	9	19	24	2
Washington Football Team	12	6	13	18
New York Giants	29	6	10	22
Oakland Raiders	27	11	22	1
New York Jets	7	15	5	13
Chicago Bears	17	32	8	13
Tennessee Titans	8	25	12	10
San Francisco 49ers	10	9	1	18
Miami Dolphins	10	31	28	22
Atlanta Falcons	21	23	32	11
Los Angeles Chargers	31	28	17	7
Detroit Lions	26	5	11	22
Houston Texans	15	17	16	6
Cincinnati Bengals	1	14	26	21
Buffalo Bills	17	19	19	22
Arizona Cardinals	16	30	20	15
Los Angeles Rams	19	21	27	11
Indianapolis Colts	30	9	14	16
Carolina Panthers	4	13	24	4
Minnesota Vikings	2	11	30	22
Dallas Cowboys	12	29	23	16
Baltimore Ravens	25	27	5	22
Denver Broncos	12	26	20	22
Philadelphia Eagles	20	24	15	2
Green Bay Packers	27	18	9	22
New Orleans Saints	22	15	7	22
Pittsburgh Steelers	5	22	31	5
Seattle Seahawks	31	1	29	22
Kansas City Chiefs	6	2	17	22
New England Patriots	22	6	2	9

Figure 3: Worst Teams and Ranks by Occurance of Injury in a Position Group

V. CONCLUSION

Our findings highlight the nuanced impact of player injuries on NFL teams' performance. The logistic regression model revealed that certain positions are more critical to a team's win probability. This analysis contributes to a deeper understanding of strategic team management and injury prevention in professional sports.