SCORE Network: Impact of Draws/Faceoffs Division I Lacrosse

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What is SCORE?

The SCORE Network is an NSF-funded national network focused on developing and distributing Sports Content for Outreach, Research, and Education in the fields of statistics and data science.

What is a Module?

1. Introduction
- Summary of the sport and concepts that will be in handout
- Provides learning objectives and methods

Variable	Description
Team	college of the team
avg_assists	average assists to goals per game
avg_caused_turnovers	average turnovers forced by the team per game
clearing_pctg	percentage of successful attempts to earn an offensive opportunity after gaining the ball in the teams own half
total_faceoffs	total faceoffs taken by a team for the season
faceoff_wins	total faceoff wins by a team for the season
faceoff_win_pct	proportion of total faceoff wins out of total faceoffs. Equivalent to the draw percentage in women's lacrosse.
avg_goals	average goals per game
avg_goals_allowed	average goals allowed by the team per game
avg_ground_balls	average loose balls picked up by the team per game
man_down_defense_pctg	proportion of times a team stops the opponent from scoring while man down due to a penalty
man_up_offense_pctg	proportion of times the offense scores out of total opportunities while man up

2. Data
- Summary of dataset, with variable descriptions
- Supplies data file and source

3. Materials
- Class handouts and answer keys

4. Conclusion
- Summarize the takeaways and learning objectives from the sports application handouts

1.) Calculate the men's regression line:

2.) Interpret the results (what do these numbers mean?)

a.) draw percentage coefficient

b.) p value
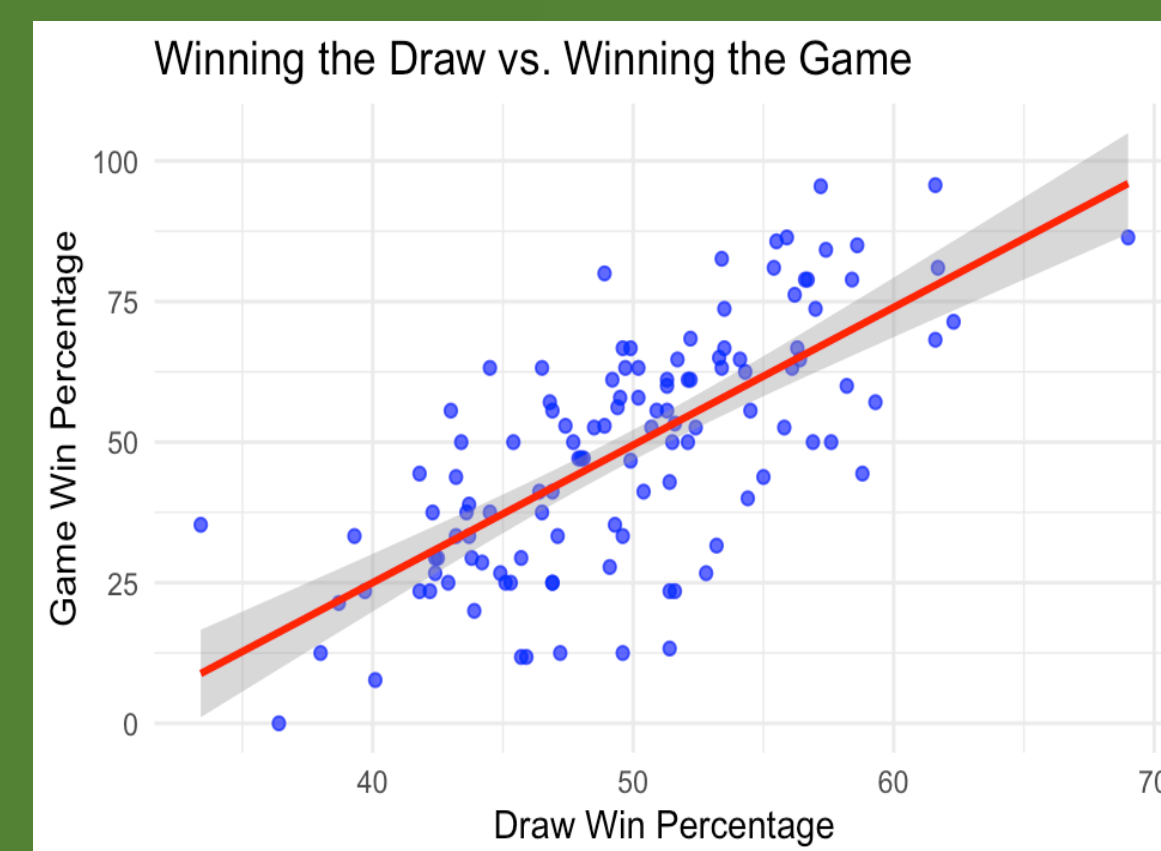
c.) R^2 value

d.) Residual Standard Error

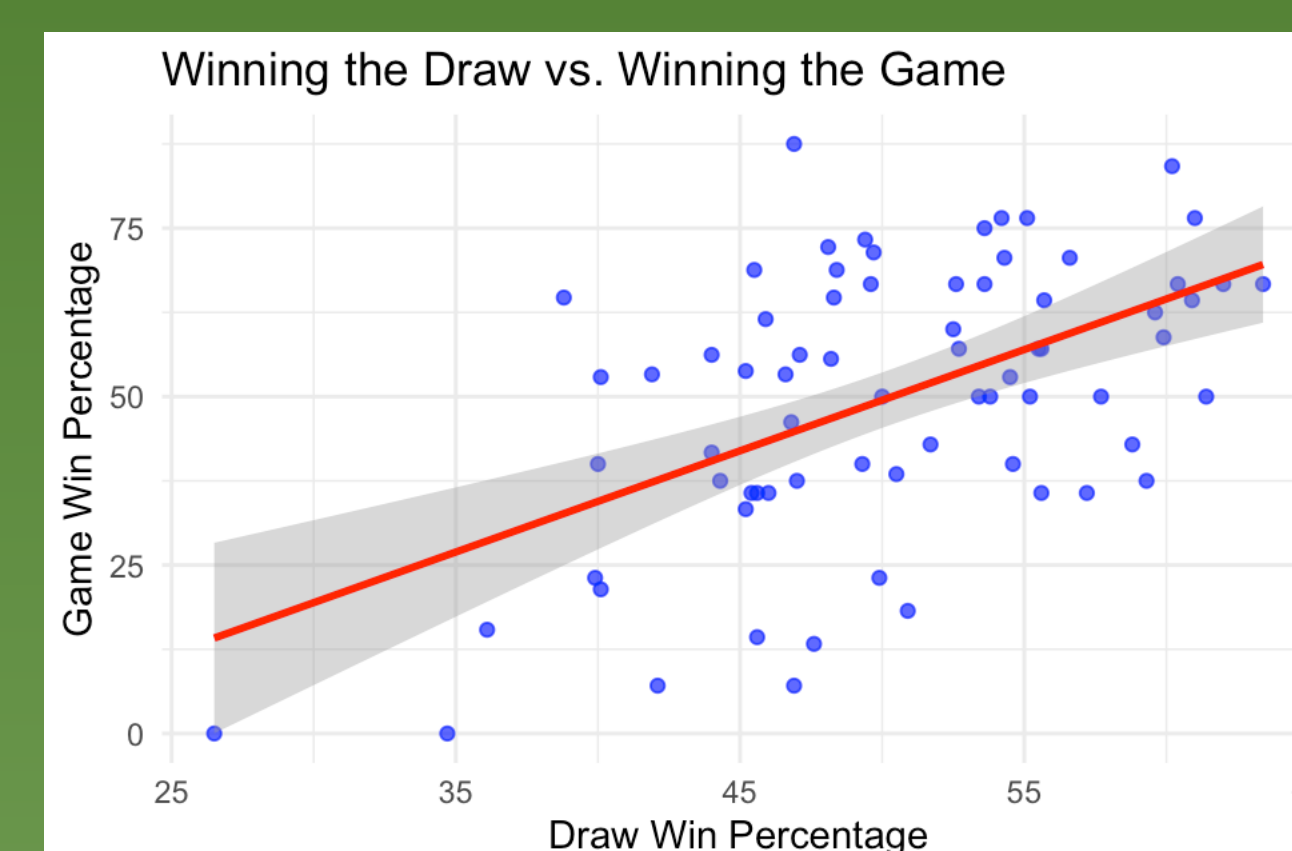## Logistic Regression Plots Division I Lacrosse

Step 1: plot the regression models for women and then men

Women

Winning the Draw vs. Winning the Game

Men

Winning the Draw vs. Winning the Game

What are we looking at?
- regression model and lines of game win percentage and draw/face off win percentage for both men and women

```
Call:
lm(formula = win_pctg ~ draw_pctg, data = WLAX)

Residuals:
    Min      1Q  Median      3Q     Max
-39.610  -9.566   1.441  10.246  33.209

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -72.9051    11.2662  -6.471 2.31e-09 ***
draw_pctg     2.4478     0.2246  10.898  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 14.95 on 118 degrees of freedom
Multiple R-squared:  0.5016,   Adjusted R-squared:  0.4974
F-statistic: 118.8 on 1 and 118 DF,  p-value: < 2.2e-16
```

```
Call:
lm(formula = win_loss_pctg ~ faceoff_win_pct, data = MLAX)

Residuals:
    Min      1Q  Median      3Q     Max
-37.712 -11.078  -0.791  13.661  42.688

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     -25.6492    14.5339  -1.765    0.082 .
faceoff_win_pct   1.5024     0.2869   5.237 1.64e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 17.49 on 70 degrees of freedom
Multiple R-squared:  0.2815,   Adjusted R-squared:  0.2712
F-statistic: 27.42 on 1 and 70 DF,  p-value: 1.637e-06
```

Interpret these results (what do these numbers mean?)

a.) draw percentage coefficient (2.4478):

for every 1% increase in draw win percentage, game win percentage increases by 2.4478 %

b.) p value (p = 0.0000000000000002)

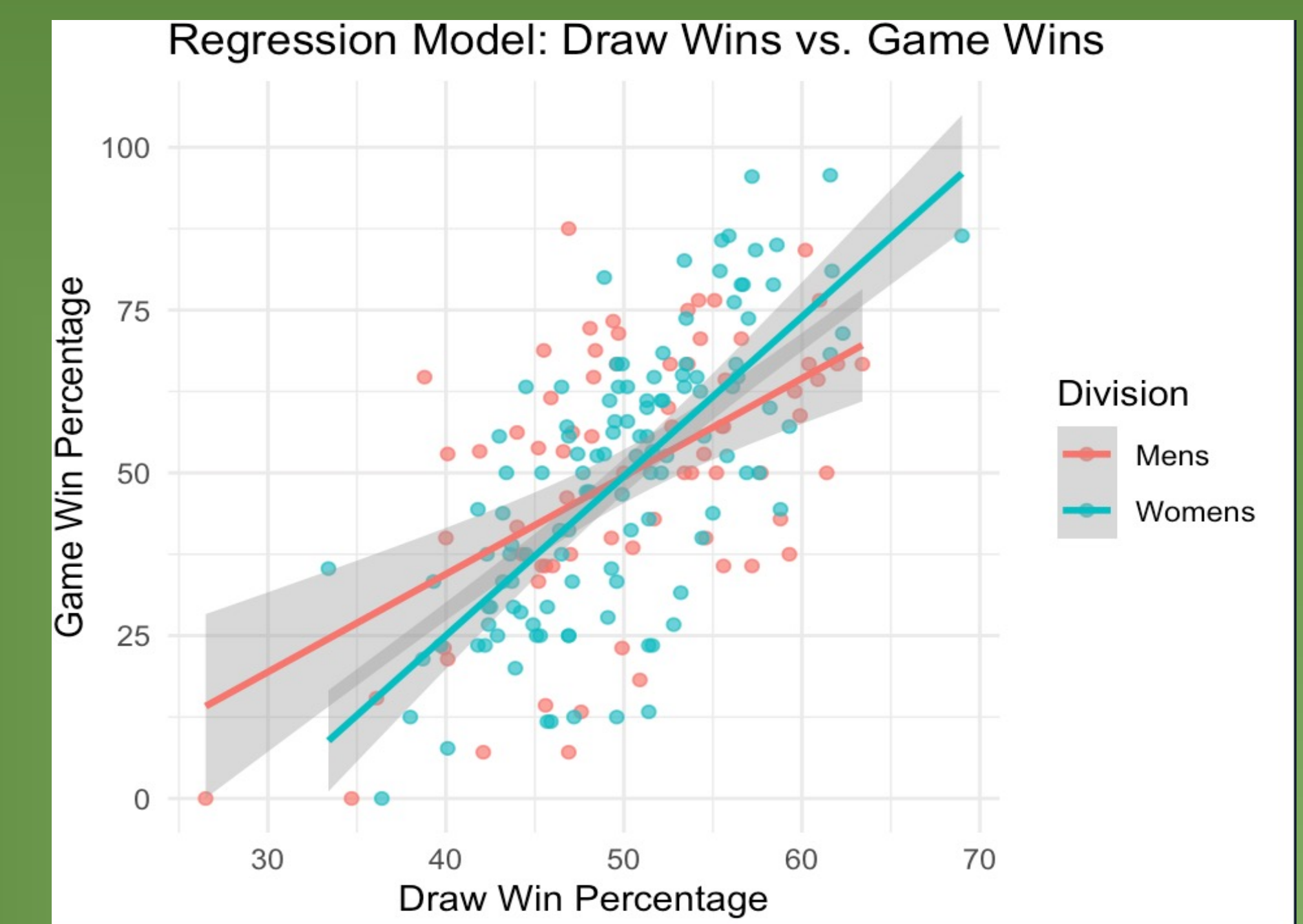the low P value depicts that draw percentage significantly affects win percentage

c.) R^2 value (R^2= 0.5016)

the model explains 50.16% of the variation in win percentage

d.) Residual Standard Error (RSE = 14.95)

on average, the model's predictions are off by about 14.95 units (percentage points)

Interaction Model

Regression Model: Draw Wins vs. Game Wins

```
Residuals:
    Min      1Q  Median      3Q     Max
-39.610  -9.613   0.495  11.541  42.688

Coefficients:
                            Estimate Std. Error t value Pr(>|t|)
(Intercept)                 -25.6492    13.2478  -1.936  0.05435
faceoff_win_pct               1.5024     0.2615   5.745 3.64e-08
DivisionWomens              -47.2559    17.8848  -2.642  0.00893
faceoff_win_pct:DivisionWomens 0.9454     0.3546   2.666  0.00835

(Intercept)                    .
faceoff_win_pct                ***
DivisionWomens                 **
faceoff_win_pct:DivisionWomens **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 15.94 on 188 degrees of freedom
Multiple R-squared:  0.4225,   Adjusted R-squared:  0.4132
F-statistic: 45.84 on 3 and 188 DF,  p-value: < 2.2e-16
```

Interpret results (what do these numbers mean?)

a.) How do the regression lines differ for men's and women's lacrosse?
The women's slope is steeper, depicting that draw win percentage has a stronger impact on game with percentage compared to the men.
The interaction term (β = 0.9454, p = 0.0084) shows that the effect of winning faceoffs/draws is stronger for women's teams than for men's teams.
For every 1% increase in draw win percentage, women's win percentage increases by (1.5024 + 0.9454 = 2.4478%), while men's win percentage increases by only 1.5024%.

b.) Which division (men's or women's) seems to show a stronger relationship between draw wins and game wins?
The women division shows a stronger relationship due to their steeper slope and higher R^2 value

c.) What does this tell you about the importance of winning faceoffs/draws in lacrosse games?
Overall, winning the draw/faceoff in the women division is more crucial and important to the games overall outcome than in the men division