Curling

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```
library("tidyverse")
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✔ dplyr     1.1.4     ✔ readr     2.1.5
## ✔ forcats   1.0.0     ✔ stringr   1.5.1
## ✔ ggplot2   3.5.2     ✔ tibble    3.3.0
## ✔ lubridate 1.9.4     ✔ tidyr     1.3.1
## ✔ purrr     1.1.0
## ── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts
to become errors
```

```
library("tidymodels")
```

```
## ── Attaching packages ─────────────────────────────────────── tidymodels 1.4.1 ──
## ✔ broom        1.0.9     ✔ rsample      1.3.1
## ✔ dials        1.4.2     ✔ tailor       0.1.0
## ✔ infer        1.0.9     ✔ tune         2.0.0
## ✔ modeldata    1.5.1     ✔ workflows    1.3.0
## ✔ parsnip      1.3.3     ✔ workflowsets 1.1.1
## ✔ recipes      1.3.1     ✔ yardstick    1.3.2
## ── Conflicts ────────────────────────────────────── tidymodels_conflicts() ──
## ✖ scales::discard() masks purrr::discard()
## ✖ dplyr::filter()   masks stats::filter()
## ✖ recipes::fixed()  masks stringr::fixed()
## ✖ dplyr::lag()      masks stats::lag()
## ✖ yardstick::spec() masks readr::spec()
## ✖ recipes::step()   masks stats::step()
```

```
library("ggforce")
library("ggplot2")
```

```
ends <- read.csv("Ends_Dummy.csv") %>%
  as_tibble()
ends
```

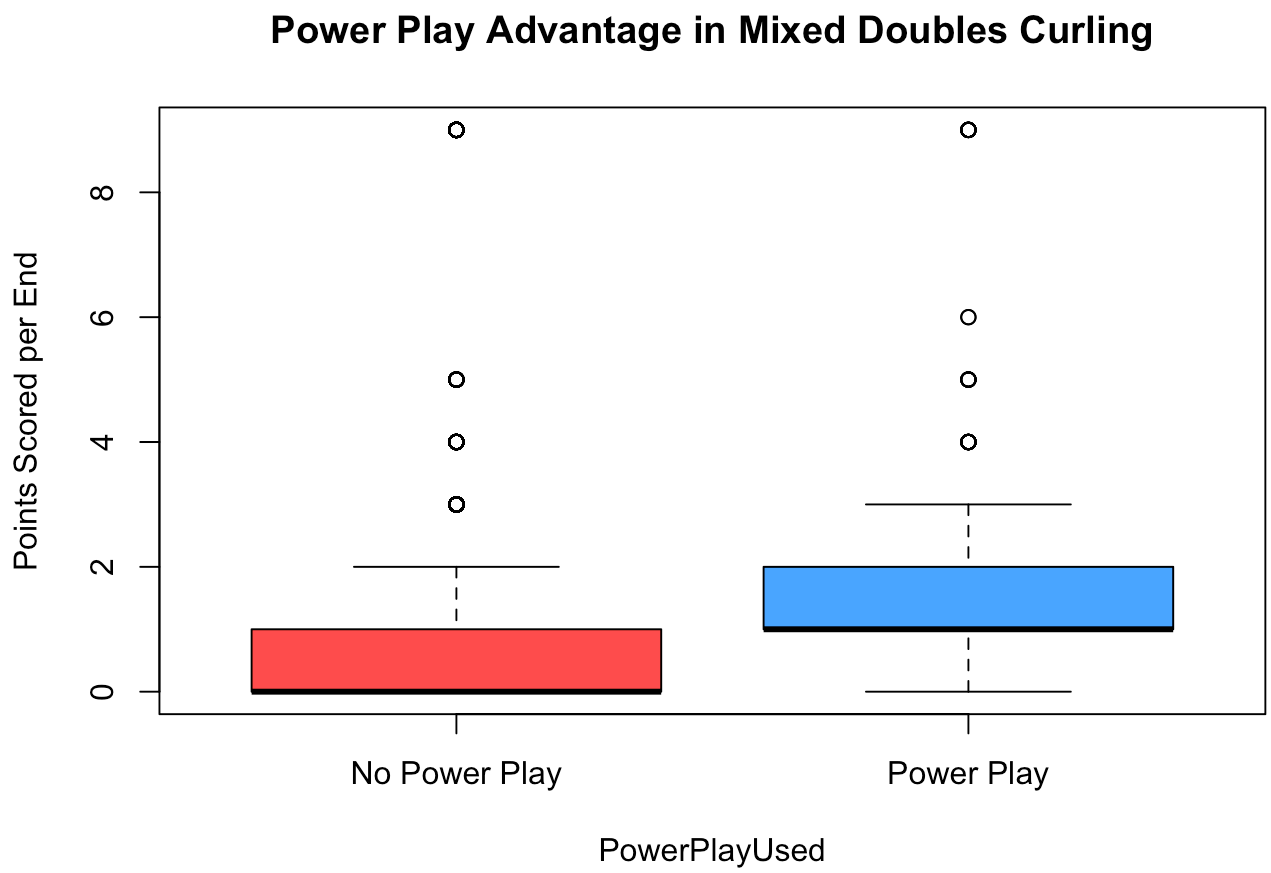
```
## # A tibble: 5,274 × 8
##    CompetitionID SessionID GameID TeamID EndID Result PowerPlay PowerPlayUsed
##            <int>     <int>  <int>  <int> <int>  <int>     <int>         <int>
##  1             0         1      1     19     1      0        NA             0
##  2             0         1      1     27     1      1        NA             0
##  3             0         1      1     19     2      2        NA             0
##  4             0         1      1     27     2      0        NA             0
##  5             0         1      1     19     3      0        NA             0
##  6             0         1      1     27     3      3        NA             0
##  7             0         1      1     19     4      1        NA             0
##  8             0         1      1     27     4      0        NA             0
##  9             0         1      1     19     5      2        NA             0
## 10             0         1      1     27     5      0        NA             0
## # ℹ 5,264 more rows
```

```
model <- lm(Result ~ PowerPlayUsed, data = ends)
summary(model)
```

```
##
## Call:
## lm(formula = Result ~ PowerPlayUsed, data = ends)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.6421 -0.9333 -0.6421  0.0667  8.0667
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.93328    0.02309   40.41   <2e-16 ***
## PowerPlayUsed  0.70886    0.06858   10.34   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.579 on 5272 degrees of freedom
## Multiple R-squared:  0.01986,    Adjusted R-squared:  0.01968
## F-statistic: 106.8 on 1 and 5272 DF,  p-value: < 2.2e-16
```

PowerPlayUsed Coefficient = 0.70886 Using a power play is associated with about +0.71 more points per end, on average, compared to not using one. Teams without a power play score about 0.93 (intercept) points per end, while teams using a power play score about 1.64 points per end.

```
boxplot(Result ~ PowerPlayUsed,
        data = ends,
        names = c("No Power Play", "Power Play"),
        ylab = "Points Scored per End",
        main = "Power Play Advantage in Mixed Doubles Curling",
        col = c("#FF4D4D", "#4DA6FF"),
        border = "black")
```



The boxplots compare points scored per end when teams use a power play versus when they do not. The entire distribution shifts upward when a power play is used: the median score is higher, the middle 50% of outcomes are higher, and there are more high-scoring outliers. This shows that teams not only score more on average with a power play, but also have a greater chance of producing big scoring ends. In contrast, non-power-play ends are clustered around zero or one point. Together, these patterns visually demonstrate a clear comparative advantage to using the power play.