EuroVsCopa

Collin

2025-02-18

```r
data <- read.csv("C:/Users/cstra/data/EuroVsCopa.csv")
View(data)
summary(data)
```

```
##    stadium            attendance         home_team          away_team
## Length:81          Length:81          Length:81          Length:81
## Class :character   Class :character   Class :character   Class :character
## Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##    home_goals        away_goals      Home.Expected.goals.xG. Home.Total.shots
## Min.   :0.000    Min.   :0.0000    Min.   :0.120           Min.   : 2
## 1st Qu.:0.000    1st Qu.:0.0000    1st Qu.:0.760           1st Qu.: 8
## Median :1.000    Median :1.0000    Median :1.110           Median :12
## Mean   :1.309    Mean   :0.9383    Mean   :1.344           Mean   :13
## 3rd Qu.:2.000    3rd Qu.:1.0000    3rd Qu.:1.770           3rd Qu.:18
## Max.   :5.000    Max.   :4.0000    Max.   :3.360           Max.   :35
## Home.Shots.on.target Home.Big.chances Home.Big.chances.missed
## Min.   : 0.000       Min.   :0.000    Min.   :0.000
## 1st Qu.: 3.000       1st Qu.:1.000    1st Qu.:0.000
## Median : 4.000       Median :2.000    Median :1.000
## Mean   : 4.531       Mean   :2.272    Mean   :1.543
## 3rd Qu.: 6.000       3rd Qu.:3.000    3rd Qu.:2.000
## Max.   :13.000       Max.   :9.000    Max.   :7.000
## Home.Accurate.passes Home.Fouls.committed  Home.Corners Home.Total.shots.
## Length:81            Min.   : 4.00         Min.   : 0    Min.   : 2
## Class :character     1st Qu.: 9.00         1st Qu.: 3    1st Qu.: 8
## Mode  :character     Median :12.00         Median : 4    Median :12
##                      Mean   :12.09         Mean   : 5    Mean   :13
##                      3rd Qu.:15.00         3rd Qu.: 6    3rd Qu.:18
##                      Max.   :26.00         Max.   :13    Max.   :35
## Home.Shots.off.target Home.Shots.on.target. Home.Blocked.shots
## Min.   : 0.000        Min.   : 0.000        Min.   : 0.000
## 1st Qu.: 3.000        1st Qu.: 3.000        1st Qu.: 2.000
## Median : 4.000        Median : 4.000        Median : 3.000
## Mean   : 4.728        Mean   : 4.531        Mean   : 3.741
## 3rd Qu.: 6.000        3rd Qu.: 6.000        3rd Qu.: 5.000
## Max.   :16.000        Max.   :13.000        Max.   :12.000
## Home.Hit.woodwork Home.Shots.inside.box Home.Shots.outside.box
## Min.   :0.0000    Min.   : 1.000        Min.   : 0.000
```

```
##  1st Qu.:0.0000    1st Qu.: 4.000      1st Qu.: 3.000
##  Median :0.0000    Median : 7.000      Median : 5.000
##  Mean   :0.2469    Mean   : 7.667      Mean   : 5.333
##  3rd Qu.:0.0000    3rd Qu.:10.000      3rd Qu.: 7.000
##  Max.   :2.0000    Max.   :20.000      Max.   :15.000
##  Home.Expected.goals..xG. Home.xG.open.play Home.xG.set.play
##  Min.   :0.120            Min.   :0.0200    Min.   :0.0000
##  1st Qu.:0.760            1st Qu.:0.5100    1st Qu.:0.0900
##  Median :1.110            Median :0.7100    Median :0.2100
##  Mean   :1.344            Mean   :0.9202    Mean   :0.3014
##  3rd Qu.:1.770            3rd Qu.:1.3500    3rd Qu.:0.3900
##  Max.   :3.360            Max.   :2.6600    Max.   :1.3500
##  Home.Non.penalty.xG Home.xG.on.target..xGOT.  Home.Passes
##  Min.   :0.120       Min.   :0.040             Min.   :229.0
##  1st Qu.:0.720       1st Qu.:0.580             1st Qu.:374.0
##  Median :1.010       Median :1.210             Median :457.0
##  Mean   :1.218       Mean   :1.445             Mean   :476.8
##  3rd Qu.:1.660       3rd Qu.:2.100             3rd Qu.:562.0
##  Max.   :3.360       Max.   :5.090             Max.   :869.0
##  Home.Accurate.passes.1 Home.Own.half    Home.Opposition.half
##  Length:81              Min.   : 75.0    Min.   : 56.0
##  Class :character       1st Qu.:157.0    1st Qu.:116.0
##  Mode  :character       Median :192.0    Median :180.0
##                         Mean   :200.1    Mean   :206.5
##                         3rd Qu.:232.0    3rd Qu.:277.0
##                         Max.   :457.0    Max.   :582.0
##  Home.Accurate.long.balls Home.Accurate.crosses  Home.Throws
##  Length:81                Length:81              Min.   : 8.00
##  Class :character         Class :character       1st Qu.:14.00
##  Mode  :character         Mode  :character       Median :18.00
##                                                  Mean   :18.12
##                                                  3rd Qu.:21.00
##                                                  Max.   :41.00
##  Home.Touches.in.opposition.box Home.Offsides    Home.Yellow.cards
##  Min.   : 4.00                  Min.   :0.000    Min.   :0.000
##  1st Qu.:13.00                  1st Qu.:1.000    1st Qu.:1.000
##  Median :21.00                  Median :2.000    Median :2.000
##  Mean   :23.02                  Mean   :1.802    Mean   :1.938
##  3rd Qu.:30.00                  3rd Qu.:3.000    3rd Qu.:3.000
##  Max.   :57.00                  Max.   :5.000    Max.   :6.000
##  Home.Red.cards    Home.Tackles.won   Home.Interceptions  Home.Blocks
##  Min.   :0.0000    Length:81          Min.   : 1.000      Min.   :0.000
##  1st Qu.:0.0000    Class :character   1st Qu.: 6.000      1st Qu.:1.000
##  Median :0.0000    Mode  :character   Median : 7.000      Median :3.000
##  Mean   :0.1111                       Mean   : 7.494      Mean   :3.062
##  3rd Qu.:0.0000                       3rd Qu.:10.000      3rd Qu.:5.000
##  Max.   :2.0000                       Max.   :15.000      Max.   :8.000
##  Home.Clearances Home.Keeper.saves Home.Duels.won  Home.Ground.duels.won
##  Min.   : 5.00   Min.   : 0.000    Min.   :22.00   Length:81
##  1st Qu.:13.00   1st Qu.: 2.000    1st Qu.:40.00   Class :character
##  Median :18.00   Median : 3.000    Median :48.00   Mode  :character
##  Mean   :19.16   Mean   : 2.728    Mean   :49.51
##  3rd Qu.:24.00   3rd Qu.: 3.000    3rd Qu.:57.00
##  Max.   :45.00   Max.   :11.000    Max.   :83.00
```

```
##  Home.Aerial.duels.won Home.Successful.dribbles Away.Expected.goals.xG.
##  Length:81              Length:81                Min.   :0.020
##  Class :character       Class :character         1st Qu.:0.570
##  Mode  :character       Mode  :character         Median :1.160
##                                                  Mean   :1.196
##                                                  3rd Qu.:1.560
##                                                  Max.   :3.740
##  Away.Total.shots Away.Shots.on.target Away.Big.chances Away.Big.chances.missed
##  Min.   : 1.00    Min.   : 0.000       Min.   :0.000    Min.   :0.000
##  1st Qu.: 9.00    1st Qu.: 2.000       1st Qu.:1.000    1st Qu.:1.000
##  Median :11.00    Median : 3.000       Median :2.000    Median :1.000
##  Mean   :11.75    Mean   : 3.667       Mean   :2.123    Mean   :1.506
##  3rd Qu.:15.00    3rd Qu.: 5.000       3rd Qu.:3.000    3rd Qu.:2.000
##  Max.   :27.00    Max.   :12.000       Max.   :6.000    Max.   :5.000
##  Away.Accurate.passes Away.Fouls.committed  Away.Corners    Away.Total.shots.
##  Length:81            Min.   : 4.00         Min.   : 0.000  Min.   : 1.00
##  Class :character     1st Qu.: 8.00         1st Qu.: 2.000  1st Qu.: 9.00
##  Mode  :character     Median :12.00         Median : 4.000  Median :11.00
##                       Mean   :11.67         Mean   : 4.358  Mean   :11.75
##                       3rd Qu.:14.00         3rd Qu.: 6.000  3rd Qu.:15.00
##                       Max.   :22.00         Max.   :13.000  Max.   :27.00
##  Away.Shots.off.target Away.Shots.on.target. Away.Blocked.shots
##  Min.   : 0.000        Min.   : 0.000        Min.   :0.000
##  1st Qu.: 3.000        1st Qu.: 2.000        1st Qu.:2.000
##  Median : 5.000        Median : 3.000        Median :3.000
##  Mean   : 4.975        Mean   : 3.667        Mean   :3.111
##  3rd Qu.: 7.000        3rd Qu.: 5.000        3rd Qu.:5.000
##  Max.   :14.000        Max.   :12.000        Max.   :8.000
##  Away.Hit.woodwork Away.Shots.inside.box Away.Shots.outside.box
##  Min.   :0.000     Min.   : 0.000        Min.   : 0.00
##  1st Qu.:0.000     1st Qu.: 4.000        1st Qu.: 3.00
##  Median :0.000     Median : 7.000        Median : 4.00
##  Mean   :0.358     Mean   : 7.173        Mean   : 4.58
##  3rd Qu.:1.000     3rd Qu.:10.000        3rd Qu.: 6.00
##  Max.   :2.000     Max.   :17.000        Max.   :13.00
##  Away.Expected.goals..xG. Away.xG.open.play Away.xG.set.play
##  Min.   :0.020            Min.   :0.0000    Min.   :0.0000
##  1st Qu.:0.570            1st Qu.:0.3200    1st Qu.:0.0500
##  Median :1.160            Median :0.7100    Median :0.1800
##  Mean   :1.196            Mean   :0.8388    Mean   :0.2711
##  3rd Qu.:1.560            3rd Qu.:1.3100    3rd Qu.:0.3500
##  Max.   :3.740            Max.   :2.4600    Max.   :1.8700
##  Away.Non.penalty.xG Away.xG.on.target..xGOT.  Away.Passes
##  Min.   :0.020       Min.   :0.000             Min.   :192.0
##  1st Qu.:0.540       1st Qu.:0.390             1st Qu.:329.0
##  Median :1.100       Median :1.130             Median :409.0
##  Mean   :1.108       Mean   :1.164             Mean   :423.9
##  3rd Qu.:1.510       3rd Qu.:1.640             3rd Qu.:517.0
##  Max.   :3.070       Max.   :4.000             Max.   :690.0
##  Away.Accurate.passes.1 Away.Own.half    Away.Opposition.half
##  Length:81              Min.   : 67.0    Min.   : 33.0
##  Class :character       1st Qu.:143.0    1st Qu.:102.0
##  Mode  :character       Median :181.0    Median :149.0
##                         Mean   :187.4    Mean   :165.9
```

```
##                          3rd Qu.:233.0   3rd Qu.:228.0
##                          Max.   :302.0   Max.   :513.0
##  Away.Accurate.long.balls Away.Accurate.crosses  Away.Throws
##  Length:81                Length:81             Min.   : 6.00
##  Class :character         Class :character      1st Qu.:13.00
##  Mode  :character         Mode  :character      Median :17.00
##                                                 Mean   :17.25
##                                                 3rd Qu.:22.00
##                                                 Max.   :29.00
##  Away.Touches.in.opposition.box Away.Offsides   Away.Yellow.cards
##  Min.   : 1.00                  Min.   :0.000   Min.   : 0.000
##  1st Qu.:13.00                  1st Qu.:0.000   1st Qu.: 1.000
##  Median :19.00                  Median :1.000   Median : 2.000
##  Mean   :20.11                  Mean   :1.358   Mean   : 2.198
##  3rd Qu.:26.00                  3rd Qu.:2.000   3rd Qu.: 3.000
##  Max.   :50.00                  Max.   :6.000   Max.   :11.000
##  Away.Red.cards     Away.Tackles.won   Away.Interceptions  Away.Blocks
##  Min.   :0.00000   Length:81          Min.   : 1.000     Min.   : 0.000
##  1st Qu.:0.00000   Class :character   1st Qu.: 5.000     1st Qu.: 2.000
##  Median :0.00000   Mode  :character   Median : 7.000     Median : 3.000
##  Mean   :0.06173                      Mean   : 7.531     Mean   : 3.654
##  3rd Qu.:0.00000                      3rd Qu.: 9.000     3rd Qu.: 5.000
##  Max.   :1.00000                      Max.   :16.000     Max.   :11.000
##  Away.Clearances Away.Keeper.saves Away.Duels.won  Away.Ground.duels.won
##  Min.   : 4.00   Min.   :0.000     Min.   :26.00   Length:81
##  1st Qu.:15.00   1st Qu.:2.000     1st Qu.:41.00   Class :character
##  Median :19.00   Median :3.000     Median :47.00   Mode  :character
##  Mean   :20.37   Mean   :3.235     Mean   :48.49
##  3rd Qu.:26.00   3rd Qu.:4.000     3rd Qu.:56.00
##  Max.   :55.00   Max.   :9.000     Max.   :73.00
##  Away.Aerial.duels.won Away.Successful.dribbles
##  Length:81             Length:81
##  Class :character      Class :character
##  Mode  :character      Mode  :character
##
##
##
```

```r
data$goals <- data$home_goals + data$away_goals
data$XG <- data$Home.Expected.goals.xG. + data$Away.Expected.goals.xG.
data$shots <- data$Home.Total.shots + data$Away.Total.shots
data$fouls <- data$Home.Fouls.committed + data$Away.Fouls.committed
data$yellows <- data$Home.Yellow.cards + data$Away.Yellow.cards
data$reds <- data$Home.Red.cards + data$Away.Red.cards
data$passes <- data$Home.Passes + data$Away.Passes
data$passes.own.half <- data$Home.Own.half + data$Away.Own.half
data$passes.opp.half <- data$Home.Opposition.half + data$Away.Opposition.half
```

```r
euro <- data[1:51,]
copa <- data[52:81,]
#View(euro)
#View(copa)
#summary(euro)
#summary(copa)
```

```r
t.test(euro$goals, copa$goals)
```

```
## 
##  Welch Two Sample t-test
## 
## data:  euro$goals and copa$goals
## t = 0.37267, df = 54.574, p-value = 0.7108
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5580423  0.8129442
## sample estimates:
## mean of x mean of y
##  2.294118  2.166667
```

```r
t.test(euro$XG, copa$XG)
```

```
## 
##  Welch Two Sample t-test
## 
## data:  euro$XG and copa$XG
## t = 0.90301, df = 65.943, p-value = 0.3698
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2177496  0.5773575
## sample estimates:
## mean of x mean of y
##  2.606471  2.426667
```

```r
t.test(euro$shots, copa$shots)
```

```
## 
##  Welch Two Sample t-test
## 
## data:  euro$shots and copa$shots
## t = 2.0421, df = 70.367, p-value = 0.04489
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.0615103 5.1894701
## sample estimates:
## mean of x mean of y
##  25.72549  23.10000
```

```r
t.test(euro$fouls, copa$fouls)
```

```
## 
##  Welch Two Sample t-test
## 
## data:  euro$fouls and copa$fouls
## t = -2.9358, df = 52.294, p-value = 0.004935
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -6.542267 -1.230282
## sample estimates:
## mean of x mean of y
##  22.31373  26.20000
```

```r
t.test(euro$yellows, copa$yellows)
```

```
##
##  Welch Two Sample t-test
##
## data:  euro$yellows and copa$yellows
## t = 1.5148, df = 78.985, p-value = 0.1338
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2339402  1.7241362
## sample estimates:
## mean of x mean of y
##  4.411765  3.666667
```

```r
t.test(euro$reds, copa$reds)
```

```
##
##  Welch Two Sample t-test
##
## data:  euro$reds and copa$reds
## t = -1.6835, df = 41.73, p-value = 0.09975
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.44410933  0.04018776
## sample estimates:
##   mean of x  mean of y
## 0.09803922 0.30000000
```

```r
t.test(euro$passes, copa$passes)
```

```
##
##  Welch Two Sample t-test
##
## data:  euro$passes and copa$passes
## t = 7.5042, df = 77.963, p-value = 8.553e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  143.2825 246.7607
## sample estimates:
## mean of x mean of y
##  972.9216  777.9000
```

```r
t.test(euro$passes.own.half, copa$passes.own.half)
```

```
##
##  Welch Two Sample t-test
##
## data:  euro$passes.own.half and copa$passes.own.half
## t = 3.7691, df = 63.282, p-value = 0.0003624
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   32.90189 107.14909
## sample estimates:
## mean of x mean of y
##  413.3922  343.3667
```

```
t.test(euro$passes.opp.half, copa$passes.opp.half)
```

```
##
##  Welch Two Sample t-test
##
## data:  euro$passes.opp.half and copa$passes.opp.half
## t = 8.206, df = 77.507, p-value = 3.908e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  105.0692 172.3896
## sample estimates:
## mean of x mean of y
##  423.8627  285.1333
```

```
# Perform t-tests and store results
t_tests <- list(
  goals = t.test(euro$goals, copa$goals),
  XG = t.test(euro$XG, copa$XG),
  shots = t.test(euro$shots, copa$shots),
  fouls = t.test(euro$fouls, copa$fouls),
  yellows = t.test(euro$yellows, copa$yellows),
  reds = t.test(euro$reds, copa$reds),
  passes = t.test(euro$passes, copa$passes),
  passes_own_half = t.test(euro$passes.own.half, copa$passes.own.half),
  passes_opp_half = t.test(euro$passes.opp.half, copa$passes.opp.half)
)
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.2
```

```
# Function to create plot for each t-test
create_plot <- function(data, t_test_result, title) {
  plot_data <- data.frame(
    group = c("Euro", "Copa"),
    mean = c(mean(data[[1]]), mean(data[[2]])),
    sd = c(sd(data[[1]]), sd(data[[2]])),
    se = c(sd(data[[1]])/sqrt(length(data[[1]])), sd(data[[2]])/sqrt(length(data[[2]])))
  )
```

```
  ggplot(plot_data, aes(x = group, y = mean)) +
    geom_bar(stat = "identity", fill = "skyblue", alpha = 0.7) +
    geom_errorbar(aes(ymin = mean - se, ymax = mean + se), width = 0.2) +
    labs(title = paste(title, "\n(t =", round(t_test_result$statistic, 2), ", p =", round(t_test_result$
         x = "Tournament", y = "Mean") +
    theme_minimal()
}
```
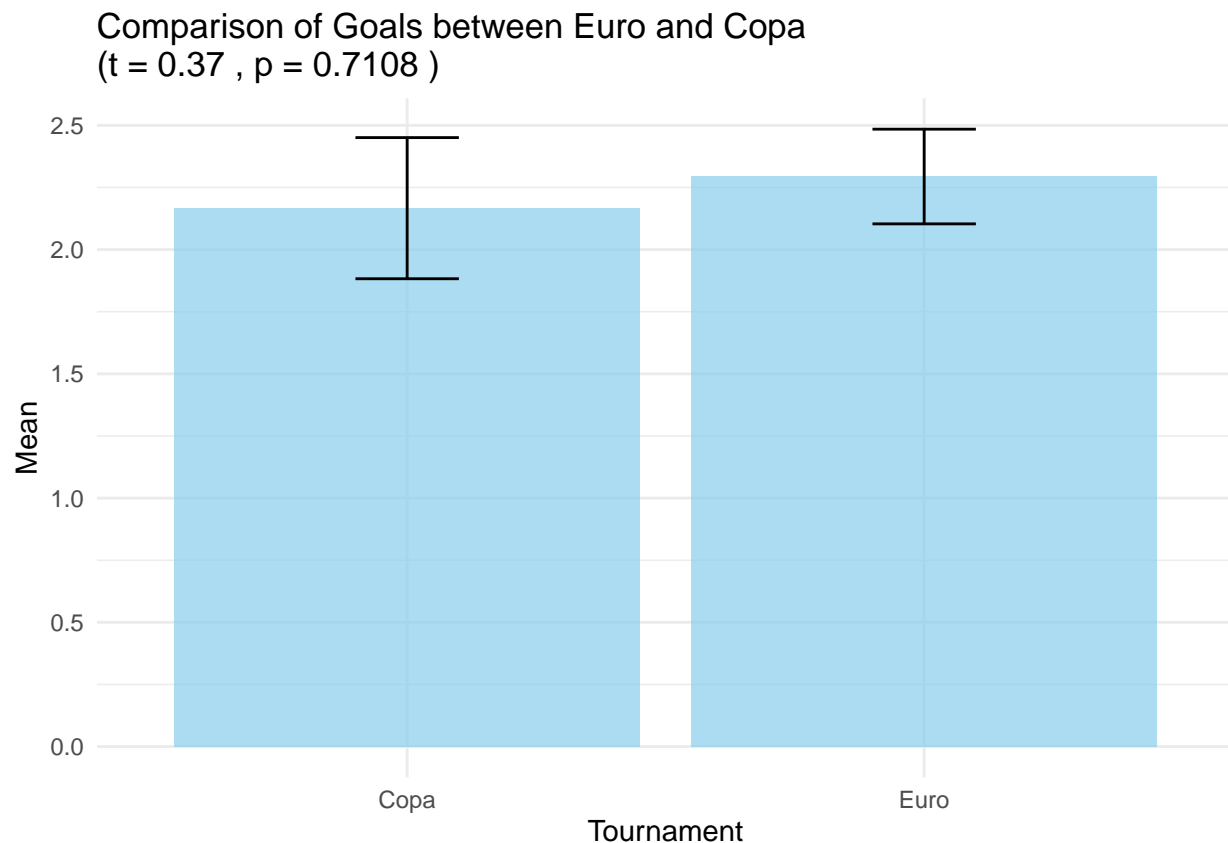
```
# Create plots
plots <- list(
  goals = create_plot(list(euro$goals, copa$goals), t_tests$goals, "Comparison of Goals between Euro and
  XG = create_plot(list(euro$XG, copa$XG), t_tests$XG, "Comparison of Expected Goals (XG) between Euro a
  shots = create_plot(list(euro$shots, copa$shots), t_tests$shots, "Comparison of Shots between Euro and
  fouls = create_plot(list(euro$fouls, copa$fouls), t_tests$fouls, "Comparison of Fouls between Euro and
  yellows = create_plot(list(euro$yellows, copa$yellows), t_tests$yellows, "Comparison of Yellow Cards
  reds = create_plot(list(euro$reds, copa$reds), t_tests$reds, "Comparison of Red Cards between Euro and
  passes = create_plot(list(euro$passes, copa$passes), t_tests$passes, "Comparison of Passes between Eur
  passes_own_half = create_plot(list(euro$passes.own.half, copa$passes.own.half), t_tests$passes_own_hal
  passes_opp_half = create_plot(list(euro$passes.opp.half, copa$passes.opp.half), t_tests$passes_opp_hal
)
```

```
plots$goals
```


Comparison of Goals between Euro and Copa
(t = 0.37 , p = 0.7108)
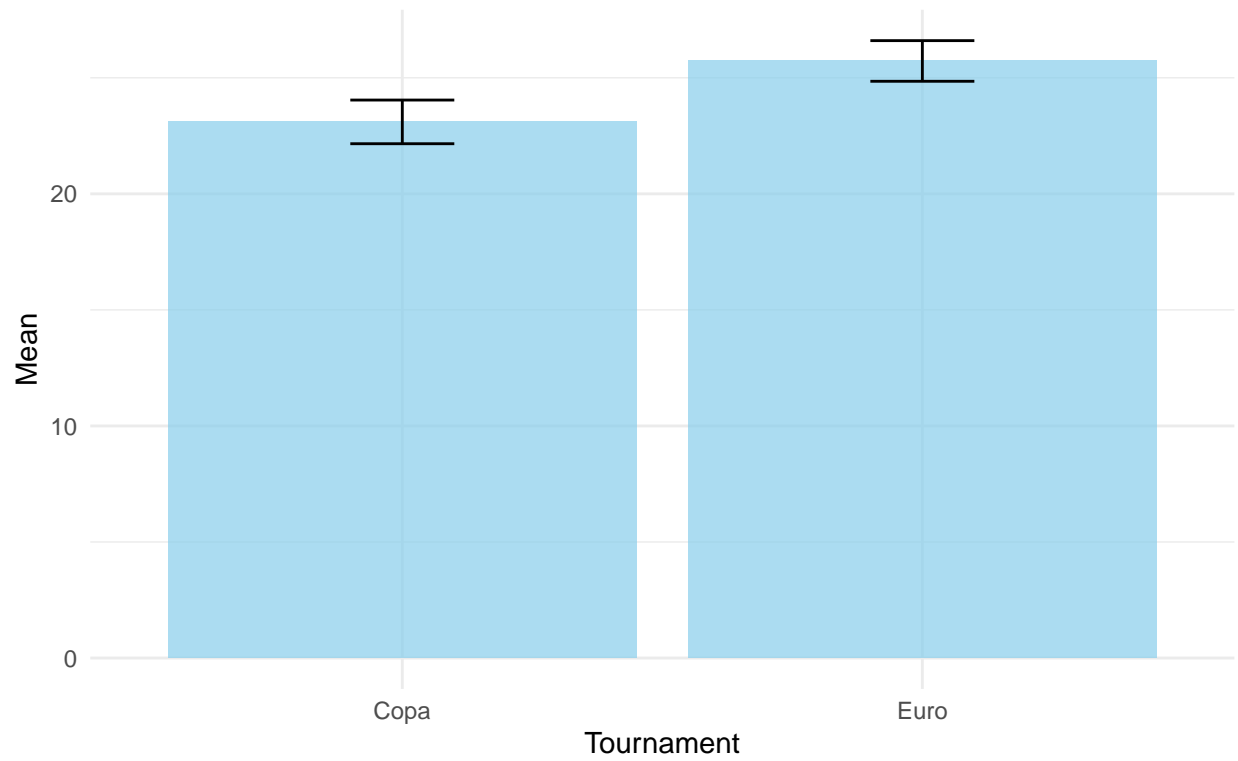
Comparison of Expected Goals (XG) between Euro and Copa
(t = 0.9 , p = 0.3698)
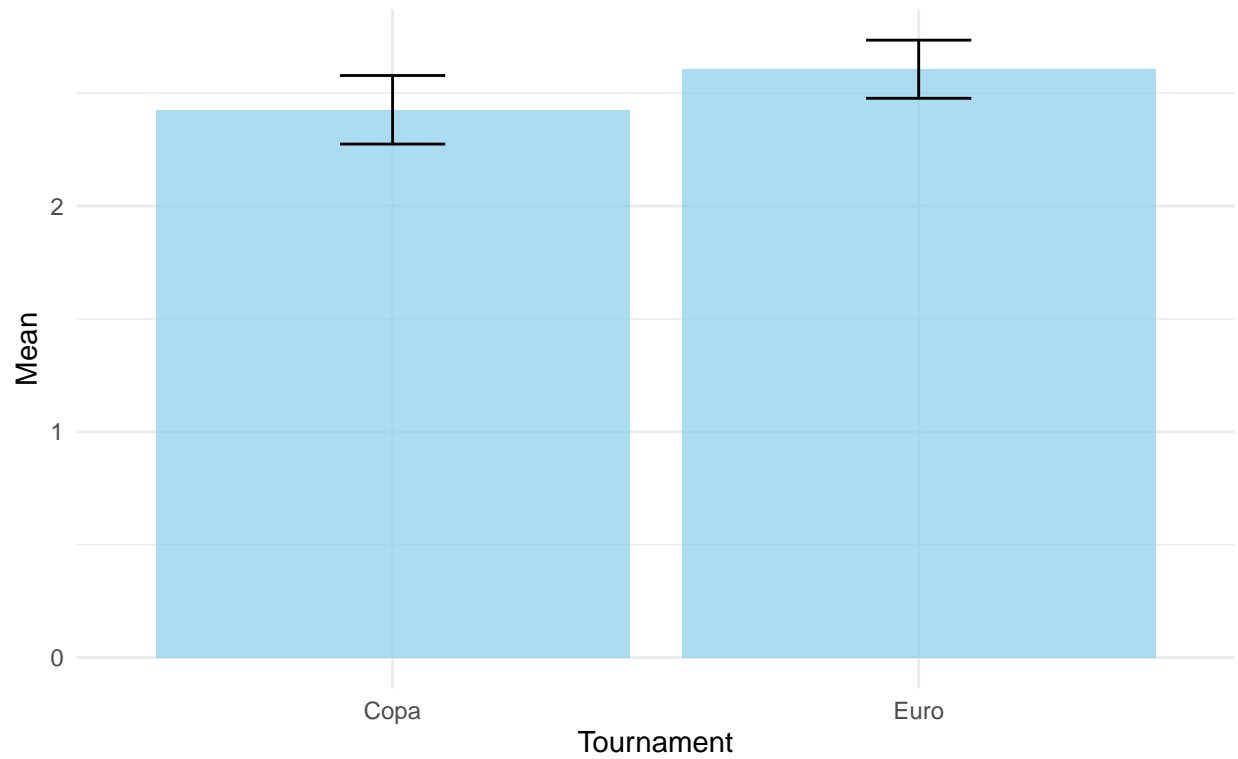
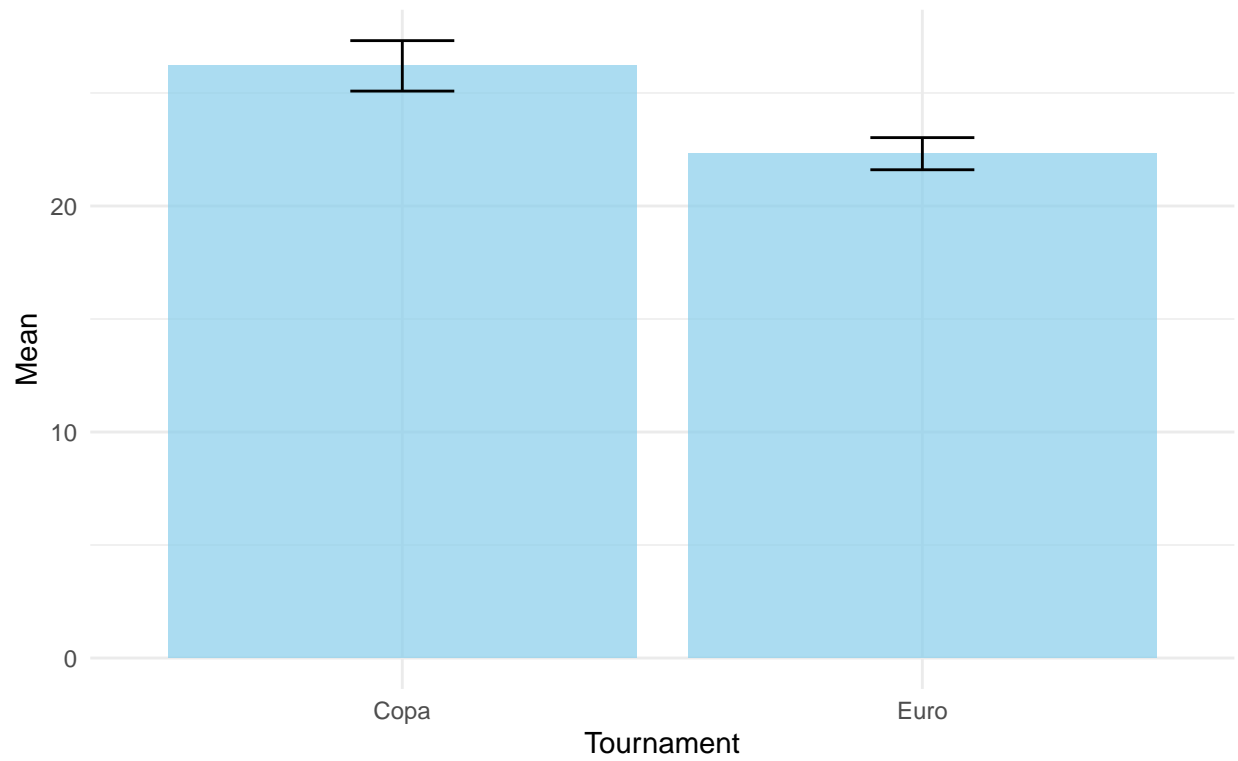
`plots$shots`

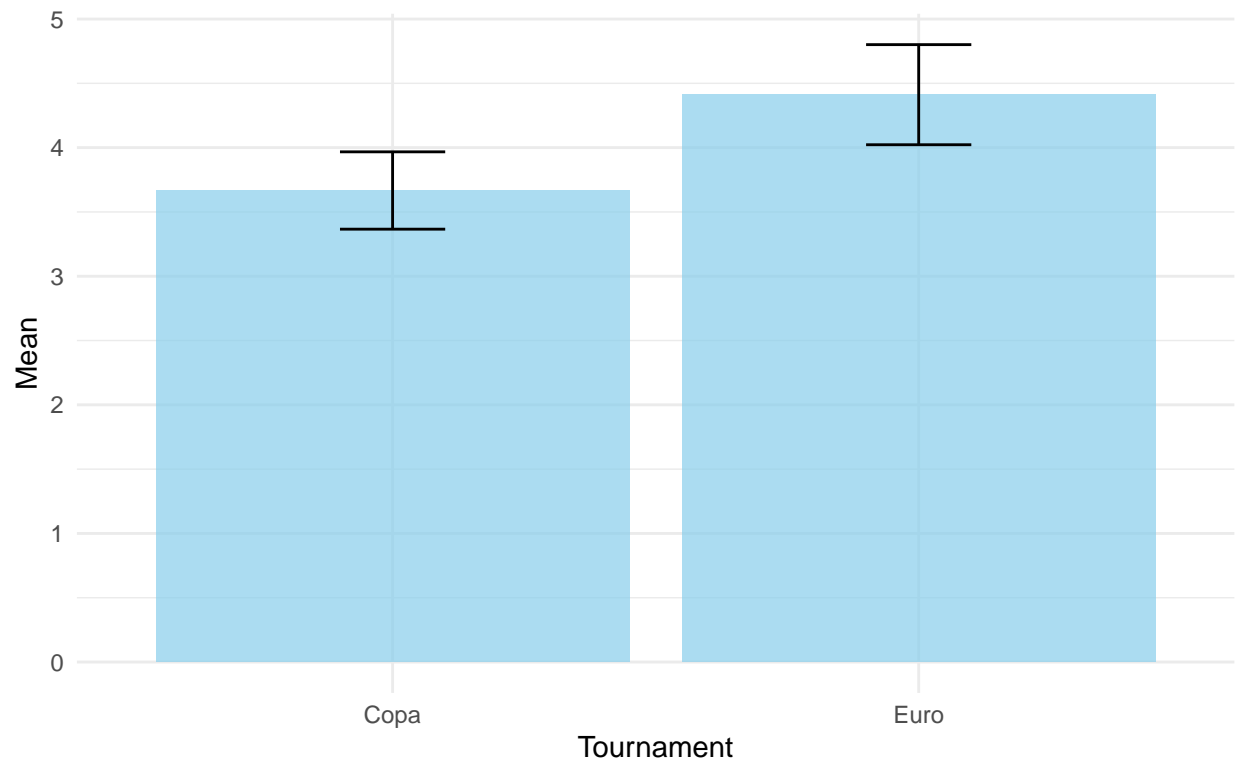## Comparison of Shots between Euro and Copa
(t = 2.04 , p = 0.0449)

plots$fouls

Comparison of Fouls between Euro and Copa
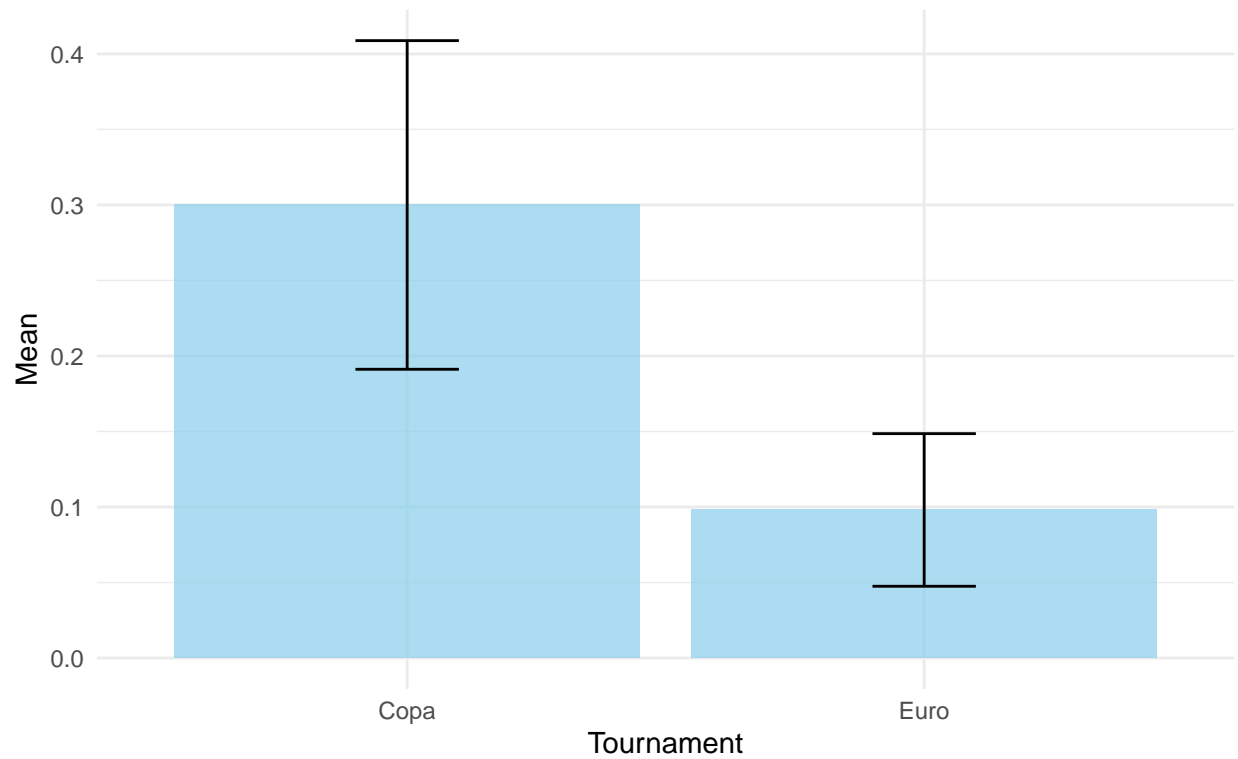(t = −2.94 , p = 0.0049)

```
plots$yellows
```

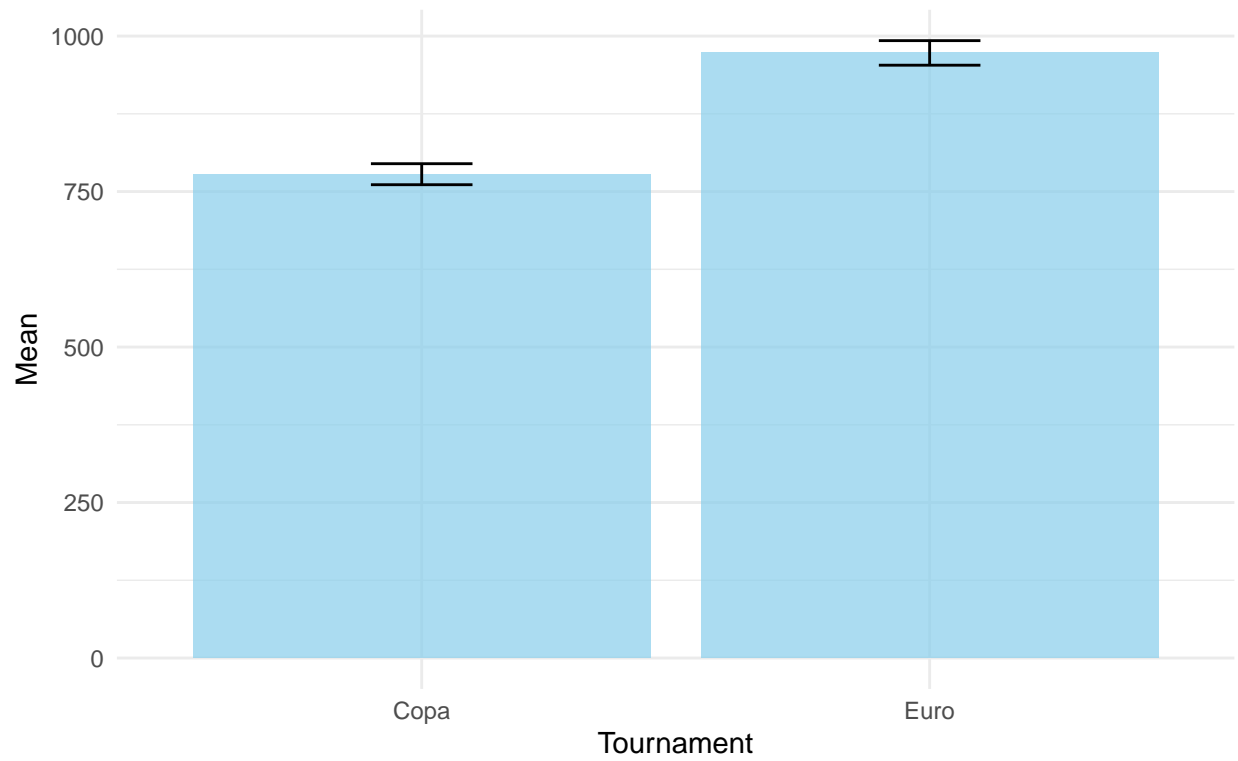Comparison of Yellow Cards between Euro and Copa
(t = 1.51 , p = 0.1338)

plots$reds

Comparison of Red Cards between Euro and Copa
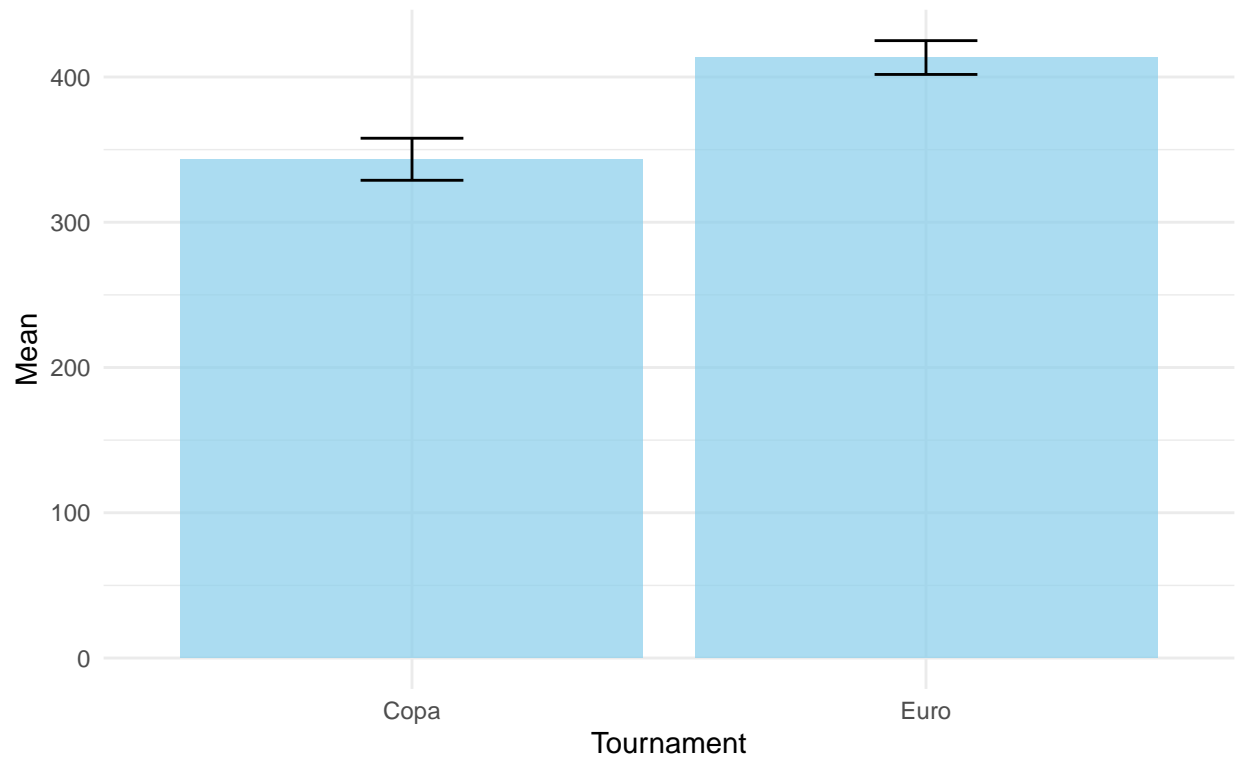(t = −1.68 , p = 0.0998)

```
plots$passes
```

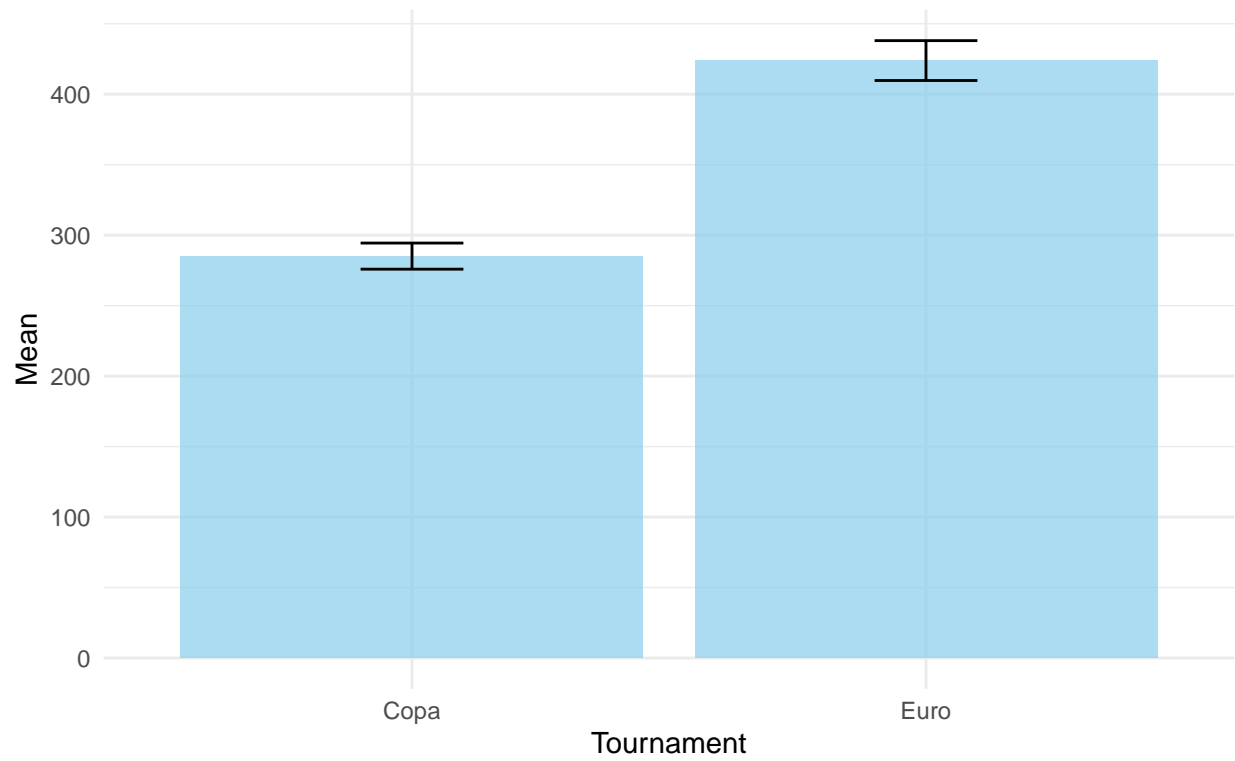Comparison of Passes between Euro and Copa
(t = 7.5 , p = 0)

```
plots$passes_own_half
```

Comparison of Passes in Own Half between Euro and Copa
(t = 3.77 , p = 4e−04)

```
plots$passes_opp_half
```

Comparison of Passes in Opponent's Half between Euro and Copa
(t = 8.21 , p = 0)

"‘