Untitled

Simran Gill

2024-11-27

Loading data

```
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 4.4.1
```

```
library(gridExtra)
```

```
## Warning: package 'gridExtra' was built under R version 4.4.1
```

```
library(stargazer)
```

```
##
## Please cite as:
```

```
##  Hlavac, Marek (2022). stargazer: Well-Formatted Regression and Summary Statistics Tables.
```

```
##  R package version 5.2.3. https://CRAN.R-project.org/package=stargazer
```

```
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following object is masked from 'package:gridExtra':
##
##     combine
```

```
## The following objects are masked from 'package:data.table':
##
##     between, first, last
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(car)
```

```
## Warning: package 'car' was built under R version 4.4.1
```

```
## Loading required package: carData
```

```
## Warning: package 'carData' was built under R version 4.4.1
```

```
##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':
##
##     recode
```

```
control <- read.csv("Coffee Survey Control (Responses) - Form Responses 1.csv")
treatment <- read.csv("Coffee Survey Group II (Responses) - Form Responses 1.csv")

# rename column names for control
colnames(control) <- c('timestamp', 'good_and_gather_score', 'chameleon_score', 'age', 'gender','how_of
# rename column names for treatment
colnames(treatment) <- c('timestamp', 'name','good_and_gather_score', 'chameleon_score', 'age', 'gender
# reorder column names for treatment
treatment <- treatment[, c('timestamp', 'good_and_gather_score', 'chameleon_score', 'age', 'gender','hou

control$treatment <- 0
control$age <- as.integer(control$age)
```

```
## Warning: NAs introduced by coercion
```

```
treatment$treatment <- 1
treatment$age <- as.integer(treatment$age)

d <- rbind(control, treatment)

cat("Number of Rows before cleaning:",nrow(d))
```

```
## Number of Rows before cleaning: 92
```

```
# re-labeling gender
d <- d %>%
  mutate(gender = case_when(
    gender == "F" ~ "Female",
    gender == "M" ~ "Male",
    TRUE ~ "Unknown"
  ))
```

```r
# removing rows where age is null
d <- d %>%
  filter(!is.na(age))

# creating age groups
d$age_group <- cut(d$age,
                   breaks = c(0, 20, 30, 40, 50, Inf),
                   labels = c("Under 20", "20-30", "31-40", "41-50", "Over 50"),
                   right = FALSE)


# Convert how_often_drink_coffee to integer by factoring
d$how_often_drink_coffee <- factor(d$how_often_drink_coffee,
                                   levels = c("Never",
                                              "Occasionally (up to 1 time a week)",
                                              "Sometimes (a few times a week)",
                                              "Often (almost every day)",
                                              "Every day"))

d$chameleon_awareness_flag <- ifelse(d$chameleon_awareness == "No", 0, 1)
d$good_and_gather_awareness_flag <- ifelse(d$good_and_gather_awareness == "No", 0, 1)

cat("\nNumber of Rows after cleaning:",nrow(d))
```

```
##
## Number of Rows after cleaning: 90
```

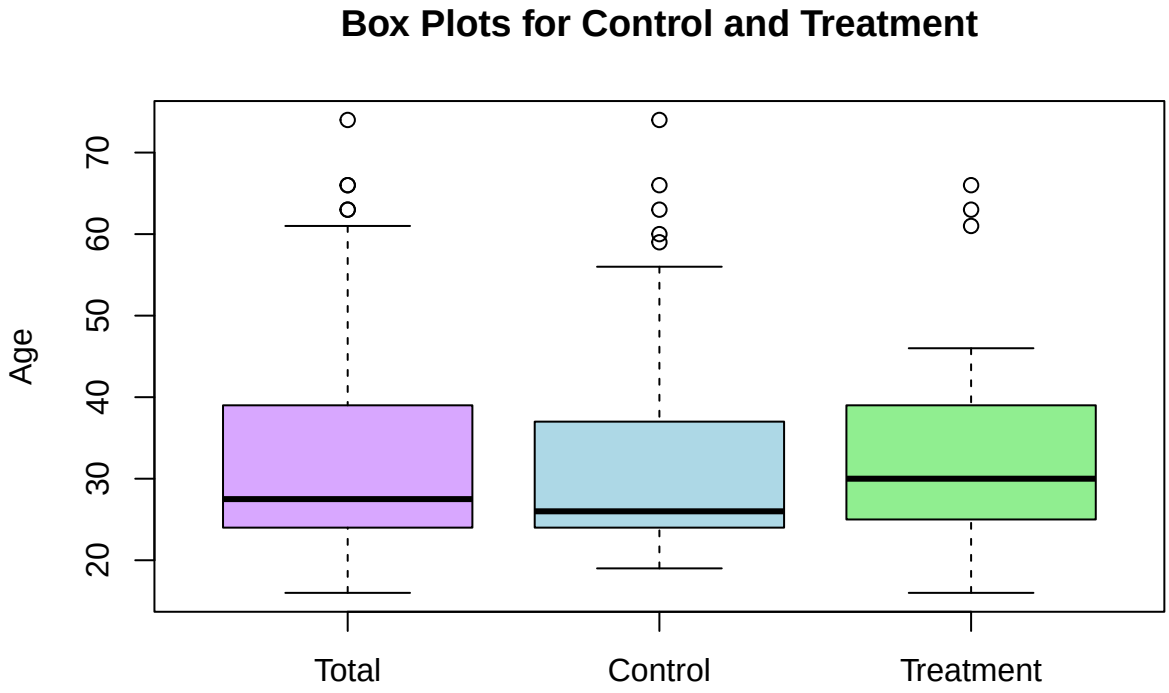
```r
str(d)
```

```
## 'data.frame':    90 obs. of  16 variables:
##  $ timestamp                     : chr  "11/11/2024 9:36:42" "11/11/2024 9:38:27" "11/11/2024 9:41:58
##  $ good_and_gather_score         : int  3 3 1 3 1 5 4 5 3 5 ...
##  $ chameleon_score               : int  5 5 5 5 3 4 2 3 5 5 ...
##  $ age                           : int  34 21 27 23 24 35 24 24 23 24 ...
##  $ gender                        : chr  "Male" "Male" "Female" "Female" ...
##  $ how_often_drink_coffee        : Factor w/ 5 levels "Never","Occasionally (up to 1 time a week)",..
##  $ hot_or_cold                   : chr  "Hot Coffee" "Hot Coffee" "Cold Coffee" "Hot Coffee" ...
##  $ sweet_or_not_sweet            : chr  "Not Sweet" "Sweet" "Not Sweet" "Not Sweet" ...
##  $ good_and_gather_awareness     : chr  "No" "Yes, Neutral" "Yes, Positive" "Yes, Positive" ...
##  $ chameleon_awareness           : chr  "No" "No" "Yes, Positive" "No" ...
##  $ medical_condition             : chr  "No" "No" "No" "No" ...
##  $ name                          : chr  "Kavin" "Arya Desai" "Liz Ren" "Halah Biviji" ...
##  $ treatment                     : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ age_group                     : Factor w/ 5 levels "Under 20","20-30",..: 3 2 2 2 2 3 2 2 2 2 ...
##  $ chameleon_awareness_flag      : num  0 0 1 0 1 1 0 0 1 0 ...
##  $ good_and_gather_awareness_flag: num  0 1 1 1 0 1 0 0 1 1 ...
```

Exploratory Data Analysis

```r
# box plot for age by treatment and control

boxplot(d$age, control$age, treatment$age,
        names = c("Total", "Control", "Treatment"),
        main = "Box Plots for Control and Treatment",
        ylab = "Age",
        col = c("#D8A7FF", "lightblue", "lightgreen"),
        border = "black")
```




```r
cat("Number of Rows for Treatment Group:", sum(d$treatment == 1))
```

```
## Number of Rows for Treatment Group: 39
```

```r
cat("\nNumber of Rows for Control Group:", sum(d$treatment == 0))
```

```
##
## Number of Rows for Control Group: 51
```

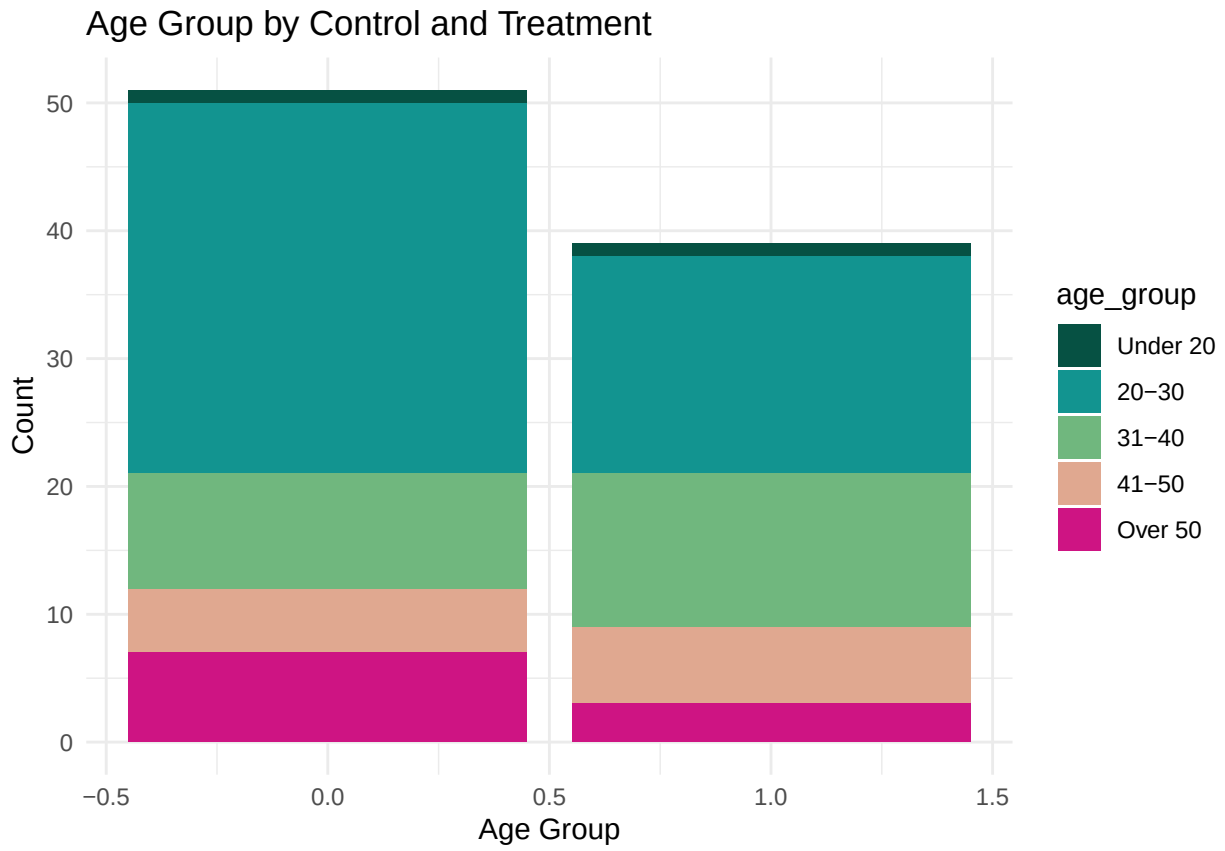
```r
unique(control$gender)
```

```
## [1] ""  "M" "F"
```

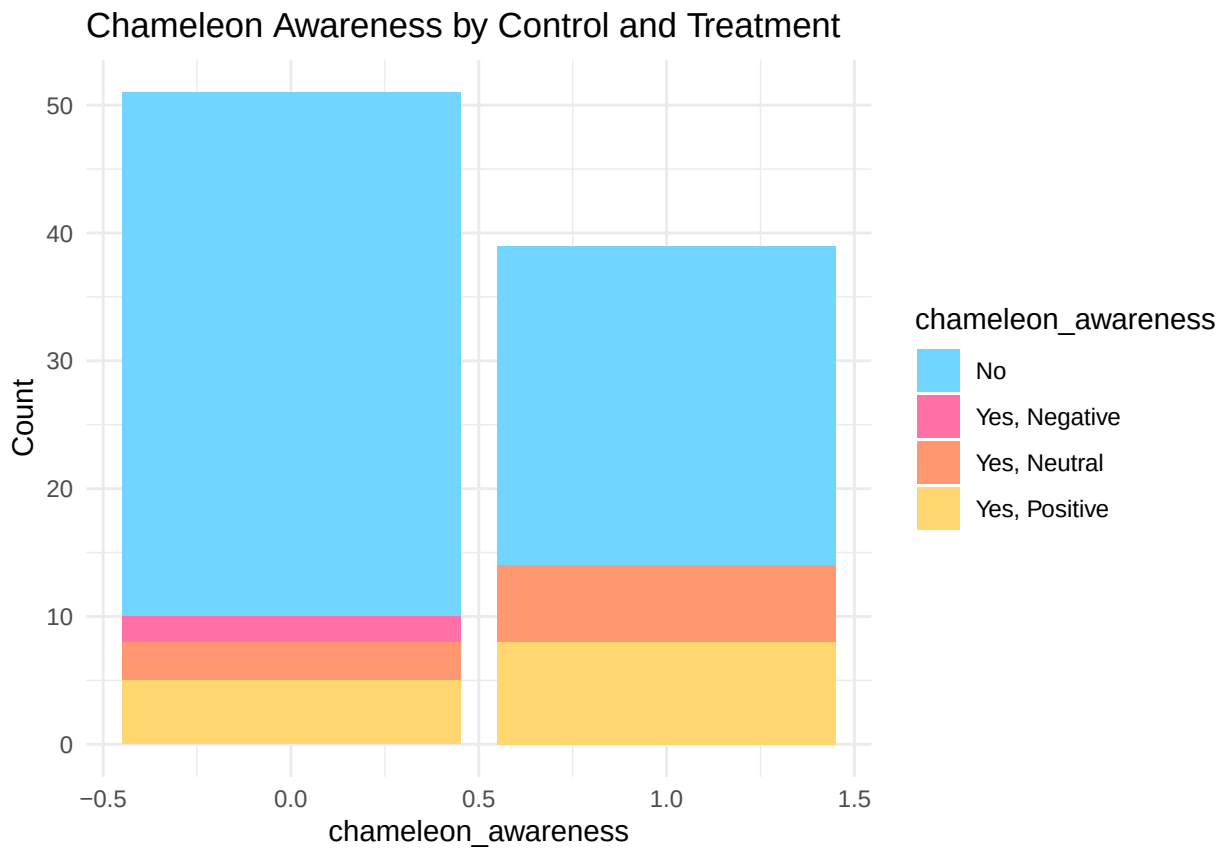
```r
unique(treatment$gender)
```

```
## [1] "M" "F"
```

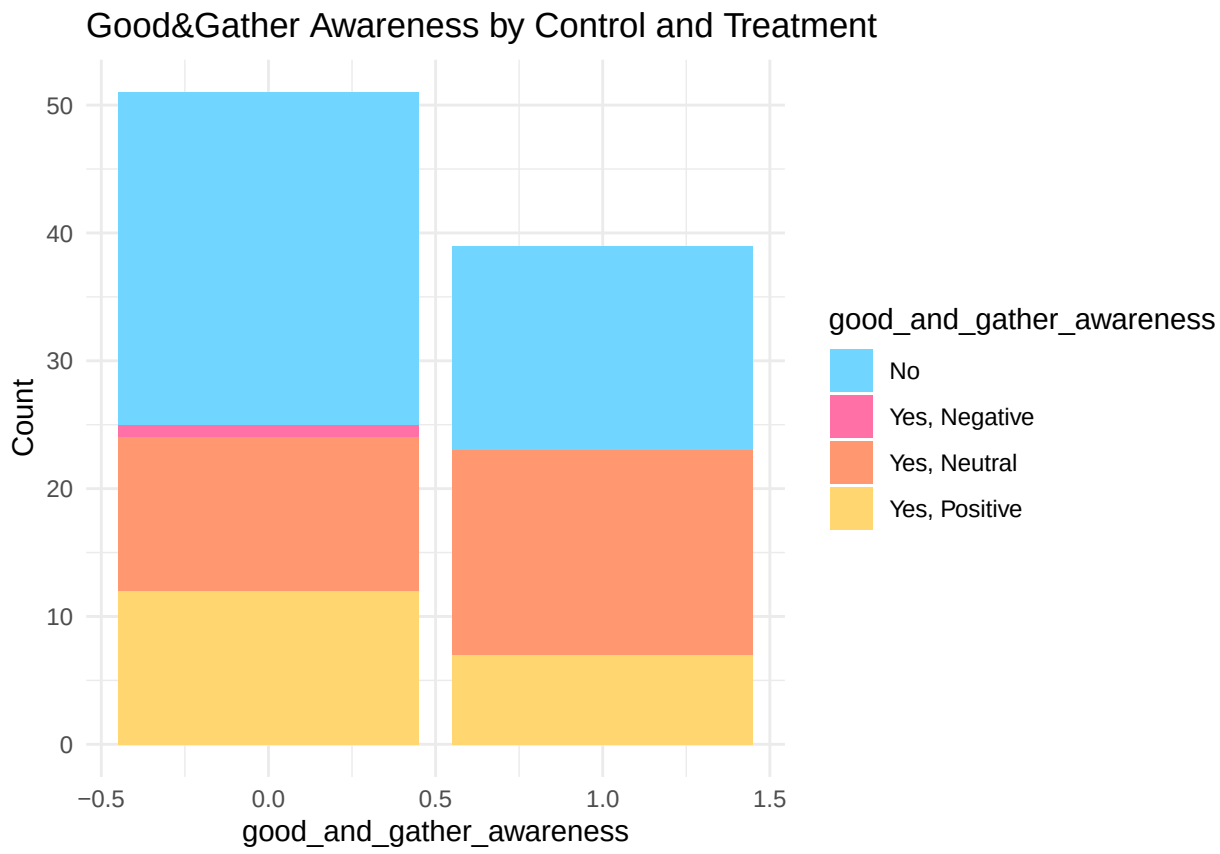
```r
ggplot(d, aes(x = treatment, fill = age_group)) +
  geom_bar(position = "stack") +
  labs(title = "Age Group by Control and Treatment", x = "Age Group", y = "Count") +
  scale_fill_manual(values = c("#065143", "#129490", "#70B77E", "#E0A890", "#CE1483"))  +
  theme_minimal()
```




```r
ggplot(d, aes(x = treatment, fill = chameleon_awareness)) +
  geom_bar(position = "stack") +
  labs(title = "Chameleon Awareness by Control and Treatment", x = "chameleon_awareness", y = "Count") +
  scale_fill_manual(values = c("#70D6FF", "#FF70A6", "#FF9770", "#FFD670")) +
  theme_minimal()
```




```
ggplot(d, aes(x = treatment, fill = good_and_gather_awareness)) +
  geom_bar(position = "stack") +
  labs(title = "Good&Gather Awareness by Control and Treatment", x = "good_and_gather_awareness", y = "
  scale_fill_manual(values = c("#70D6FF", "#FF70A6", "#FF9770", "#FFD670")) +
  theme_minimal()
```



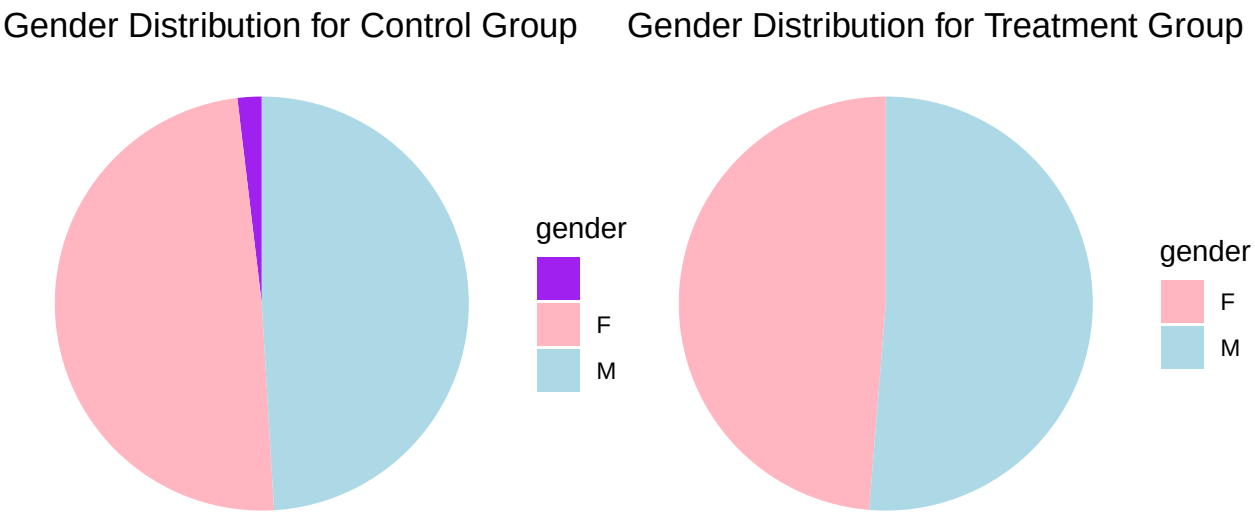

```
### Control Group Gender ###
control_gender_counts <- control %>%
  group_by(gender) %>%
  tally()

control_pie <- ggplot(control_gender_counts, aes(x = "", y = n, fill = gender)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar(theta = "y") +
  labs(title = "Gender Distribution for Control Group") +
  scale_fill_manual(values = c("purple","lightpink", "lightblue")) +
  theme_void()

### Treatment Group Gender ###
treatment_gender_counts <- treatment %>%
  group_by(gender) %>%
  tally()

treatment_pie <- ggplot(treatment_gender_counts, aes(x = "", y = n, fill = gender)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar(theta = "y") +
  labs(title = "Gender Distribution for Treatment Group") +
  scale_fill_manual(values = c("lightpink", "lightblue", "purple")) +
  theme_void()

grid.arrange(control_pie, treatment_pie, ncol = 2)
```



Simple Average Treatment Effect

```
ate_good_and_gather <- mean(d$good_and_gather_score[d$treatment == 1], na.rm = TRUE) -
                       mean(d$good_and_gather_score[d$treatment == 0], na.rm = TRUE)
cat("ATE Good & Gather:", ate_good_and_gather)
```

```
## ATE Good & Gather: -0.4434389
```

```
ate_chameleon <- mean(d$chameleon_score[d$treatment == 1], na.rm = TRUE) -
                       mean(d$chameleon_score[d$treatment == 0], na.rm = TRUE)
cat("\nATE Chameleon:", ate_chameleon)
```

```
##
## ATE Chameleon: 0.2865762
```

Average Treatment Effect using Linear Regression

```
# Basic Linear regression to estimate ATE
model_gg <- lm(good_and_gather_score ~ treatment, data=d)
ate_regression <- coef(model_gg)["treatment"]
print(ate_regression)
```

```
##  treatment
## -0.4434389
```

```
summary(model_gg)
```

```
##
## Call:
## lm(formula = good_and_gather_score ~ treatment, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.05882 -1.05882 -0.05882  0.94118  2.94118
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.0588     0.1992  20.377   <2e-16 ***
## treatment    -0.4434     0.3026  -1.466    0.146
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.422 on 88 degrees of freedom
## Multiple R-squared:  0.02383,    Adjusted R-squared:  0.01273
## F-statistic: 2.148 on 1 and 88 DF,  p-value: 0.1463
```

```
# Basic Linear regression to estimate ATE
model_c <- lm(chameleon_score ~ treatment, data=d)
ate_regression <- coef(model_c)["treatment"]
print(ate_regression)
```

```
## treatment
## 0.2865762
```

```
summary(model_c)
```

```
##
## Call:
## lm(formula = chameleon_score ~ treatment, data = d)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.0513 -1.5863  0.2353  1.2353  2.2353
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   3.7647     0.2169   17.36   <2e-16 ***
## treatment     0.2866     0.3294    0.87    0.387
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.549 on 88 degrees of freedom
## Multiple R-squared:  0.008525,   Adjusted R-squared:  -0.002741
## F-statistic: 0.7567 on 1 and 88 DF,  p-value: 0.3867
```

ATE Adjusted for Covariates

```
model_gg_covariates <- lm(good_and_gather_score ~ treatment + log(age) + gender + chameleon_awareness ,

ate_with_covariates <- coef(model_gg_covariates)["treatment"]
print(ate_with_covariates)
```

```
##  treatment
## -0.5684904
```

```
summary(model_gg_covariates)
```

```
##
## Call:
## lm(formula = good_and_gather_score ~ treatment + log(age) + gender +
##     chameleon_awareness, data = d)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.10730 -0.82418 -0.00309  0.84285  2.56540
##
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       -0.5236     1.5124  -0.346  0.73005
## treatment                         -0.5685     0.2870  -1.981  0.05094 .
## log(age)                           1.3032     0.4280   3.045  0.00312 **
## genderMale                         0.3850     0.2764   1.393  0.16736
## chameleon_awarenessYes, Negative  -1.8873     0.9450  -1.997  0.04908 *
## chameleon_awarenessYes, Neutral    0.9324     0.4750   1.963  0.05298 .
## chameleon_awarenessYes, Positive  -0.6172     0.4014  -1.538  0.12792
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.301 on 83 degrees of freedom
## Multiple R-squared:  0.2293, Adjusted R-squared:  0.1736
## F-statistic: 4.116 on 6 and 83 DF,  p-value: 0.00115
```

```
model_gg_covariates_v2 <- lm(good_and_gather_score ~ treatment + gender + log(age) + chameleon_awareness

anova(model_gg_covariates , model_gg_covariates_v2)
```

```
## Analysis of Variance Table
##
## Model 1: good_and_gather_score ~ treatment + log(age) + gender + chameleon_awareness
## Model 2: good_and_gather_score ~ treatment + gender + log(age) + chameleon_awareness +
##     good_and_gather_awareness
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1     83 140.57
## 2     80 136.00  3    4.5703 0.8961  0.447
```

Interpretation We tested multiple covariates to see if we can improve the regression model for Good&Gather Score. The main covariates we see has a positive impact is how a participate views the Chameleon brand and age group.

When it comes to age, participants in the age group 30 - 39 and 40 - 49 are likely to rate Good & Gather higher after the brand is revealed. Because these two variables have some significants, age group does play a part in how a participant rates the coffee after treatment is provided.

When it comes to the Chameleon, even though the participants has a negative view of Chameleon coffee as a brand, they are still likely to score Good & Gather -1.8285 after treatment is provided. The p-value for Chameleon awareness is 0.0561, which means this variable is marginally significant.

We also wanted to test if adding Good&Gather brand awareness as a variable to model has an significant effect to the model. From the ANOVA test we can see that the p-value is 0.5600 which is greater than 0.05. This indicated Good&Gather brand awareness has no statistically significant impact on scoring the coffee.

```
stargazer(model_gg_covariates, model_gg_covariates_v2,
          type = "text",    # Use "html" for HTML output or "latex" for LaTeX
          title = "Regression Results for Good and Gather Score",
          covariate.labels = c("Treatment", "log(Age)", "Gender", "Chameleon Awareness", "Good and Gathe
          star.cutoffs = c(0.10, 0.05, 0.01, 0.001),    # Significance stars
          out = "regression_table.txt")  # Optional: Save output to a text file
```

```
##
## Regression Results for Good and Gather Score
## ================================================================================
##                                                  Dependent variable:
##                                              ---------------------------
##                                                  good_and_gather_score
##                                                 (1)                (2)
## --------------------------------------------------------------------------------
## Treatment                                     -0.568*            -0.513*
##                                               (0.287)            (0.294)
##
## log(Age)                                     1.303***            1.130**
##                                               (0.428)            (0.442)
##
## Gender                                         0.385              0.254
##                                               (0.276)            (0.289)
##
## Chameleon Awareness                          -1.887**           -2.097**
##                                               (0.945)            (0.960)
##
## Good and Gather Awareness                      0.932*             0.951*
##                                               (0.475)            (0.493)
##
## chameleon_awarenessYes, Positive              -0.617             -0.526
##                                               (0.401)            (0.421)
##
## good_and_gather_awarenessYes, Negative                           -0.856
##                                                                  (1.350)
##
## good_and_gather_awarenessYes, Neutral                            -0.543
##                                                                  (0.350)
##
```

```
## good_and_gather_awarenessYes, Positive                                -0.147
##                                                                       (0.391)
##
## Constant                                          -0.524               0.314
##                                                   (1.512)             (1.605)
##
## ------------------------------------------------------------------------------------
## Observations                                        90                   90
## R2                                                 0.229                0.254
## Adjusted R2                                        0.174                0.170
## Residual Std. Error                          1.301 (df = 83)      1.304 (df = 80)
## F Statistic                                4.116*** (df = 6; 83) 3.032*** (df = 9; 80)
## ====================================================================================
## Note:                                                    *p<0.1; **p<0.05; ***p<0.01
```

c('timestamp', 'good_and_gather_score', 'chameleon_score', 'age', 'gender','how_often_drink_coffee', 'hot_or_cold', 'sweet_or_not_sweet', 'good_and_gather_awareness','chameleon_awareness', 'medical_condition', 'name')

```
model_c_covariates <- lm(chameleon_score ~ treatment + log(age) + gender + chameleon_awareness_flag + g

ate_with_covariates <- coef(model_c_covariates)["treatment"]
print(ate_with_covariates)
```

```
##   treatment
## -0.01728814
```

```
summary(model_c_covariates)
```

```
##
## Call:
## lm(formula = chameleon_score ~ treatment + log(age) + gender +
##     chameleon_awareness_flag + good_and_gather_awareness_flag,
##     data = d)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.2778 -0.9554  0.0911  1.0778  2.7193
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                    -1.72728    1.64566  -1.050 0.296916
## treatment                      -0.01729    0.29862  -0.058 0.953970
## log(age)                        1.37784    0.45577   3.023 0.003317 **
## genderMale                      0.41675    0.30145   1.383 0.170482
## chameleon_awareness_flag        1.30106    0.34630   3.757 0.000316 ***
## good_and_gather_awareness_flag  0.61820    0.31401   1.969 0.052276 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.375 on 84 degrees of freedom
## Multiple R-squared:  0.2544, Adjusted R-squared:   0.21
## F-statistic: 5.731 on 5 and 84 DF,  p-value: 0.0001344
```

```r
model_c_covariates_v2 <- lm(chameleon_score ~ treatment + log(age) + gender + chameleon_awareness_flag,

anova(model_c_covariates , model_c_covariates_v2)
```

```
## Analysis of Variance Table
##
## Model 1: chameleon_score ~ treatment + log(age) + gender + chameleon_awareness_flag +
##     good_and_gather_awareness_flag
## Model 2: chameleon_score ~ treatment + log(age) + gender + chameleon_awareness_flag
##   Res.Df    RSS Df Sum of Sq      F  Pr(>F)
## 1     84 158.74
## 2     85 166.06 -1   -7.3248 3.8761 0.05228 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
stargazer(model_gg_covariates, model_gg_covariates_v2,
          type = "text",    # Use "html" for HTML output or "latex" for LaTeX
          title = "Regression Results for Good and Gather Score",
          covariate.labels = c("Treatment", "log(Age)", "Gender", "Chameleon Awareness", "Good and Gathe
          star.cutoffs = c(0.10, 0.05, 0.01, 0.001),    # Significance stars
          out = "regression_table.txt")  # Optional: Save output to a text file
```

```
##
## Regression Results for Good and Gather Score
## ================================================================================
##                                                Dependent variable:
##                                            ----------------------------------------
##                                                  good_and_gather_score
##                                                (1)                   (2)
## --------------------------------------------------------------------------------
## Treatment                                     -0.568*               -0.513*
##                                               (0.287)               (0.294)
##
## log(Age)                                     1.303***               1.130**
##                                               (0.428)               (0.442)
##
## Gender                                         0.385                 0.254
##                                               (0.276)               (0.289)
##
## Chameleon Awareness                          -1.887**              -2.097**
##                                               (0.945)               (0.960)
##
## Good and Gather Awareness                      0.932*                0.951*
##                                               (0.475)               (0.493)
##
## chameleon_awarenessYes, Positive              -0.617                -0.526
##                                               (0.401)               (0.421)
##
## good_and_gather_awarenessYes, Negative                              -0.856
##                                                                     (1.350)
##
## good_and_gather_awarenessYes, Neutral                               -0.543
```

```
##                                                                    (0.350)
##
## good_and_gather_awarenessYes, Positive                             -0.147
##                                                                    (0.391)
##
## Constant                                          -0.524            0.314
##                                                   (1.512)          (1.605)
##
## ------------------------------------------------------------------------------
## Observations                                        90                90
## R2                                                 0.229             0.254
## Adjusted R2                                        0.174             0.170
## Residual Std. Error                          1.301 (df = 83)   1.304 (df = 80)
## F Statistic                                4.116*** (df = 6; 83) 3.032*** (df = 9; 80)
## ==============================================================================
## Note:                                                  *p<0.1; **p<0.05; ***p<0.01
```