# DataAnalysis_Temperature.R

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```
rm(list=ls())

setwd("~/Dropbox/DCMPNS_Temperature/PSRM/Replication files")

library(stargazer)
```

```
##
## Please cite as:

##  Hlavac, Marek (2018). stargazer: Well-Formatted Regression and Summary Statistics Tables.

##  R package version 5.2.2. https://CRAN.R-project.org/package=stargazer
```

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

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

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

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

```
library(lfe)
```

```
## Loading required package: Matrix
```

```
library(psych)
```

```
##
## Attaching package: 'psych'

## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha
```

```
## Read in data:
first_experiment <- read.csv("first_experiment.csv") #data from the first experiment (2018)
first_experiment$exp <- 1

second_experiment <- read.csv("second_experiment.csv") #data from the second experiment (2019)
second_experiment$exp <- 2


## Merge the data:
combined <- rbind(first_experiment, second_experiment)


## Some data cleaning:
combined$station1 <-
  gsub(" ", "", combined$station1, fixed = TRUE) #remove empty spaces from station names


## Creating some additional variables (binary variables for heat (at different thresholds)):
combined$hot24 <- ifelse(combined$temp>24,1,0)
combined$hot25 <- ifelse(combined$temp>25,1,0)
combined$hot26 <- ifelse(combined$temp>26,1,0)

combined_hot24 <- combined
combined_hot24$temperature <- combined_hot24$hot24

combined_hot25 <- combined
combined_hot25$temperature <- combined_hot25$hot25

combined_hot26 <- combined
combined_hot26$temperature <- combined_hot26$hot26



####################################
# TABLES
####################################

############
# Table 1
# Balance Tests: Bystander Characteristics: Hot vs. Normal Temperature
############

balance <-
  rbind(
    c("Share of women bystanders",
      summary(felm(sharewomen~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of bystanders with earphones",
      summary(felm(shareearphones~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share natives bystanders",
      summary(felm(sharenative~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
```

```
    c("Share of bystanders below 30",
      summary(felm(sharebelow30~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of bystanders above 60",
      summary(felm(shareabove60~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of Christian bystanders",
      summary(felm(christian~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of non-religious bystanders",
      summary(felm(noreligion~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of bystanders full-time employed",
      summary(felm(workft~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)]),
    c("Share of bystanders with university education",
      summary(felm(uniplus~temperature | rush + station1 + bystander
                   | 0 | station1, data=combined_hot25))$coefficients[1,][c(1,2,4)])
  )

colnames(balance) <- c("Variable","Difference","SE", "p-value")
balance[,2] <- round(as.numeric(balance[,2]),digits=3)
balance[,3] <- round(as.numeric(balance[,3]),digits=3)
balance[,4] <- round(as.numeric(balance[,4]),digits=3)

stargazer(balance, title="Balance Tests", type = "text")
```

```
##
## Balance Tests
## ================================================================================
## Variable                                        Difference  SE   p-value
## --------------------------------------------------------------------------------
## Share of women bystanders                         -0.019   0.019  0.316
## Share of bystanders with earphones                0.003    0.006  0.614
## Share natives bystanders                          -0.028   0.02   0.167
## Share of bystanders below 30                      0.014    0.028  0.611
## Share of bystanders above 60                      -0.051   0.023  0.036
## Share of Christian bystanders                     0.016    0.031  0.615
## Share of non-religious bystanders                 -0.01    0.029  0.721
## Share of bystanders full-time employed              0      0.017  0.993
## Share of bystanders with university education     -0.008   0.018  0.655
## --------------------------------------------------------------------------------
```

```
#stargazer(balance, title="Balance Tests")



#############
# Table 2
# Help Behavior by Temperature
#############

temperature_absolute <- felm(anyhelp~temp*treat | 0 | 0 | station1, data=combined)
```

```r
temperature_absolute_fe <- felm(anyhelp~temp*treat | rush + station1 | 0 | station1, data=combined)
temperature_absolute_fe_bystander <- felm(anyhelp~temp*treat | rush + station1 + bystander | 0 | statio

stargazer(temperature_absolute, temperature_absolute_fe, temperature_absolute_fe_bystander,
          title="Help Behavior by Temperature", align=TRUE,star.cutoffs = c(0.2, 0.1, 0.02), type = "te
```

```
##
## Help Behavior by Temperature
## ==========================================================================
##                                      Dependent variable:
##                      ----------------------------------------------------
##                                            anyhelp
##                            (1)               (2)               (3)
## --------------------------------------------------------------------------
## temp                     0.004*            0.007**          0.008***
##                          (0.003)           (0.003)           (0.003)
##
## treat                     0.140             0.137             0.150
##                          (0.145)           (0.141)           (0.139)
##
## temp:treat              -0.009**          -0.008**          -0.009**
##                          (0.005)           (0.005)           (0.005)
##
## Constant                0.672***
##                          (0.088)
##
## --------------------------------------------------------------------------
## Observations              1,786             1,786             1,786
## R2                        0.013             0.043             0.056
## Adjusted R2               0.012             0.025             0.026
## Residual Std. Error 0.445 (df = 1782) 0.442 (df = 1752) 0.442 (df = 1730)
## ==========================================================================
## Note:                       *p<0.1; **p<0.05; ***p<0.01, one-tailed test.
```

```r
#stargazer(temperature_absolute, temperature_absolute_fe, temperature_absolute_fe_bystander,
#          title="Help Behavior by Temperature", align=TRUE,star.cutoffs = c(0.2, 0.1, 0.02), notes = "
#          parentheses. *p<0.1; **p<0.05; ***p<0.01, one-tailed test.",notes.append = FALSE)



############
# Additonal Tests Referenced in the Manuscript
############

# interaction between temperature, discrimination, and rush hour
# to probe whether there is heterogeneity in the relationship between temperature and discrimination
# between iterations conducted during rush hours and other times of the day
# (discussed on page 9):
summary(felm(anyhelp~temp*treat*rush | station1 | 0 | station1, data=combined))
```

```
##
## Call:
```

```
##    felm(formula = anyhelp ~ temp * treat * rush | station1 | 0 |      station1, data = combined)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.9403 -0.6103  0.2225  0.3109  0.6744
##
## Coefficients:
##                  Estimate Cluster s.e. t value Pr(>|t|)
## temp             0.010110     0.004001   2.527   0.0172 *
## treat            0.229531     0.175351   1.309   0.2008
## rush             0.303474     0.238696   1.271   0.2137
## temp:treat      -0.012100     0.006083  -1.989   0.0562 .
## temp:rush       -0.012773     0.008828  -1.447   0.1587
## treat:rush      -0.353647     0.292426  -1.209   0.2363
## temp:treat:rush  0.014148     0.011181   1.265   0.2158
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4421 on 1749 degrees of freedom
##   (2024 observations deleted due to missingness)
## Multiple R-squared(full model): 0.0448   Adjusted R-squared: 0.02514
## Multiple R-squared(proj model): 0.01437   Adjusted R-squared: -0.005919
## F-statistic(full model, *iid*):2.279 on 36 and 1749 DF, p-value: 2.621e-05
## F-statistic(proj model): 3.172 on 7 and 29 DF, p-value: 0.01287
```

```
# help behavior by temperature toward outgroup members only
# (discussed on page 13):
summary(felm(anyhelp~temp | 0 | 0 | station1, data=subset(combined, treat==1)))
```

```
##
## Call:
##    felm(formula = anyhelp ~ temp | 0 | 0 | station1, data = subset(combined,      treat == 1))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7345 -0.6609  0.3057  0.3255  0.3880
##
## Coefficients:
##              Estimate Cluster s.e. t value Pr(>|t|)
## (Intercept)  0.812491     0.103332   7.863 9.73e-15 ***
## temp        -0.004843     0.003569  -1.357    0.175
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4665 on 995 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared(full model): 0.001997   Adjusted R-squared: 0.0009935
## Multiple R-squared(proj model): 0.001997   Adjusted R-squared: 0.0009935
## F-statistic(full model, *iid*):1.991 on 1 and 995 DF, p-value: 0.1586
## F-statistic(proj model): 1.841 on 1 and 28 DF, p-value: 0.1856
```

```
#############
# Table S1
```

```r
# Descriptive Statistics
############

combined_valid <- subset(combined,!is.na(anyhelp) & !is.na(temp) & (treat==1 | treat==0)) #subsetting t
descript <- combined_valid %>%
  select(temp, anyhelp, sharewomen, shareearphones, sharenative,
         sharebelow30, shareabove60, christian, noreligion, workft, uniplus)

descriptives <- describe(descript)[,c(8,9,3,5,4,2)]
descriptives <-
  cbind(c("Temperature","Assistance (Outcome)","Share of women bystanders",
          "Share of bystanders with earphones", "Share native bystanders", "Share of bystanders below 3
          "Share of bystanders above 60", "Share of Christian bystanders", "Share of non-religious byst
          "Share of bystanders full-time employed", "Share of bystanders with university education"),des
names(descriptives) <- c("Variable","Min","Max","Mean","Median","SD","N")
descriptives$Mean <- round(descriptives$Mean,2)
descriptives$SD <- round(descriptives$SD,2)

stargazer(as.matrix(descriptives),rownames=F, title="Descriptive Statistics", type="text")
```

```
##
## Descriptive Statistics
## ================================================================================
## Variable                                    Min  Max  Mean  Median  SD   N
## --------------------------------------------------------------------------------
## Temperature                                 16.1 41.4 27.13  26.8  4.38 1786
## Assistance (Outcome)                        0.0  1.0  0.72   1.0   0.45 1786
## Share of women bystanders                   0.0  1.0  0.54   0.5   0.35 1786
## Share of bystanders with earphones          0.0  1.0  0.06   0.0   0.17 1785
## Share native bystanders                     0.0  1.0  0.94   1.0   0.21 1121
## Share of bystanders below 30                0.0  1.0  0.32   0.0   0.42 1121
## Share of bystanders above 60                0.0  1.0  0.20   0.0   0.36 1121
## Share of Christian bystanders               0.0  1.0  0.37   0.0   0.46 861
## Share of non-religious bystanders           0.0  1.0  0.45   0.0   0.48 861
## Share of bystanders full-time employed      0.0  1.0  0.38   0.0   0.46 859
## Share of bystanders with university education 0.0  1.0  0.36   0.0   0.45 861
## --------------------------------------------------------------------------------
```

```r
#stargazer(as.matrix(descriptives),rownames=F, title="Descriptive Statistics")



############
# Table S2
# Help Behavior at Hot Temperatures
############

results_hot24 <- felm(anyhelp~temperature*treat | 0 | 0 | station1, data=combined_hot24)
results_hot24_fe <- felm(anyhelp~temperature*treat | rush + station1 | 0 | station1, data=combined_hot24

results_hot25 <- felm(anyhelp~temperature*treat | 0 | 0 | station1, data=combined_hot25)
results_hot25_fe <- felm(anyhelp~temperature*treat | rush + station1 | 0 | station1, data=combined_hot25
```

```r
results_hot26 <- felm(anyhelp~temperature*treat | 0 | 0 | station1, data=combined_hot26)
results_hot26_fe <- felm(anyhelp~temperature*treat | rush + station1 | 0 | station1, data=combined_hot2

stargazer(results_hot24, results_hot24_fe, results_hot25, results_hot25_fe, results_hot26, results_hot2
```

```
##
## Help Behavior at Hot Temperatures
## ==========================================================================================
##                                                          Dependent variable:
##                     ---------------------------------------------------------------------
##                                                                anyhelp
##                           (1)              (2)              (3)              (4)              (5
## ------------------------------------------------------------------------------------------
## temperature              0.007            0.034           0.049**          0.074***          0.04
##                         (0.026)          (0.029)          (0.025)          (0.027)          (0.0
##
## treat                   -0.055           -0.049           -0.037           -0.032           -0.0
##                         (0.045)          (0.045)          (0.041)          (0.040)          (0.0
##
## temperature:treat       -0.055*          -0.057*         -0.092***        -0.092***        -0.08
##                         (0.041)          (0.041)          (0.038)          (0.037)          (0.0
##
## Constant               0.772***                          0.747***                          0.753
##                         (0.028)                           (0.027)                           (0.0
##
## ------------------------------------------------------------------------------------------
## Observations             1,786            1,786            1,786            1,786            1,7
## R2                       0.013            0.042            0.014            0.044            0.0
## Adjusted R2              0.011            0.024            0.012            0.026            0.0
## Residual Std. Error 0.445 (df = 1782) 0.442 (df = 1752) 0.445 (df = 1782) 0.442 (df = 1752) 0.445 (d
## ==========================================================================================
## Note:                                                                  *p<0.1; **p<0.05; *
```

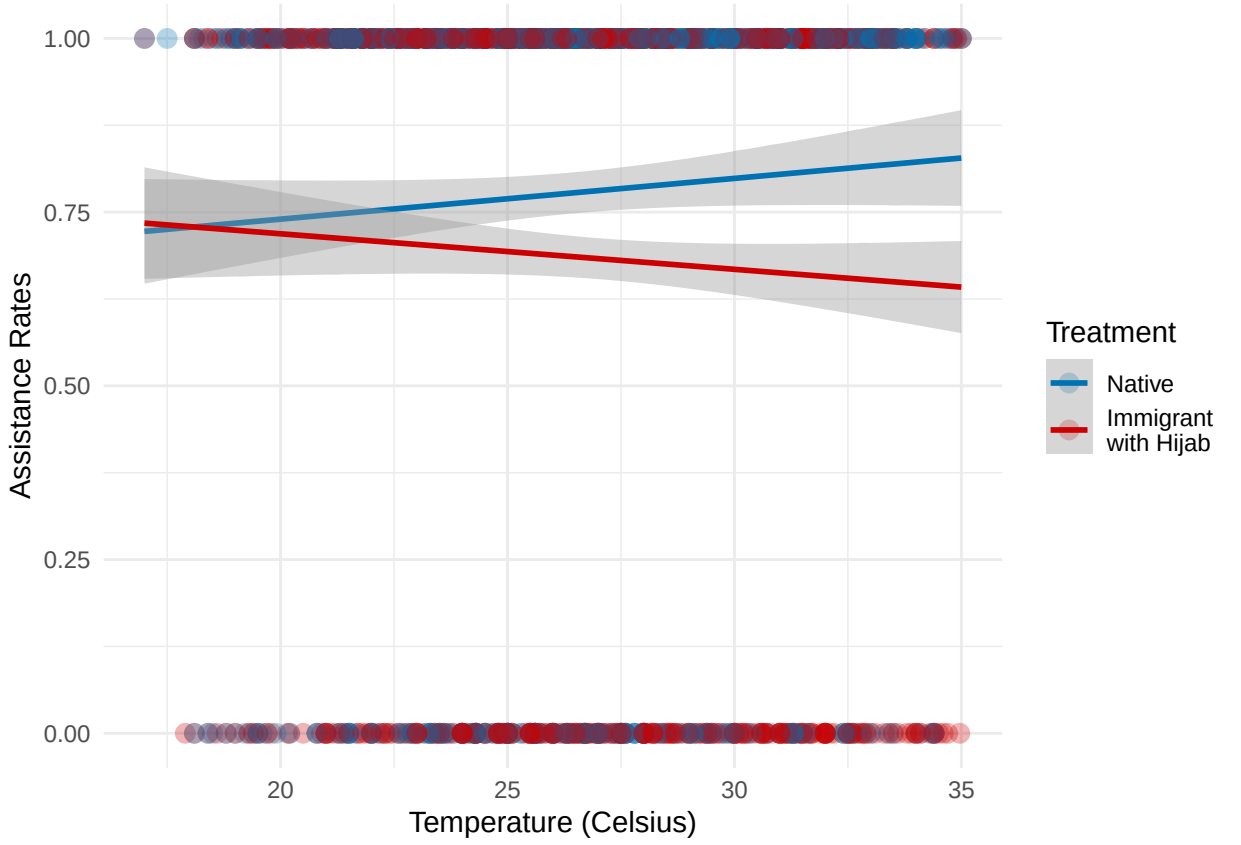
```r
#stargazer(results_hot24, results_hot24_fe, results_hot25, results_hot25_fe, results_hot26, results_hot
#parentheses. *p<0.1; **p<0.05; ***p<0.01, one-tailed test.",notes.append = FALSE)



############
# Table S3
# Help Behavior by Temperature: East vs. West
############

temperature_absolute_region <- felm(anyhelp~temp*treat*east | 0 | 0 | station1, data=combined)
temperature_absolute_fe_region <- felm(anyhelp~temp*treat*east | rush | 0 | station1, data=combined)
temperature_absolute_fe_bystander_region <- felm(anyhelp~temp*treat*east | rush + bystander | 0 | stati

stargazer(temperature_absolute_region, temperature_absolute_fe_region, temperature_absolute_fe_bystande
          title="Help Behavior by Temperature: East vs. West", align=TRUE,star.cutoffs = c(0.2, 0.1, 0.0
```

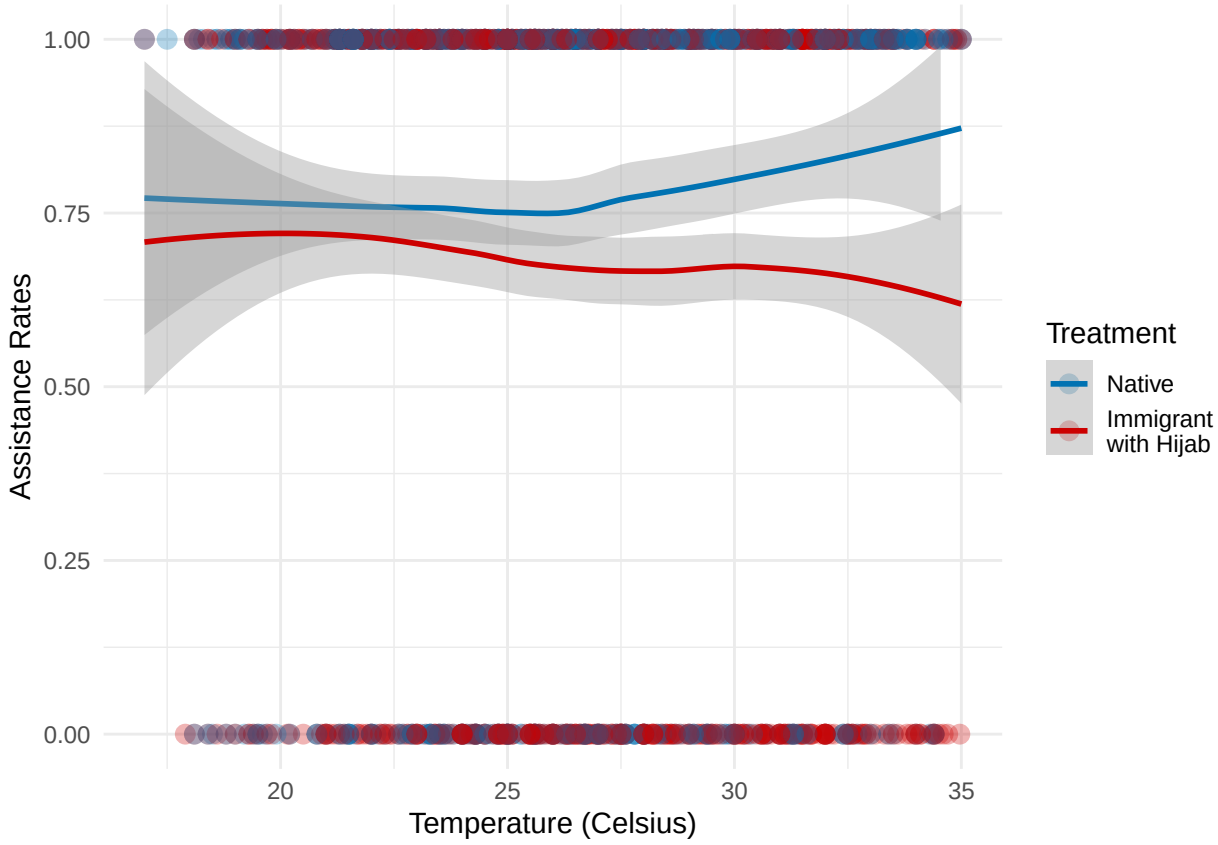
```
##
## Help Behavior by Temperature: East vs. West
```

```
## ==========================================================================
##                                      Dependent variable:
##                      ----------------------------------------------------
##                                            anyhelp
##                            (1)               (2)               (3)
## --------------------------------------------------------------------------
## temp                     0.005*            0.005*            0.006**
##                          (0.003)           (0.003)           (0.003)
##
## treat                     0.138             0.135             0.131
##                          (0.188)           (0.190)           (0.193)
##
## east                      0.167             0.161             0.152
##                          (0.153)           (0.156)           (0.148)
##
## temp:treat               -0.007            -0.007            -0.007
##                          (0.006)           (0.006)           (0.006)
##
## temp:east                -0.004            -0.004            -0.004
##                          (0.006)           (0.006)           (0.006)
##
## treat:east                0.015             0.025             0.054
##                          (0.247)           (0.253)           (0.246)
##
## temp:treat:east          -0.004            -0.004            -0.005
##                          (0.009)           (0.009)           (0.009)
##
## Constant                0.620***
##                          (0.101)
##
## --------------------------------------------------------------------------
## Observations              1,786             1,786             1,786
## R2                        0.017             0.017             0.031
## Adjusted R2               0.013             0.013             0.014
## Residual Std. Error 0.445 (df = 1778) 0.445 (df = 1777) 0.445 (df = 1755)
## ==========================================================================
## Note:                       *p<0.1; **p<0.05; ***p<0.01, one-tailed test.
```

```
#stargazer(temperature_absolute_region, temperature_absolute_fe_region, temperature_absolute_fe_bystand
#          title="Help Behavior by Temperature: East vs. West", align=TRUE,star.cutoffs = c(0.2, 0.1, 0
#          parentheses. *p<0.1; **p<0.05; ***p<0.01, one-tailed test.",notes.append = FALSE)



####################################
# FIGURES
####################################

############
# Figure 2
# Help rates to natives or immigrants with hijab by temperature level with linear trendlines
############

fig2 <-
```

```
  ggplot(combined_valid, aes(x = temp, y = anyhelp, color=factor(treat))) +
  geom_point(size = 3, alpha = 0.3) + theme_minimal() +
  stat_smooth(method = "lm", formula = y ~ poly(x, 1), se = TRUE, level=0.95, span = 0.9) +
  xlim(17, 35) +
  ylim(0, 1) +
  xlab("Temperature (Celsius)") +
  ylab("Assistance Rates") +
  scale_colour_manual(name="Treatment",
                      values=c("#0072B2","#CC0000"),
                      labels = c("Native", "Immigrant\nwith Hijab"))
suppressWarnings(ggsave("Figure2.pdf", fig2, width = 7, height = 6, units = "in"))
suppressWarnings(print(fig2, width = 7, height = 6, units = "in"))
```




```
############
# Figure S5
# Help rates in response to the two treatments by absolute temperature with LOESS curves
############

figS5 <-
  ggplot(combined_valid, aes(x = temp, y = anyhelp, color=factor(treat))) +
  geom_point(size = 3, alpha = 0.3) + theme_minimal() +
  stat_smooth(method = "loess", formula = y ~ poly(x, 1), se = TRUE, level=0.95, span = 0.9) +
  xlim(17, 35) +
  ylim(0, 1) +
  xlab("Temperature (Celsius)") +
  ylab("Assistance Rates") +
```

```
  scale_colour_manual(name="Treatment",
                      values=c("#0072B2","#CC0000"),
                      labels = c("Native", "Immigrant\nwith Hijab"))
suppressWarnings(ggsave("FigureS5.pdf", figS5, width = 7, height = 6, units = "in"))
suppressWarnings(print(figS5, width = 7, height = 6, units = "in"))
```