Feedback MTurk Study

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Introduction

Load Data

```r
# ?register_google
# register_google(key = "AIzaSyCTk2a5vIEqcvgz9KmQmItoNF7J8_hiMMk")
#
# #uses Google API to obtain location data based on longitude and latitude....dont use unless necessary
# d_respondents_only[ , c("housenumber", "street", "city", "county", "state", "zip", "country") := revg
# #
# head(d_respondents_only)
# #
# #
# fwrite(d_respondents_only, file='datatable_clean_survey_responses_v2.dta')

d_respondents <- fread('datatable_clean_survey_responses_v2.dta')

setnames(d_respondents,
         old = c('Duration (in seconds)'),
         new = c('Survey_Duration'))
head(d_respondents)
```

```
##              StartDate             EndDate     Status      IPAddress Progress
## 1: 2020-11-09 20:46:55 2020-11-09 20:50:39 IP Address 174.88.123.135      100
## 2: 2020-11-09 20:47:33 2020-11-09 20:51:24 IP Address  172.93.166.91      100
## 3: 2020-11-09 20:47:23 2020-11-09 20:51:35 IP Address  68.36.215.223      100
## 4: 2020-11-09 20:46:32 2020-11-09 20:51:43 IP Address   99.75.53.174      100
## 5: 2020-11-09 20:47:44 2020-11-09 20:52:08 IP Address   24.35.119.43      100
## 6: 2020-11-09 20:46:47 2020-11-09 20:52:39 IP Address  98.212.214.93      100
##    Survey_Duration Finished        RecordedDate        ResponseId
## 1:             223     TRUE 2020-11-09 20:50:39 R_VLuUQ4C82PP9HEd
## 2:             231     TRUE 2020-11-09 20:51:25 R_29cCZD1XK1dpmdY
## 3:             251     TRUE 2020-11-09 20:51:35 R_3lVN8EncJofnqnV
## 4:             310     TRUE 2020-11-09 20:51:43 R_50vJlfmoFTK1IeB
## 5:             264     TRUE 2020-11-09 20:52:08 R_1dFaKMSjyE3FJHg
## 6:             351     TRUE 2020-11-09 20:52:39 R_25vjj4Ik4Dkm2UN
##    RecipientLastName RecipientFirstName RecipientEmail ExternalReference
## 1:                NA                 NA             NA                NA
## 2:                NA                 NA             NA                NA
## 3:                NA                 NA             NA                NA
## 4:                NA                 NA             NA                NA
## 5:                NA                 NA             NA                NA
## 6:                NA                 NA             NA                NA
```

```
##    LocationLatitude LocationLongitude DistributionChannel UserLanguage
## 1:            43.68            -79.29           anonymous           EN
## 2:            33.75            -84.39           anonymous           EN
## 3:            42.66            -83.12           anonymous           EN
## 4:            42.00            -88.14           anonymous           EN
## 5:            40.08            -82.97           anonymous           EN
## 6:            42.01            -88.10           anonymous           EN
##    Amazon_Turk_ID Gender Q82_3_TEXT Age_Range           Education_Level
## 1:  A4D99Y82KOLC8   Male         NA     35-44              Trade school
## 2: A1AC47WJLNW4G7   Male         NA     25-34 Master's degree and above
## 3:  A77K8W55MJEKX Female         NA     45-54         Bachelor's degree
## 4: A17TKHT8FEVH0R   Male         NA     25-34        Associate's degree
## 5: A1A0WMOOJMOF7Z Female         NA     25-34              Trade school
## 6: A2VO8C41JJIQY9   Male         NA     25-34 Master's degree and above
##           Q1        Q2        Q3        Q4        Q5        Q6        Q7
## 1: Pneumonia    Normal    Normal Pneumonia    Normal Pneumonia Pneumonia
## 2: Pneumonia    Normal    Normal Pneumonia    Normal    Normal    Normal
## 3: Pneumonia Pneumonia Pneumonia Pneumonia Pneumonia Pneumonia    Normal
## 4:    Normal Pneumonia Pneumonia    Normal Pneumonia Pneumonia Pneumonia
## 5:    Normal Pneumonia Pneumonia    Normal Pneumonia Pneumonia Pneumonia
## 6: Pneumonia    Normal    Normal Pneumonia Pneumonia Pneumonia    Normal
##           Q8        Q9       Q10
## 1:    Normal Pneumonia Pneumonia
## 2:    Normal    Normal Pneumonia
## 3:    Normal Pneumonia Pneumonia
## 4:    Normal Pneumonia    Normal
## 5:    Normal Pneumonia    Normal
## 6: Pneumonia Pneumonia Pneumonia
##
## 1:
## 2:
## 3:
## 4:
## 5: The sentiment that this place brings, and how much hospitality means to them. How open, diverse a
## 6:
##    Q70_First Click Q70_Last Click Q70_Page Submit Q70_Click Count       Q11
## 1:              NA             NA              NA              NA    Normal
## 2:              NA             NA              NA              NA    Normal
## 3:              NA             NA              NA              NA Pneumonia
## 4:              NA             NA              NA              NA Pneumonia
## 5:           31.08          31.08           77.39               1    Normal
## 6:              NA             NA              NA              NA    Normal
##          Q12       Q13       Q14       Q15       Q16       Q17       Q18
## 1:    Normal Pnuemonia Pneumonia Pneumonia    Normal    Normal Pneumonia
## 2:    Normal Pnuemonia    Normal    Normal Pneumonia    Normal Pneumonia
## 3:    Normal Pnuemonia Pneumonia Pneumonia Pneumonia Pneumonia Pneumonia
## 4:    Normal Pnuemonia    Normal    Normal    Normal Pneumonia    Normal
## 5: Pneumonia    Normal Pneumonia Pneumonia    Normal Pneumonia Pneumonia
## 6:    Normal Pnuemonia Pneumonia    Normal    Normal Pneumonia Pneumonia
##          Q19       Q20
## 1: Pneumonia    Normal
## 2:    Normal Pneumonia
## 3: Pneumonia Pneumonia
## 4: Pneumonia Pneumonia
```

```
## 5:    Normal Pneumonia
## 6: Pneumonia Pneumonia
##
## 1:
## 2:
## 3:
## 4:
## 5: It brings awareness to a serious issue that can harm people. It's an advertisement to bring peopl
## 6:
##    Q90_First Click Q90_Last Click Q90_Page Submit Q90_Click Count       Q21
## 1:              NA             NA              NA              NA Pneumonia
## 2:              NA             NA              NA              NA    Normal
## 3:              NA             NA              NA              NA Pneumonia
## 4:              NA             NA              NA              NA    Normal
## 5:           10.13          68.74           70.97               2 Pneumonia
## 6:              NA             NA              NA              NA    Normal
##          Q22       Q23       Q24       Q25       Q26       Q27       Q28
## 1: Pneumonia    Normal Pneumonia    Normal Pneumonia Pneumonia    Normal
## 2: Pneumonia Pneumonia    Normal    Normal    Normal Pneumonia    Normal
## 3: Pneumonia    Normal Pneumonia Pneumonia Pneumonia Pneumonia Pneumonia
## 4: Pneumonia Pneumonia Pneumonia Pneumonia Pneumonia    Normal Pneumonia
## 5: Pneumonia Pneumonia    Normal Pneumonia    Normal    Normal Pneumonia
## 6: Pneumonia Pneumonia    Normal Pneumonia    Normal    Normal Pneumonia
##          Q29       Q30 Q36
## 1:    Normal Pneumonia
## 2: Pneumonia    Normal
## 3: Pneumonia Pneumonia
## 4: Pneumonia    Normal
## 5: Pneumonia Pneumonia
## 6:    Normal    Normal
##                                                            Self_Reflect_Q1
## 1:
## 2:
## 3:
## 4: I think I did pretty good. I was not expecting to do as well as I did.
## 5:
## 6:
##    Q61_First Click Q61_Last Click Q61_Page Submit Q61_Click Count Q41
## 1:              NA             NA              NA              NA
## 2:              NA             NA              NA              NA
## 3:              NA             NA              NA              NA
## 4:           32.36          43.79           111.6               3
## 5:              NA             NA              NA              NA
## 6:              NA             NA              NA              NA
##                                                                           Self_Reflect_Q2
## 1:
## 2:
## 3:
## 4: I think I did incredible. I only got 2 wrong. This was harder than the previous page.
## 5:
## 6:
##    Q62_First Click Q62_Last Click Q62_Page Submit Q62_Click Count
## 1:              NA             NA              NA              NA
## 2:              NA             NA              NA              NA
```

```
## 3:             NA            NA              NA              NA
## 4:          10.06         10.06           100.3               1
## 5:             NA            NA              NA              NA
## 6:             NA            NA              NA              NA
##                                                                                     Q38
## 1:
## 2:
## 3:
## 4:
## 5:
## 6: Image 2Correct diagnosis: Normal\nYou chose: ${q://QID5/ChoiceGroup/SelectedChoices}\n
##    Q63_First Click Q63_Last Click Q63_Page Submit Q63_Click Count Q43
## 1:             NA            NA              NA              NA
## 2:             NA            NA              NA              NA
## 3:             NA            NA              NA              NA
## 4:             NA            NA              NA              NA
## 5:             NA            NA              NA              NA
## 6:          1.205         100.7             108              16
##    Q64_First Click Q64_Last Click Q64_Page Submit Q64_Click Count Q45
## 1:             NA            NA              NA              NA  NA
## 2:             NA            NA              NA              NA  NA
## 3:             NA            NA              NA              NA  NA
## 4:             NA            NA              NA              NA  NA
## 5:             NA            NA              NA              NA  NA
## 6:          76.03         101.2           102.4               3  NA
##    Q65_First Click Q65_Last Click Q65_Page Submit Q65_Click Count Q47
## 1:             NA            NA              NA              NA  NA
## 2:          14.69         16.23           47.68               2  NA
## 3:             NA            NA              NA              NA  NA
## 4:             NA            NA              NA              NA  NA
## 5:             NA            NA              NA              NA  NA
## 6:             NA            NA              NA              NA  NA
##    Q66_First Click Q66_Last Click Q66_Page Submit Q66_Click Count Q46
## 1:             NA            NA              NA              NA  NA
## 2:           5.75         18.28           46.59               2  NA
## 3:             NA            NA              NA              NA  NA
## 4:             NA            NA              NA              NA  NA
## 5:             NA            NA              NA              NA  NA
## 6:             NA            NA              NA              NA  NA
##    Q67_First Click Q67_Last Click Q67_Page Submit Q67_Click Count Q48
## 1:          0.855         57.41           58.20              29  NA
## 2:             NA            NA              NA              NA  NA
## 3:         16.263         16.26           50.06               1  NA
## 4:             NA            NA              NA              NA  NA
## 5:             NA            NA              NA              NA  NA
## 6:             NA            NA              NA              NA  NA
##    Q68_First Click Q68_Last Click Q68_Page Submit Q68_Click Count Total_Score
## 1:          0.530        60.605           61.22              15          16
## 2:             NA            NA              NA              NA          12
## 3:          9.427         9.427           49.63               1          15
## 4:             NA            NA              NA              NA          21
## 5:             NA            NA              NA              NA          14
## 6:             NA            NA              NA              NA          18
##    Random ID Assignment Q1_Score Q2_Score Q3_Score Q4_Score Q5_Score Q6_Score
```

```
## 1:     14409      FL_41        0        1        0        1        1        1
## 2:     58508      FL_16        0        1        0        1        1        0
## 3:     96075      FL_41        0        0        1        1        0        1
## 4:     74553      FL_14        1        0        1        0        0        1
## 5:     35543      FL_17        1        0        1        0        0        1
## 6:     84565      FL_15        0        1        0        1        0        1
##    Q7_Score Q8_Score Q9_Score Q10_Score Q11_Score Q12_Score Q13_Score Q14_Score
## 1:        1        1        1         0         0         1         0         1
## 2:        0        1        0         0         0         1         0         0
## 3:        0        1        1         0         1         1         0         1
## 4:        1        1        1         1         1         1         0         0
## 5:        1        1        1         1         0         0         0         1
## 6:        0        0        1         0         0         1         0         1
##    Q15_Score Q16_Score Q17_Score Q18_Score Q19_Score Q20_Score Q21_Score
## 1:         0         1         0         0         1         1         0
## 2:         1         0         0         0         0         0         1
## 3:         0         0         1         0         1         0         0
## 4:         1         1         1         1         1         0         1
## 5:         0         1         1         0         0         0         0
## 6:         1         1         1         0         1         0         1
##    Q22_Score Q23_Score Q24_Score Q25_Score Q26_Score Q27_Score Q28_Score
## 1:         0         0         0         0         1         1         0
## 2:         0         1         1         0         0         1         0
## 3:         0         0         0         1         1         1         1
## 4:         0         1         0         1         1         0         1
## 5:         0         1         1         1         0         0         1
## 6:         0         1         1         1         0         0         1
##    Q29_Score Q30_Score Assignment_Group TaskPhase1_Score TaskPhase2_Score
## 1:         1         0  Negative Images              0.7              0.5
## 2:         0         1  Positive Images              0.4              0.2
## 3:         0         0  Negative Images              0.5              0.5
## 4:         0         1     Self-Reflect              0.7              0.7
## 5:         0         0          Control              0.7              0.3
## 6:         1         1 Medical Feedback              0.4              0.6
##    TaskPhase3_Score housenumber                street            city
## 1:              0.3         351      Glen Manor Drive         Toronto
## 2:              0.5         262 Capitol Avenue Southeast         Atlanta
## 3:              0.4         440      Bedlington Drive Rochester Hills
## 4:              0.6        1200       Sycamore Avenue    Hanover Park
## 5:              0.4        1913        Brookfield Road        Columbus
## 6:              0.7         617          Boxwood Drive      Schaumburg
##           county    state     zip       country
## 1:        Canada  Ontario M4E 2X8        Canada
## 2: United States  Georgia   30312 United States
## 3: United States Michigan   48307 United States
## 4: United States Illinois   60133 United States
## 5: United States     Ohio   43229 United States
## 6: United States Illinois   60193 United States
```

```r
nrow(d_respondents)
```

```
## [1] 350
```

```r
#remove duplicate Amazon Turk IDs
nrow(d_respondents)  #350 rows
```

```
## [1] 350
```

```
d_respondents <- d_respondents[ !duplicated(d_respondents$Amazon_Turk_ID) , ]  #350 rows
```

EDA

Helper Functions

```
create_heatmap <- function(var1, var2) {
  ### Create a heatmap for a table of frequencies between two variables ###
  df <- data.frame(table(var1,var2))

  ggplot(df,aes(x=var1,y=var2)) +
    geom_tile(aes(fill=Freq,color=Freq),show.legend=FALSE,alpha=.8) +
    geom_text(aes(label=Freq)) +
    scale_fill_continuous(high = "darkslategray4", low = "powderblue")
}

g_legend<-function(a.gplot){
  #extract legend from a ggplot object
  #https://stackoverflow.com/questions/13649473/add-a-common-legend-for-combined-ggplots
  #https://github.com/hadley/ggplot2/wiki/Share-a-legend-between-two-ggplot2-graphs
  tmp <- ggplot_gtable(ggplot_build(a.gplot))
  leg <- which(sapply(tmp$grobs, function(x) x$name) == "guide-box")
  legend <- tmp$grobs[[leg]]
  return(legend)}
```

```
#some EDA

#d_respondents[ , table(state, country)]


table(d_respondents$state, d_respondents$country) %>%
        as.data.frame() %>%
        arrange(desc(Freq)) %>%
        filter(Freq>0)
```

```
##                              Var1          Var2 Freq
## 1                      Tamil Nadu         India  107
## 2                      California United States   72
## 3                        New York United States   22
## 4                          Kansas United States   21
## 5                           Texas United States   15
## 6                         Florida United States    9
## 7                   Massachusetts United States    7
## 8                        Missouri United States    6
## 9                     Connecticut United States    5
## 10                        Georgia United States    5
## 11                        Indiana United States    5
## 12                       Michigan United States    5
## 13                     New Jersey United States    5
## 14                       Illinois United States    4
## 15                       Virginia United States    4
## 16                         Kerala         India    3
```

```
## 17                 Maharashtra          India    3
## 18                    Colorado  United States    3
## 19                    Kentucky  United States    3
## 20                    Maryland  United States    3
## 21              North Carolina  United States    3
## 22                      Oregon  United States    3
## 23                     Ontario         Canada    2
## 24                     Alabama  United States    2
## 25                       Idaho  United States    2
## 26                   Minnesota  United States    2
## 27                 Mississippi  United States    2
## 28                      Nevada  United States    2
## 29                        Ohio  United States    2
## 30                Pennsylvania  United States    2
## 31                  Washington  United States    2
## 32               Qarku i Tiranës        Albania    1
## 33             Khulna Division     Bangladesh    1
## 34                       Bahia         Brazil    1
## 35                     Atacama          Chile    1
## 36 Provence-Alpes-Côte d'Azur         France    1
## 37    Departamento de Olancho       Honduras    1
## 38              Andhra Pradesh          India    1
## 39                   Karnataka          India    1
## 40                    Sardegna          Italy    1
## 41                     England United Kingdom    1
## 42                     Arizona  United States    1
## 43                        Iowa  United States    1
## 44                   Louisiana  United States    1
## 45                       Maine  United States    1
## 46                    Nebraska  United States    1
## 47                    Oklahoma  United States    1
## 48              South Carolina  United States    1
## 49                South Dakota  United States    1
## 50                   Tennessee  United States    1
```

```
table(d_respondents$country) %>%
        as.data.frame() %>%
        arrange(desc(Freq))
```

```
##              Var1 Freq
## 1   United States  225
## 2           India  115
## 3          Canada    2
## 4         Albania    1
## 5      Bangladesh    1
## 6          Brazil    1
## 7           Chile    1
## 8          France    1
## 9        Honduras    1
## 10          Italy    1
## 11 United Kingdom    1
```

```
table(d_respondents$Total_Score) %>%
  as.data.frame() %>%
  arrange(desc(Var1))
```

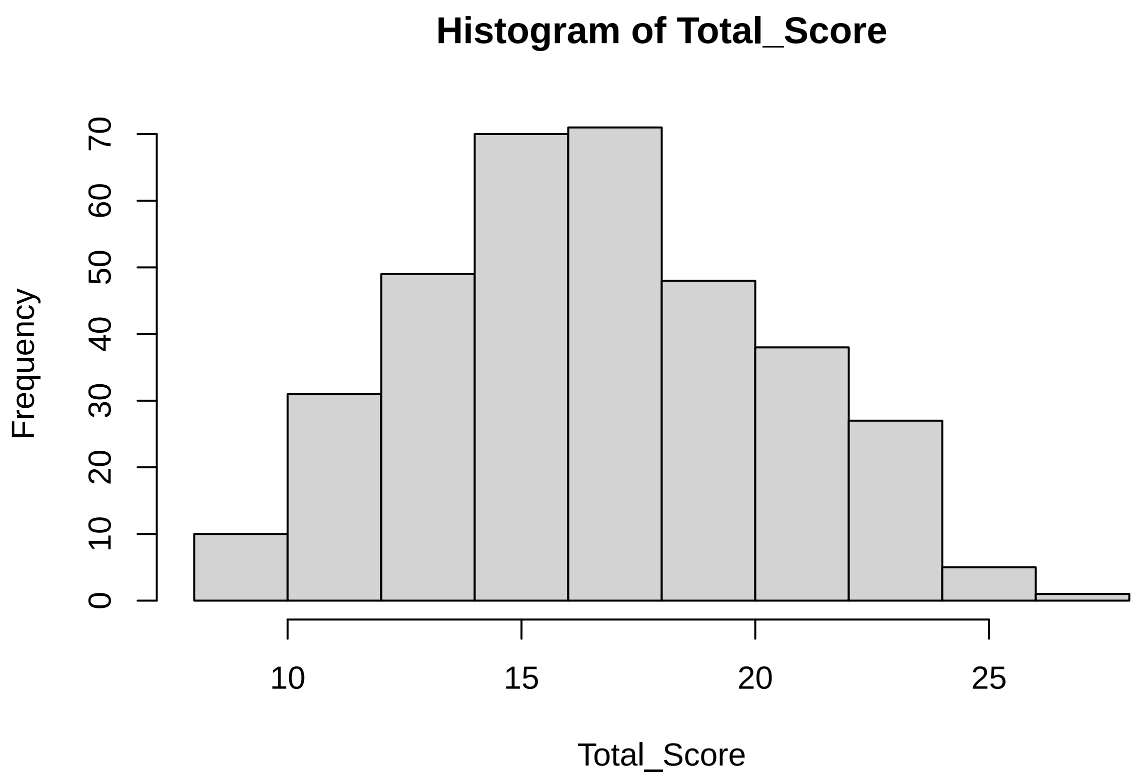
```
##    Var1 Freq
## 1    27    1
## 2    26    1
## 3    25    4
## 4    24   12
## 5    23   15
## 6    22   16
## 7    21   22
## 8    20   27
## 9    19   21
## 10   18   31
## 11   17   40
## 12   16   40
## 13   15   30
## 14   14   30
## 15   13   19
## 16   12   18
## 17   11   13
## 18   10    6
## 19    9    3
## 20    8    1
```

```
d_respondents %>%
  group_by(Assignment_Group) %>%
  summarise(mean = mean(Total_Score),
            count = n(),
            time_duration = mean(Survey_Duration))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
## # A tibble: 5 x 4
##   Assignment_Group  mean count time_duration
##   <chr>            <dbl> <int>         <dbl>
## 1 Control           16.7    69          638.
## 2 Medical Feedback  17.8    70          656.
## 3 Negative Images   16.5    72          783
## 4 Positive Images   17.3    70          505.
## 5 Self-Reflect      17.2    69          612.
```

```
#d_respondents[ , .(count = .N, avg = mean(Total_Score)), by=Assignment_Group] #same thing

d_respondents[ , hist(Total_Score)]
```




```
## $breaks
##  [1]  8 10 12 14 16 18 20 22 24 26 28
##
## $counts
##  [1] 10 31 49 70 71 48 38 27  5  1
##
## $density
##  [1] 0.014286 0.044286 0.070000 0.100000 0.101429 0.068571 0.054286 0.038571
##  [9] 0.007143 0.001429
##
## $mids
##  [1]  9 11 13 15 17 19 21 23 25 27
##
## $xname
## [1] "Total_Score"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

```
tapply(d_respondents$Total_Score, d_respondents$Assignment_Group, summary)
```

```
## $Control
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     8.0    14.0    16.0    16.7    19.0    24.0
##
## $`Medical Feedback`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
```

```
##    10.0    16.0    17.5    17.8    20.0    24.0
##
## $`Negative Images`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     9.0    13.0    16.0    16.5    19.2    25.0
##
## $`Positive Images`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     9.0    15.0    17.0    17.3    20.0    27.0
##
## $`Self-Reflect`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     9.0    14.0    17.0    17.2    20.0    25.0
```

```
tapply(d_respondents$Total_Score, d_respondents$Assignment_Group, sd)
```

```
##         Control Medical Feedback  Negative Images  Positive Images
##           3.659            3.279            3.996            3.817
##     Self-Reflect
##           3.882
```

```
d_respondents[ , sd(Total_Score)]
```

```
## [1] 3.743
```

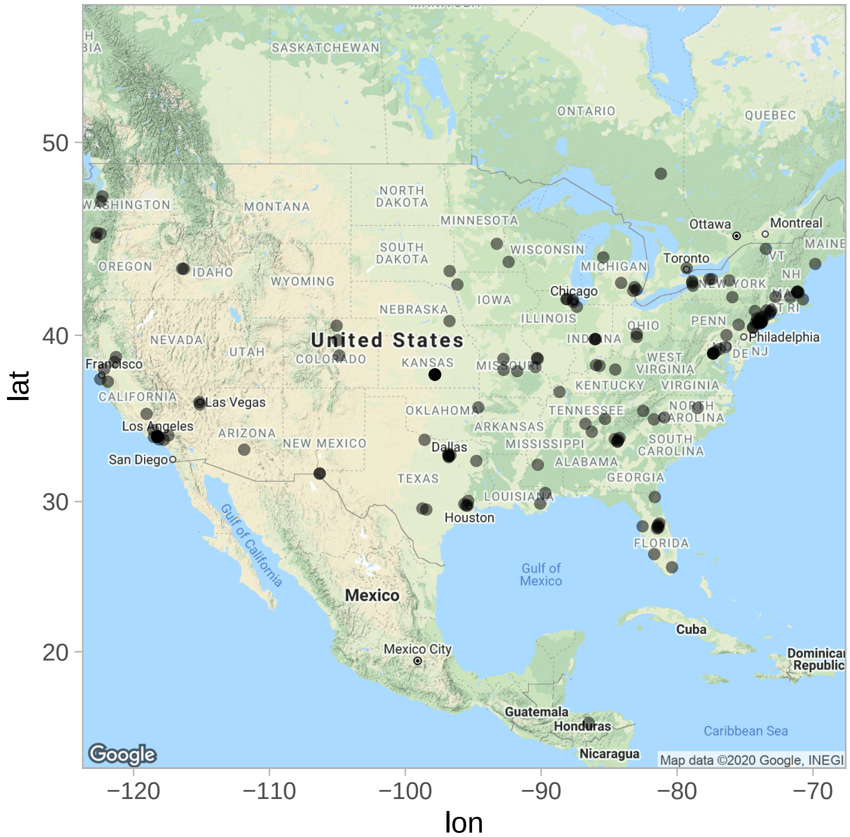
```
library(ggmap)
?register_google
register_google(key = "AIzaSyCTk2a5vIEqcvgz9KmQmItoNF7J8_hiMMk")
# ggmap_show_api_key()

us_map<-get_map(location='united states', zoom=4, maptype = "terrain",
             source='google',color='color')
```

```
## Source : https://maps.googleapis.com/maps/api/staticmap?center=united%20states&zoom=4&size=640x640&s
```

```
## Source : https://maps.googleapis.com/maps/api/geocode/json?address=united+states&key=xxx
```

```
ggmap(us_map) + geom_point(x=d_respondents$LocationLongitude, y = d_respondents$LocationLatitude, show_
```

```
## Warning: `show_guide` has been deprecated. Please use `show.legend` instead.
```



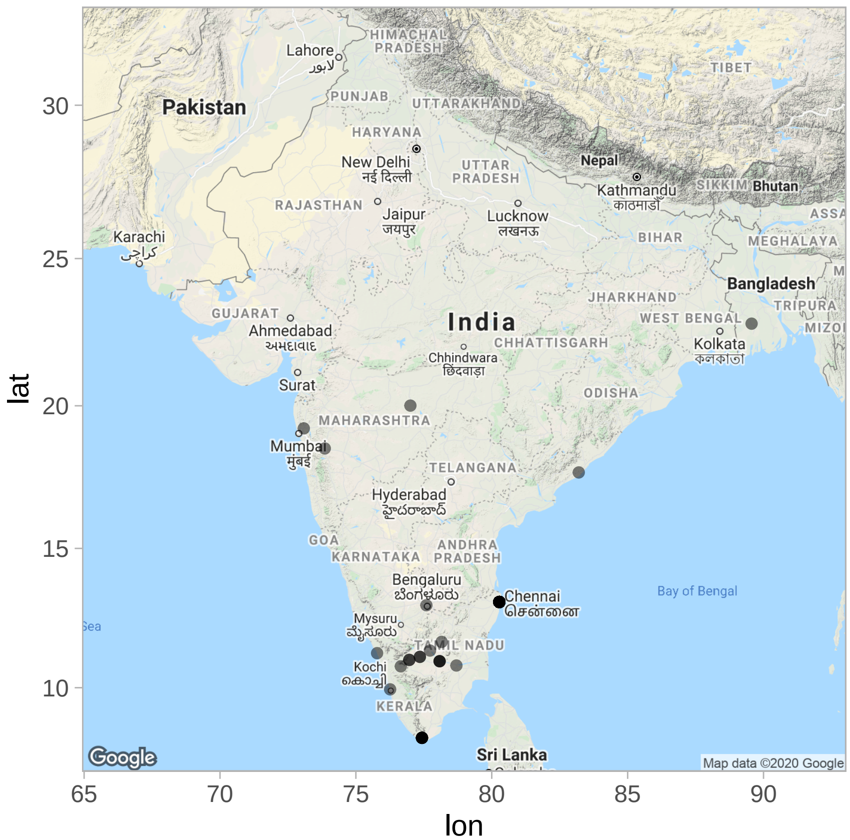

```
india_map<-get_map(location='india', zoom=5, maptype = "terrain",
             source='google',color='color')
```

```
## Source : https://maps.googleapis.com/maps/api/staticmap?center=india&zoom=5&size=640x640&scale=2&map
```

```
## Source : https://maps.googleapis.com/maps/api/geocode/json?address=india&key=xxx
```

```
ggmap(india_map) + geom_point(x=d_respondents$LocationLongitude, y = d_respondents$LocationLatitude, sho
```

```
## Warning: `show_guide` has been deprecated. Please use `show.legend` instead.
```



Randomization Check

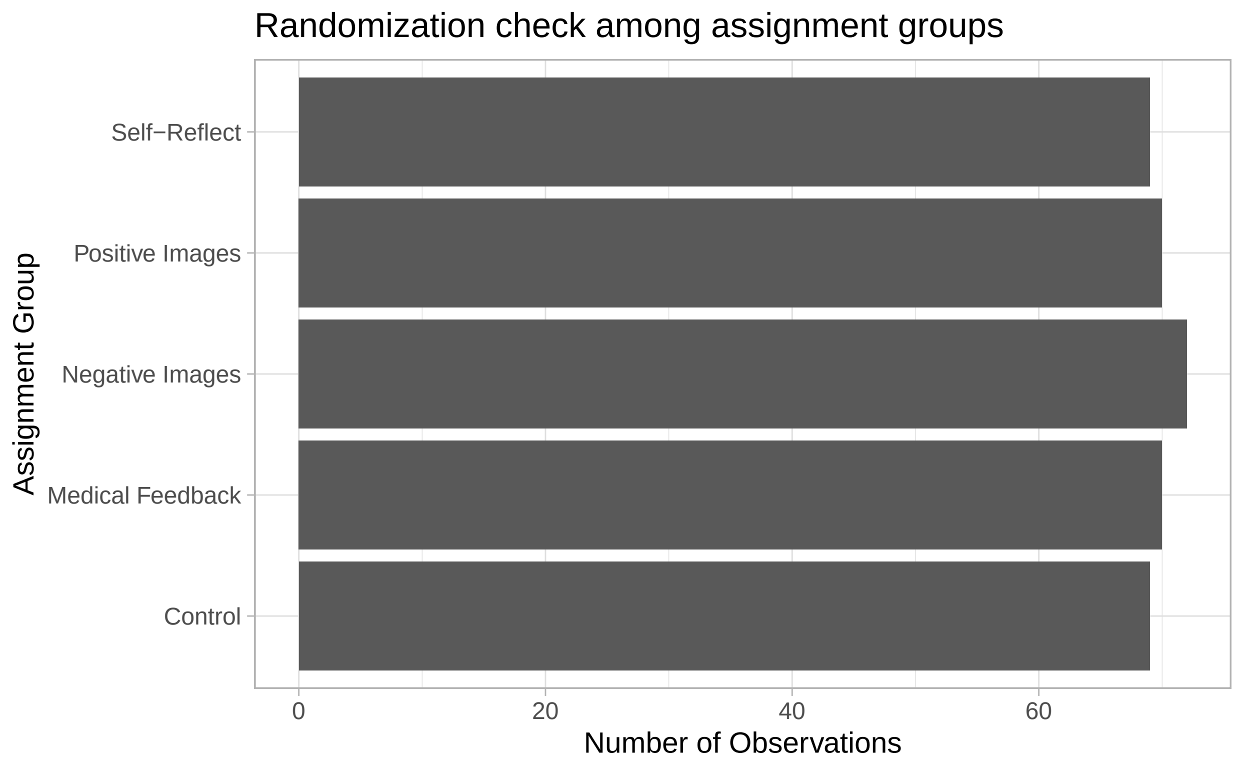
```r
#http://www.sthda.com/english/wiki/chi-square-goodness-of-fit-test-in-r

respondent_counts <- d_respondents[ , .(.N), keyby=Assignment_Group]

respondent_counts_chisq_test <- chisq.test(respondent_counts[,2], p=c(1/5, 1/5, 1/5, 1/5, 1/5))
pander(respondent_counts_chisq_test,style ='rmarkdown')
```

Table 1: Chi-squared test for given probabilities: `respondent_counts[, 2]`

Test statistic	df	P value
0.08571	4	0.9991

```r
respondent_counts %>%
  ggplot(aes(x = Assignment_Group,y=N)) +
  geom_bar(stat = 'identity') +
  coord_flip() +
  xlab('Assignment Group') +
  ylab('Number of Observations') +
  labs(title='Randomization check among assignment groups',
       caption = paste0('Assuming equal distribution among assignment groups, a chi-squared goodness of
                        round(respondent_counts_chisq_test$parameter,4),' degrees of \nfreedom ', 'yiel
                        round(respondent_counts_chisq_test$p.value,4),
```

```
                       ', suggesting that the observed proportions are not significantly different fro
  theme(plot.caption = element_text(hjust = 0))
```



Assuming equal distribution among assignment groups, a chi−squared goodness of fit test wit
freedom yields p=0.9991, suggesting that the observed proportions are not significantly differe
expected proportions at a significance level of 0.05.

```
#p-value = 0.9991, which is greater than significance level of 0.05.
#We can conclude that the observed proportions are not significantly different from the expected propor
```

Covariate Balance Check

```
#let's consider adding age bins and education bins

d_respondents[ Age_Range == "18-24", age_bin := 1]
d_respondents[ Age_Range == "25-34", age_bin := 2]
d_respondents[ Age_Range == "35-44", age_bin := 3]
d_respondents[ Age_Range == "45-54", age_bin := 4]
d_respondents[ Age_Range == "55-64", age_bin := 5]
d_respondents[ Age_Range == "Above 65", age_bin := 6]

d_respondents[ Education_Level == "Associate's degree", edu_bin := 1]
d_respondents[ Education_Level == "Bachelor's degree", edu_bin := 2]
d_respondents[ Education_Level == "High school", edu_bin := 3]
d_respondents[ Education_Level == "Master's degree and above", edu_bin := 4]
d_respondents[ Education_Level == "Some high school", edu_bin := 5]
d_respondents[ Education_Level == "Trade school", edu_bin := 6]

d_respondents[ Assignment_Group == "Control", assign_bin := 1]
d_respondents[ Assignment_Group == "Medical Feedback", assign_bin := 2]
```

```
d_respondents[ Assignment_Group == "Negative Images", assign_bin := 3]
d_respondents[ Assignment_Group == "Positive Images", assign_bin := 4]
d_respondents[ Assignment_Group == "Self-Reflect", assign_bin := 5]

d_respondents[ , US_Dummy := ifelse(country == "United States", 1, 0)]

d_respondents[ , Male_Dummy := ifelse(Gender == "Male", 1, 0)]

#add treatment dummy

d_respondents[ , Treatment_Dummy := ifelse(Assignment_Group != "Control", 1, 0)]

#head(d_respondents)
```

```
d_respondents %>%
  group_by(Assignment_Group) %>%
  summarise(num_respondents = n(),
            pre_treatment_avg = mean(TaskPhase1_Score),
            taskphase2_avg = mean(TaskPhase2_Score),
            taskphase3_avg = mean(TaskPhase3_Score))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)

## # A tibble: 5 x 5
##   Assignment_Group num_respondents pre_treatment_a~ taskphase2_avg
##   <chr>                      <int>            <dbl>          <dbl>
## 1 Control                       69            0.607          0.461
## 2 Medical Feedback              70            0.634          0.523
## 3 Negative Images               72            0.578          0.494
## 4 Positive Images               70            0.614          0.514
## 5 Self-Reflect                  69            0.599          0.526
## # ... with 1 more variable: taskphase3_avg <dbl>
```

```
d_respondents %>%
  group_by(Assignment_Group) %>%
  summarise(num_respondents = n(),
            avg_age_bin = mean(age_bin),
            avg_edu_bin = mean(edu_bin),
            male = mean(Male_Dummy),
            US = mean(US_Dummy))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)

## # A tibble: 5 x 6
##   Assignment_Group num_respondents avg_age_bin avg_edu_bin  male    US
##   <chr>                      <int>       <dbl>       <dbl> <dbl> <dbl>
## 1 Control                       69        2.68        2.61 0.609 0.652
## 2 Medical Feedback              70        2.63        2.47 0.586 0.529
## 3 Negative Images               72        2.62        2.58 0.583 0.625
## 4 Positive Images               70        2.86        2.6  0.586 0.714
## 5 Self-Reflect                  69        2.83        2.42 0.594 0.696
```

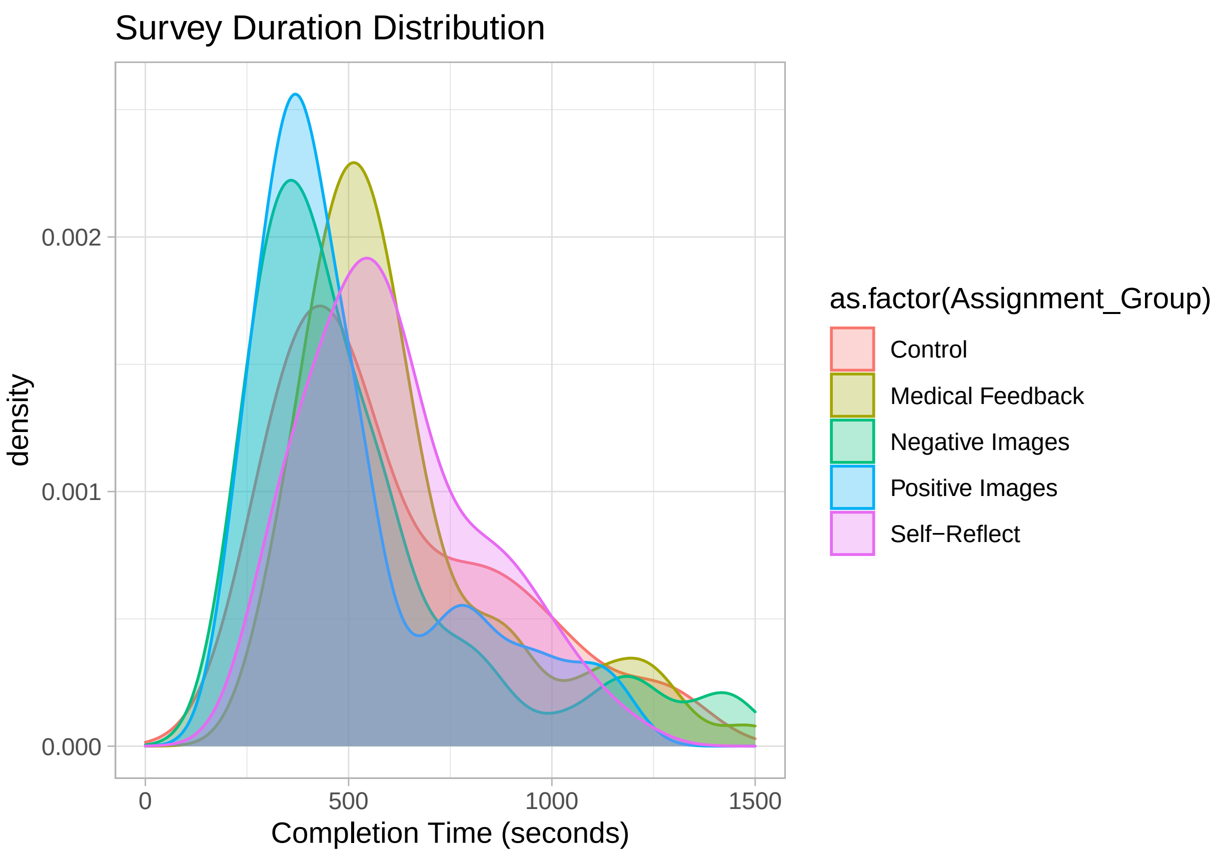
```
d_respondents %>%
  group_by(Assignment_Group) %>%
  summarise(num_respondents = n(),
            )
```

```
## `summarise()` ungrouping output (override with `.groups` argument)

## # A tibble: 5 x 2
##   Assignment_Group num_respondents
##   <chr>                      <int>
## 1 Control                       69
## 2 Medical Feedback              70
## 3 Negative Images               72
## 4 Positive Images               70
## 5 Self-Reflect                  69
```

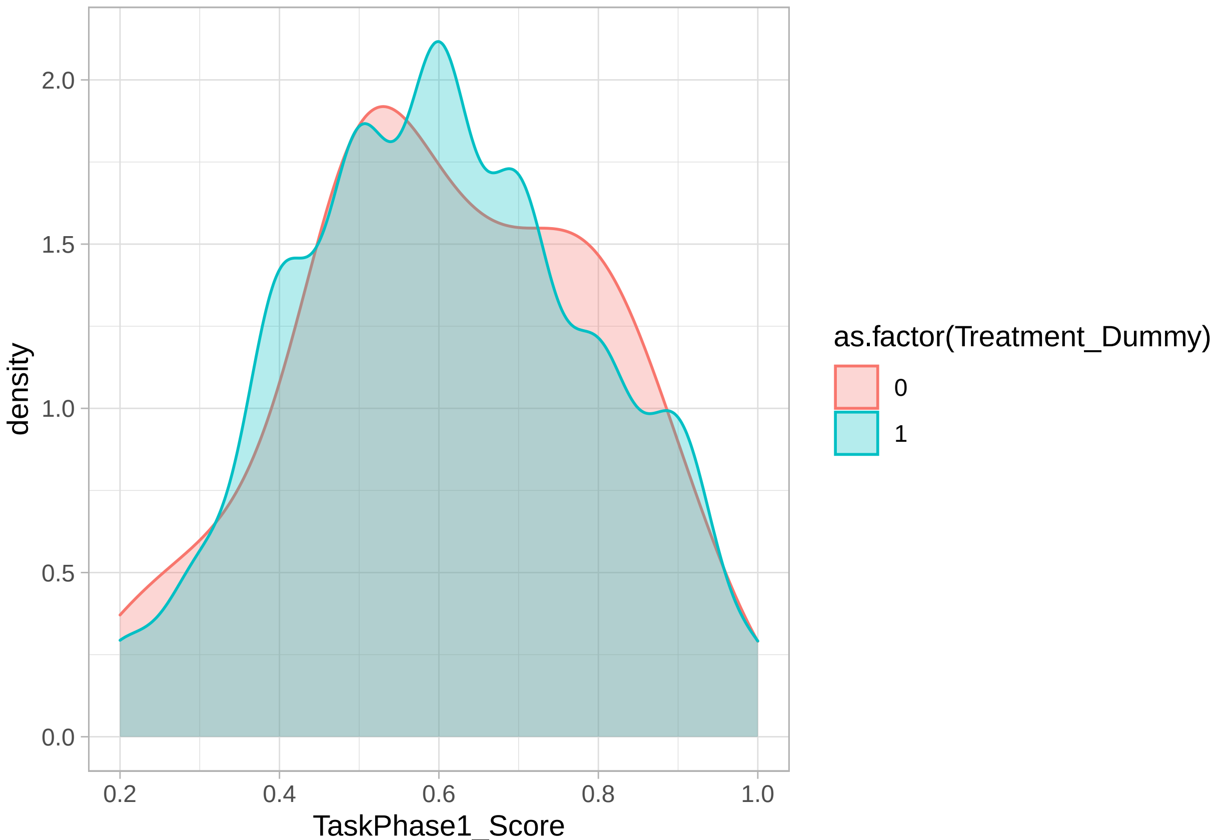
Visuals

```r
#Density distribution of Survey Duration
ggplot(d_respondents, aes(x=Survey_Duration, colour=as.factor(Assignment_Group), fill = as.factor(Assig
  geom_density(alpha = 0.3) +
  xlim(0, 1500) +
  xlab("Completion Time (seconds)") +
  ggtitle("Survey Duration Distribution")
```

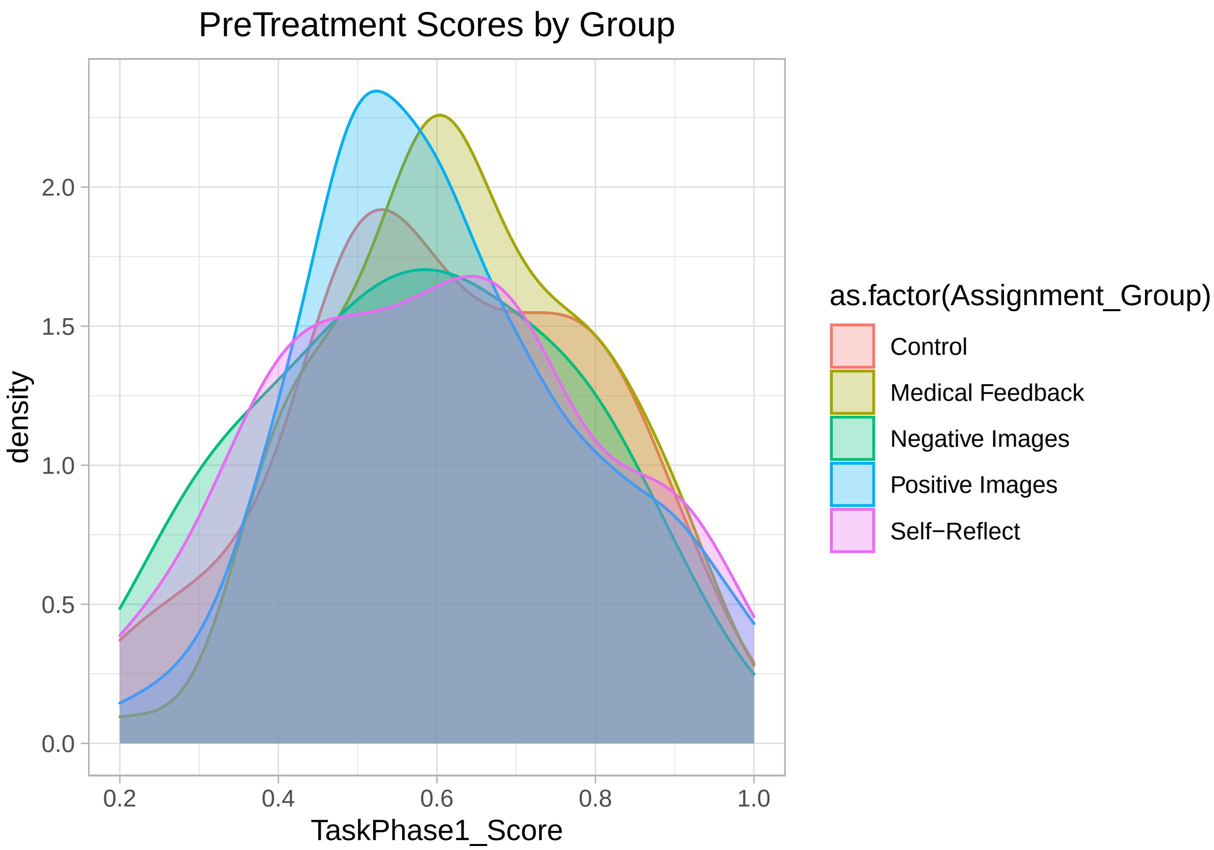
```
## Warning: Removed 6 rows containing non-finite values (stat_density).
```



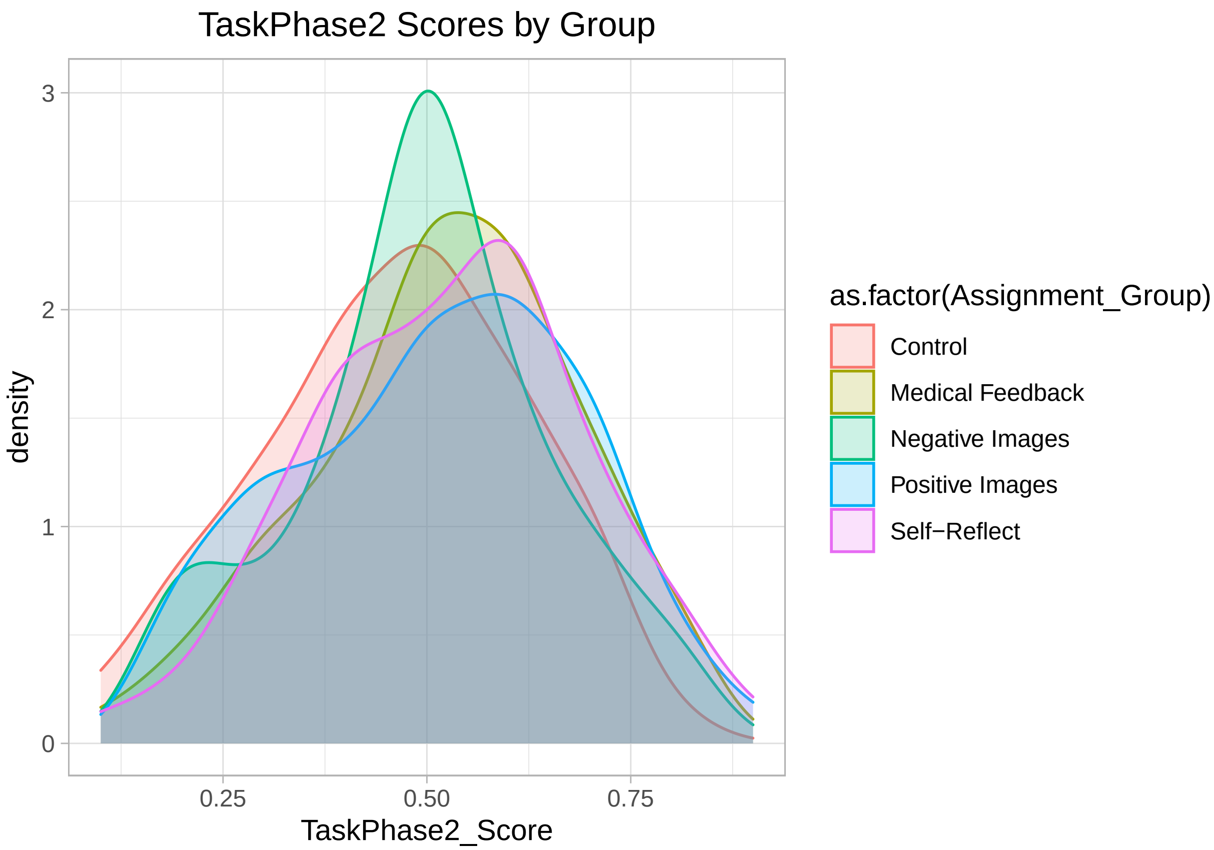

```r
#Comparing pretreatment values
ggplot(d_respondents, aes(x=TaskPhase1_Score, fill = as.factor(Treatment_Dummy), colour=as.factor(Treat
```



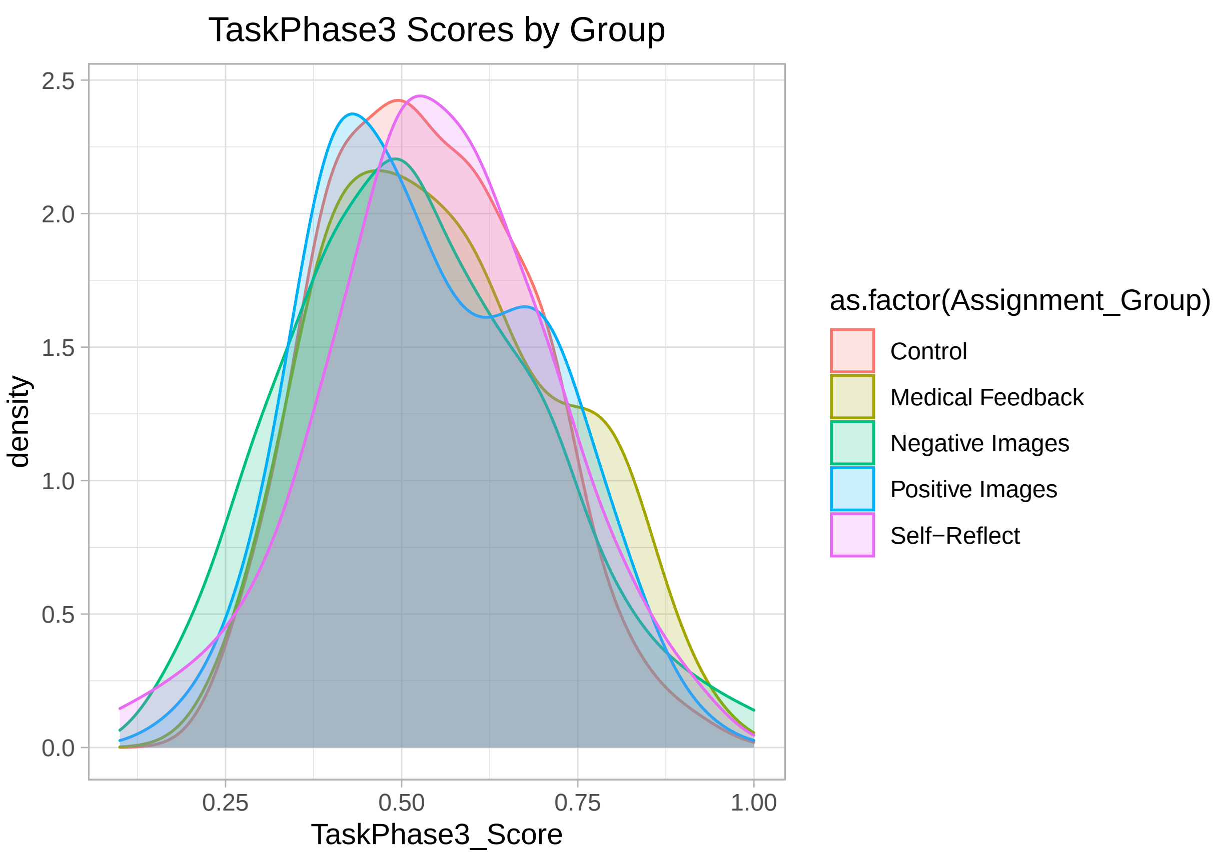

```
ggplot(d_respondents, aes(x=TaskPhase1_Score, fill = as.factor(Assignment_Group), colour=as.factor(Assig
```




```
#Comparing taskphase2 values
ggplot(d_respondents, aes(x=TaskPhase2_Score, fill = as.factor(Assignment_Group), colour=as.factor(Assig
```




```
#Comparing taskphase3 values
ggplot(d_respondents, aes(x=TaskPhase3_Score, fill = as.factor(Assignment_Group), colour=as.factor(Assi
```




```
# TODO add these boxplots for binary treatment/control groups

task2a_bp <- ggplot(d_respondents, aes(x = Treatment_Dummy, y=TaskPhase1_Score, colour=as.factor(Treatm
  geom_boxplot() +
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('Task Score (%)') +
  ggtitle("Pre Treatment Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "bottom",
        legend.title = element_blank())
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

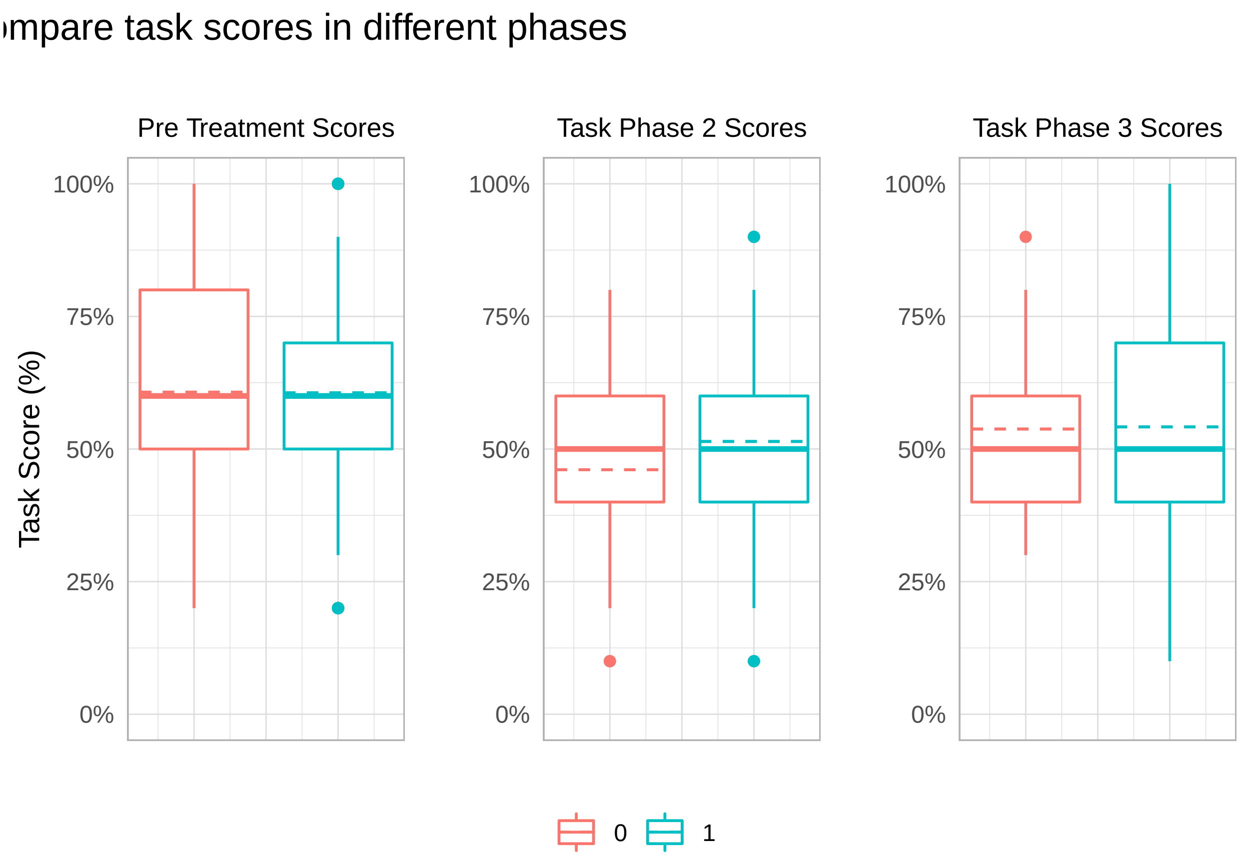
```
task2b_bp <- ggplot(d_respondents, aes(x = Treatment_Dummy, y=TaskPhase2_Score, colour=as.factor(Treatm
  geom_boxplot() +
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('') +
  ggtitle("Task Phase 2 Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "none")
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

```
task2c_bp <- ggplot(d_respondents, aes(x = Treatment_Dummy, y=TaskPhase3_Score, colour=as.factor(Treatme
  geom_boxplot() +
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('') +
  ggtitle("Task Phase 3 Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "none")
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

```
mylegend_2<-g_legend(task2a_bp)

grid.arrange(arrangeGrob(task2a_bp + theme(legend.position="none"),task2b_bp,task2c_bp,ncol=3),
             mylegend_2,
             nrow=2,
             heights=c(10,1),
             top = textGrob("Compare task scores in different phases\n",just='right',gp=gpar(fontsize=14
```




```
# boxplots for multiple treatment groups
task1a_bp <- ggplot(d_respondents, aes(x = Assignment_Group, y=TaskPhase1_Score, colour=as.factor(Assig
  geom_boxplot() +
```

```
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('Task Score (%)') +
  ggtitle("Pre Treatment Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "bottom",
        legend.title = element_blank())
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

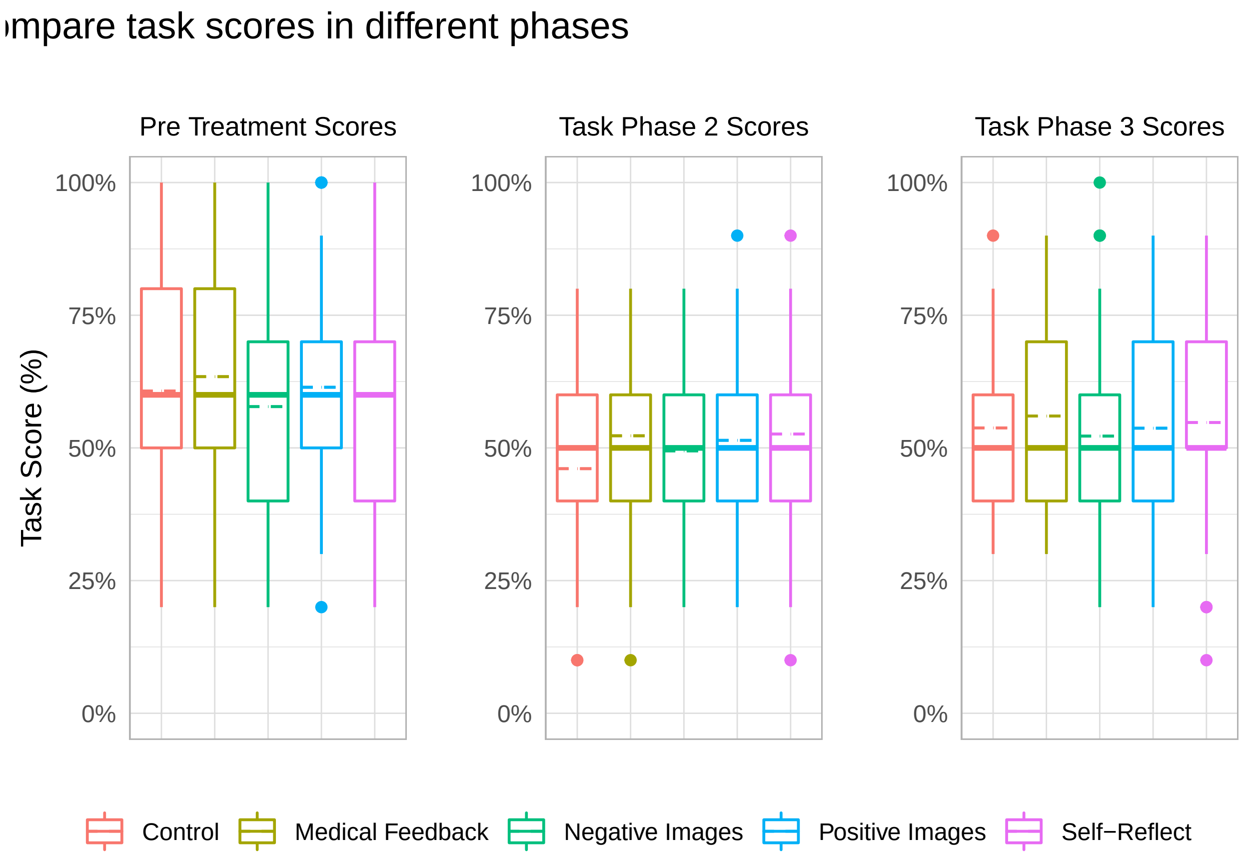
```
task1b_bp <- ggplot(d_respondents, aes(x = Assignment_Group, y=TaskPhase2_Score, colour=as.factor(Assign
  geom_boxplot() +
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('') +
  ggtitle("Task Phase 2 Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "none")
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

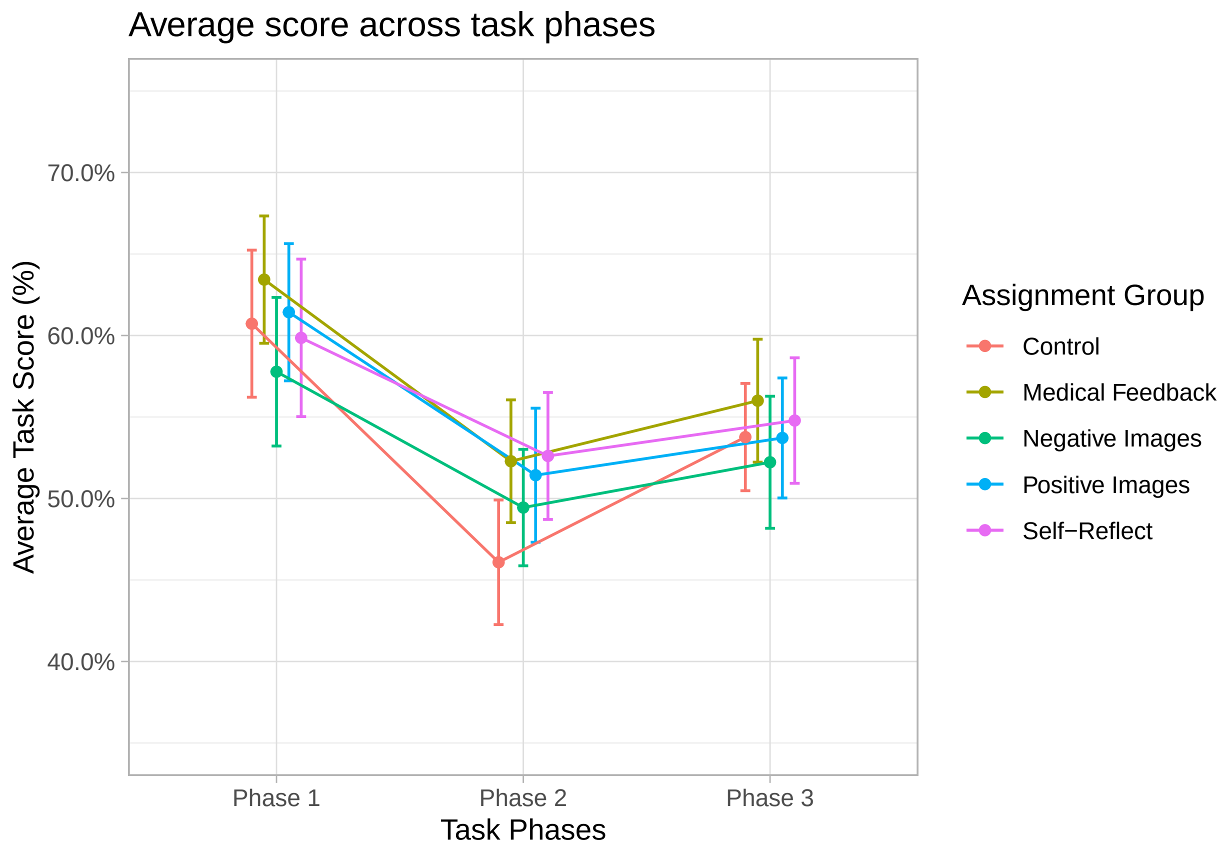
```
task1c_bp <- ggplot(d_respondents, aes(x = Assignment_Group, y=TaskPhase3_Score, colour=as.factor(Assign
  geom_boxplot() +
  stat_summary(fun.y = mean, geom = "errorbar", aes(ymax = ..y.., ymin = ..y..), width = .75, linetype =
  xlab('') +
  ylab('') +
  ggtitle("Task Phase 3 Scores") +
  scale_y_continuous(labels = scales::percent,limits = c(0,1)) +
  theme(axis.text.x = element_blank(),
        axis.ticks = element_blank(),
        plot.title = element_text(hjust = 0.5,size=10),
        legend.position = "none")
```

```
## Warning: `fun.y` is deprecated. Use `fun` instead.
```

```
mylegend_1<-g_legend(task1a_bp)

grid.arrange(arrangeGrob(task1a_bp + theme(legend.position="none"),task1b_bp,task1c_bp,ncol=3),
             mylegend_1,
             nrow=2,
             heights=c(10,1),
             top = textGrob("Compare task scores in different phases\n",just='right',gp=gpar(fontsize=14
```




```
# Compare score across time for all groups
# https://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/BS704_Confidence_Intervals/BS704_Confidence_Intervals_
# TODO finish formatting
# TODO duplicate for treatment dummy as well
summary_task_score <- (melt(d_respondents,id.vars=c('Assignment_Group'),
                            measure.vars = c('TaskPhase1_Score','TaskPhase2_Score','TaskPhase3_Score'))
  ,.('avg_score'=mean(value),'sd_score'=sd(value),'obs'=.N),keyby=.(Assignment_Group,variable)])[
    ,se:=1.96*sd_score/sqrt(obs)]

summary_task_score %>%
  ggplot( aes(x=variable, y=avg_score, group=Assignment_Group, color=Assignment_Group)) +
  geom_errorbar(aes(ymin=avg_score-1.96*sd_score/sqrt(obs), ymax=avg_score+1.96*sd_score/sqrt(obs)),
                width=.2,
                position=position_dodge(0.25)) +
  geom_line(position=position_dodge(0.25)) +
  geom_point(position=position_dodge(0.25)) +
  scale_y_continuous(labels = scales::percent,limits = c(.35,.75)) +
  scale_x_discrete(breaks=c("TaskPhase1_Score", "TaskPhase2_Score","TaskPhase3_Score"),
                   labels=c("Phase 1", "Phase 2", "Phase 3")) +
  xlab('Task Phases') +
  ylab('Average Task Score (%)') +
  labs(title='Average score across task phases', color = "Assignment Group")
```




```
# TODO add this to the appendix
kable(summary_task_score)
```

Assignment_Group	variable	avg_score	sd_score	obs	se
Control	TaskPhase1_Score	0.6072	0.1912	69	0.0451
Control	TaskPhase2_Score	0.4609	0.1620	69	0.0382
Control	TaskPhase3_Score	0.5377	0.1394	69	0.0329
Medical Feedback	TaskPhase1_Score	0.6343	0.1667	70	0.0391
Medical Feedback	TaskPhase2_Score	0.5229	0.1608	70	0.0377
Medical Feedback	TaskPhase3_Score	0.5600	0.1610	70	0.0377
Negative Images	TaskPhase1_Score	0.5778	0.1973	72	0.0456
Negative Images	TaskPhase2_Score	0.4944	0.1546	72	0.0357
Negative Images	TaskPhase3_Score	0.5222	0.1754	72	0.0405
Positive Images	TaskPhase1_Score	0.6143	0.1796	70	0.0421
Positive Images	TaskPhase2_Score	0.5143	0.1755	70	0.0411
Positive Images	TaskPhase3_Score	0.5371	0.1571	70	0.0368
Self-Reflect	TaskPhase1_Score	0.5986	0.2047	69	0.0483
Self-Reflect	TaskPhase2_Score	0.5261	0.1651	69	0.0390
Self-Reflect	TaskPhase3_Score	0.5478	0.1632	69	0.0385

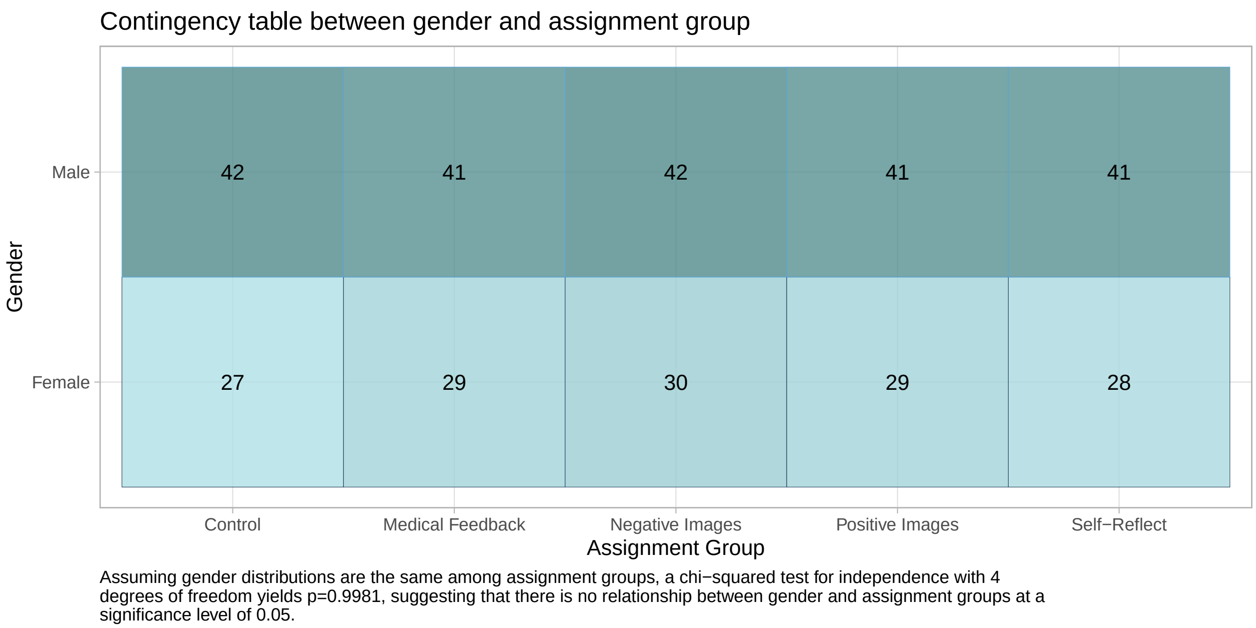
Gender

```
# TODO format figures and captions
#check balance between gender

gender_chiqq <- chisq.test(d_respondents[ , table(Assignment_Group, Gender)])
```

```r
pander(gender_chiq,style='rmarkdown')
```

Quitting from lines 570-586 (EDA.Rmd) Error in pander(gender_chiq, style = "rmarkdown") : object 'gender_chiq' not found Calls: ... withCallingHandlers -> withVisible -> eval -> eval -> pander

```r
create_heatmap(var1 = d_respondents$Assignment_Group,var2 = d_respondents$Gender) +
  xlab('Assignment Group') +
  ylab('Gender') +
  labs(title = 'Contingency table between gender and assignment group',
       caption = paste0('Assuming gender distributions are the same among assignment groups, a chi-squa
                        round(gender_chiqq$parameter,4),' \ndegrees of freedom ', 'yields p=',
                        round(gender_chiqq$p.value,4),
                        ', suggesting that there is no relationship between gender and assignment group
  theme(plot.caption = element_text(hjust = 0))
```



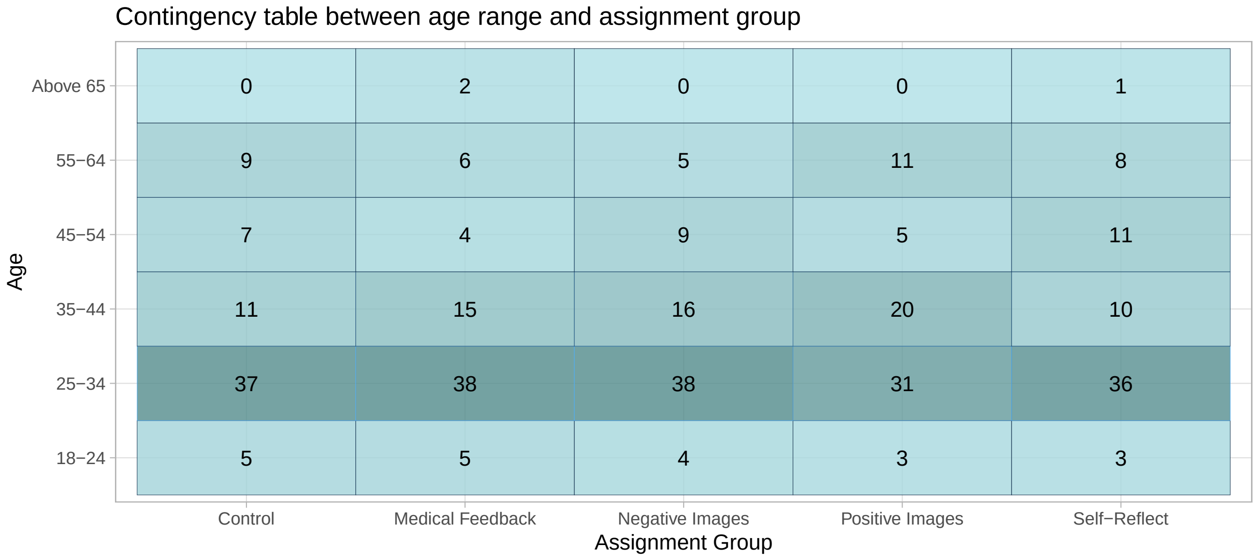
Age Range

```r
# TODO format figures and captions
#check balance between age-range

# expected frequency count for each cell of the contingency table should be at least 5. Since this is n
# https://stats.stackexchange.com/questions/81483/warning-in-r-chi-squared-approximation-may-be-incorre
age_chisq <- chisq.test(d_respondents[ , table(Assignment_Group, Age_Range)],simulate.p.value = TRUE)
pander(age_chisq,style='rmarkdown')
```

Table 3: Pearson's Chi-squared test with simulated p-value (based on 2000 replicates): `d_respondents[, table(Assignment_Group, Age_Range)]`

Test statistic	df	P value
19.22	NA	0.5037

```r
create_heatmap(var1 = d_respondents$Assignment_Group,var2 = d_respondents$Age_Range) +
  xlab('Assignment Group') +
  ylab('Age') +
  labs(title = 'Contingency table between age range and assignment group',
       caption = paste0('Assuming age distributions are the same among assignment groups, a chi-squared
                        round(age_chisq$p.value,4),
                        ', suggesting that there is no relationship between age and assignment groups a
  theme(plot.caption = element_text(hjust = 0))
```



Assuming age distributions are the same among assignment groups, a chi−squared test for independence with Monte Carlo simulation yields p=0.5037, suggesting that there is no relationship between age and assignment groups at a significance level of 0.05.

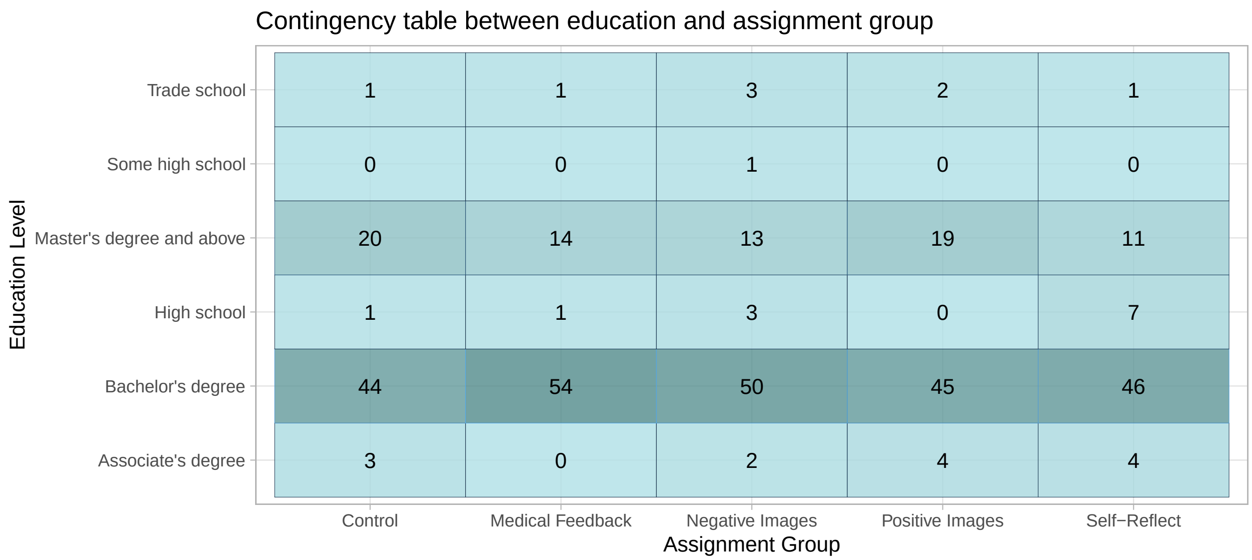
Education Level

```r
# TODO format figures and captions
#check balance between education levels
edu_chisq <- chisq.test(d_respondents[ , table(Assignment_Group, Education_Level)],simulate.p.value = T
pander(edu_chisq,style='rmarkdown')
```

Table 4: Pearson's Chi-squared test with simulated p-value (based on 2000 replicates): `d_respondents[, table(Assignment_Group, Education_Level)]`

Test statistic	df	P value
28.7	NA	0.07146

```r
create_heatmap(var1 = d_respondents$Assignment_Group,var2 = d_respondents$Education_Level) +
  xlab('Assignment Group') +
  ylab('Education Level') +
  labs(title = 'Contingency table between education and assignment group',
       caption = paste0('Assuming education distributions are the same among assignment groups, a chi-s
                        round(edu_chisq$p.value,4),
                        ', suggesting that there is no relationship \nbetween education and assignment
  theme(plot.caption = element_text(hjust = 0))
```



Assuming education distributions are the same among assignment groups, a chi−squared test for independence with Monte Carlo simulation yields p=0.0715, suggesting that there is no relationship between education and assignment groups at a significance level of 0.05.

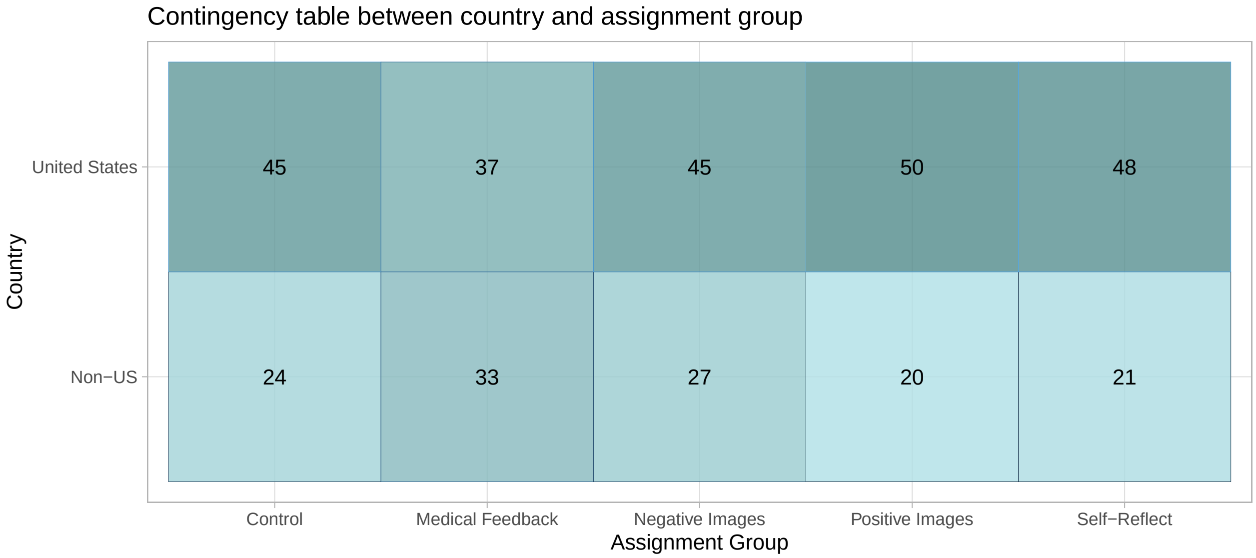
Country: US, non-US

```
# TODO format figures and captions
# out.width = "80%"
# check balance between US and non-US respondents

us_chisq <- chisq.test(d_respondents[ , table(Assignment_Group, US_Dummy)])
pander(us_chisq,style='rmarkdown')
```

Table 5: Pearson's Chi-squared test: `d_respondents[, table(Assignment_Group, US_Dummy)]`

Test statistic	df	P value
6.502	4	0.1647

```
create_heatmap(var1 = d_respondents$Assignment_Group,var2 = d_respondents$US_Dummy) +
  xlab('Assignment Group') +
  ylab('Country') +
  scale_y_discrete(breaks=c("0", "1"),
                   labels=c("Non-US", "United States")) +
  labs(title = 'Contingency table between country and assignment group',
       caption = paste0('Assuming country distributions are the same among assignment groups, a chi-squa
                        round(us_chisq$parameter,4),' degrees of freedom ', 'yields p=',
                        round(us_chisq$p.value,4),
                        ', suggesting that there is no relationship between country and assignment \ngro
  theme(plot.caption = element_text(hjust = 0))
```



Assuming country distributions are the same among assignment groups, a chi−squared test for independence with 4 degrees of freedom yields p=0.1647, suggesting that there is no relationship between country and assignment groups at a significance level of 0.05.

```
# ATE of treatment on Total Score

d_respondents[ Treatment_Dummy == 1, mean(Total_Score)] - d_respondents[ Treatment_Dummy == 0, mean(Tota

## [1] 0.5143

sd(d_respondents$Total_Score)

## [1] 3.743

# ATE of treatment on TaskPhase2 Score

d_respondents[ Treatment_Dummy == 1, mean(TaskPhase2_Score)] - d_respondents[ Treatment_Dummy == 0, mean

## [1] 0.05337

sd(d_respondents$TaskPhase2_Score)

## [1] 0.1645

#trying 2SLS...but dont think it applies here

# d_respondents[ , lm(Total_Score ~ Education_Level)]
# d_respondents[ , ivreg(Total_Score ~ Education_Level | Assignment_Group)]

power.t.test( delta = .05, sd=.16, sig.level = 0.05, power=0.8)

##
##      Two-sample t test power calculation
##
##               n = 161.7
##           delta = 0.05
##              sd = 0.16
##       sig.level = 0.05
##           power = 0.8
##     alternative = two.sided
##
## NOTE: n is number in *each* group
```

Analysis

Helper Functions

```
get_robust_se <- function(model){
  # Get robust SE for use in stargazer
  vcov <- vcovHC(model,type = "HC1")
  return(sqrt(diag(vcov)))
}
```

Task Phase 2 Analysis

```
# does any treatment have an effect on task phase 2 score?
mod_task2_a <- d_respondents[, lm(TaskPhase2_Score ~ Treatment_Dummy)]

mod_task2_b <- d_respondents[, lm(TaskPhase2_Score ~ Treatment_Dummy +
                                                     TaskPhase1_Score +
                                                     as.factor(Gender) +
                                                     as.factor(Education_Level) +
                                                     as.factor(Age_Range))]

stargazer(mod_task2_a,
          mod_task2_b,
          se = list(get_robust_se(mod_task2_a),get_robust_se(mod_task2_b)),
          omit = c("Education_Level","Age_Range"),
          add.lines = list(c('Education Fixed Effects', 'No','Yes'),
                           c('Age Fixed Effects','No','Yes')),
          header=FALSE,
          type='latex')
```

```
#add an F test to compare
pander(anova(mod_task2_a, mod_task2_b, test='F'),stle='rmarkdown')
```

Table 7: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
348	9.287	NA	NA	NA	NA
336	8.338	12	0.9498	3.19	0.0002426

```
#does the specific treatment group have an effect on task phase 2 score?
mod_task2_c <- d_respondents[, lm(TaskPhase2_Score ~ as.factor(Assignment_Group))]

mod_task2_d <- d_respondents[, lm(TaskPhase2_Score ~ as.factor(Assignment_Group) +
                                                     TaskPhase1_Score +
                                                     as.factor(Gender) +
                                                     as.factor(Education_Level) +
                                                     as.factor(Age_Range))]

# Do you think that there are features of the data that might systematically predict that people will r
# TODO update this heterogeneity issue. I'm not quite sure this applies because they're both considered
# mod5 <- d_respondents[, lm(TaskPhase2_Score ~ Treatment_Dummy + as.factor(assign_bin) +
#                              Treatment_Dummy * as.factor(assign_bin))]
```

Table 6:

	Dependent variable:	
	TaskPhase2_Score	
	(1)	(2)
Treatment_Dummy	0.053**	0.051**
	(0.022)	(0.022)
TaskPhase1_Score		0.240***
		(0.047)
as.factor(Gender)Male		−0.010
		(0.017)
Constant	0.461***	0.281***
	(0.019)	(0.072)
Education Fixed Effects	No	Yes
Age Fixed Effects	No	Yes
Observations	350	350
R^2	0.017	0.117
Adjusted R^2	0.014	0.083
Residual Std. Error	0.163 (df = 348)	0.158 (df = 336)
F Statistic	5.911** (df = 1; 348)	3.433*** (df = 13; 336)
Note:		*p<0.1; **p<0.05; ***p<0.01

```r
stargazer(mod_task2_c,
          mod_task2_d,
          se = list(get_robust_se(mod_task2_c),get_robust_se(mod_task2_d)),
          omit = c("Education_Level","Age_Range"),
          add.lines = list(c('Education Fixed Effects', 'No','Yes'),
                           c('Age Fixed Effects','No','Yes')),
          header=FALSE,
          type='latex')
```

Table 8:

	Dependent variable:	
	TaskPhase2_Score	
	(1)	(2)
as.factor(Assignment_Group)Medical Feedback	0.062**	0.055*
	(0.027)	(0.029)
as.factor(Assignment_Group)Negative Images	0.034	0.039
	(0.027)	(0.027)
as.factor(Assignment_Group)Positive Images	0.053*	0.050*
	(0.029)	(0.027)
as.factor(Assignment_Group)Self-Reflect	0.065**	0.058**
	(0.028)	(0.029)
TaskPhase1_Score		0.238***
		(0.048)
as.factor(Gender)Male		−0.010
		(0.017)
Constant	0.461***	0.282***
	(0.019)	(0.073)
Education Fixed Effects	No	Yes
Age Fixed Effects	No	Yes
Observations	350	350
R^2	0.021	0.119
Adjusted R^2	0.010	0.076
Residual Std. Error	0.164 (df = 345)	0.158 (df = 333)
F Statistic	1.874 (df = 4; 345)	2.805*** (df = 16; 333)
Note:		*p<0.1; **p<0.05; ***p<0.01

```r
pander(anova(mod_task2_c, mod_task2_d, test='F'),style='rmarkdown')
```

Table 9: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
345	9.244	NA	NA	NA	NA

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
333	8.323	12	0.921	3.071	0.0003943

Task Phase 3 Analysis

```
# test final task and any treatment
mod_task3_a <- d_respondents[, lm(TaskPhase3_Score ~ Treatment_Dummy)]
mod_task3_b <- d_respondents[, lm(TaskPhase3_Score ~ Treatment_Dummy +
                                                     TaskPhase1_Score +
                                                     as.factor(Gender) +
                                                     as.factor(Education_Level) +
                                                     as.factor(Age_Range))]

stargazer(mod_task3_a,
          mod_task3_b,
          se = list(get_robust_se(mod_task3_a),get_robust_se(mod_task3_b)),
          omit = c("Education_Level","Age_Range"),
          add.lines = list(c('Education Fixed Effects', 'No','Yes'),
                           c('Age Fixed Effects','No','Yes')),
          header=FALSE,
          type='latex')
```

```
pander(anova(mod_task3_a, mod_task3_b, test='F'),style='rmarkdown')
```

Table 11: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
348	8.865	NA	NA	NA	NA
336	8.117	12	0.7479	2.58	0.002743

```
# test final task and specific treatment
mod_task3_c <- d_respondents[, lm(TaskPhase3_Score ~ as.factor(Assignment_Group))]
mod_task3_d <- d_respondents[, lm(TaskPhase3_Score ~ as.factor(Assignment_Group) +
                                                     TaskPhase1_Score +
                                                     as.factor(Gender) +
                                                     as.factor(Education_Level) +
                                                     as.factor(Age_Range))]

stargazer(mod_task3_c,
          mod_task3_d,
          se = list(get_robust_se(mod_task3_c),get_robust_se(mod_task3_d)),
          omit = c("Education_Level","Age_Range"),
          add.lines = list(c('Education Fixed Effects', 'No','Yes'),
                           c('Age Fixed Effects','No','Yes')),
          header=FALSE,
          type='latex')
```

```
pander(anova(mod_task3_c, mod_task3_d, test='F'),style='rmarkdown')
```

Table 10:

	Dependent variable:	
	TaskPhase3_Score	
	(1)	(2)
Treatment_Dummy	0.004	0.002
	(0.019)	(0.019)
TaskPhase1_Score		0.161***
		(0.047)
as.factor(Gender)Male		−0.004
		(0.017)
Constant	0.538***	0.515***
	(0.017)	(0.064)
Education Fixed Effects	No	Yes
Age Fixed Effects	No	Yes
Observations	350	350
R^2	0.0001	0.084
Adjusted R^2	−0.003	0.049
Residual Std. Error	0.160 (df = 348)	0.155 (df = 336)
F Statistic	0.034 (df = 1; 348)	2.384*** (df = 13; 336)
Note:		*p<0.1; **p<0.05; ***p<0.01

Table 12:

	Dependent variable:	
	TaskPhase3_Score	
	(1)	(2)
as.factor(Assignment_Group)Medical Feedback	0.022	0.011
	(0.026)	(0.026)
as.factor(Assignment_Group)Negative Images	−0.015	−0.011
	(0.027)	(0.026)
as.factor(Assignment_Group)Positive Images	−0.001	0.004
	(0.025)	(0.025)
as.factor(Assignment_Group)Self-Reflect	0.010	0.005
	(0.026)	(0.026)
TaskPhase1_Score		0.157***
		(0.047)
as.factor(Gender)Male		−0.004
		(0.017)
Constant	0.538***	0.518***
	(0.017)	(0.064)
Education Fixed Effects	No	Yes
Age Fixed Effects	No	Yes
Observations	350	350
R^2	0.006	0.087
Adjusted R^2	−0.005	0.043
Residual Std. Error	0.160 (df = 345)	0.156 (df = 333)
F Statistic	0.545 (df = 4; 345)	1.971** (df = 16; 333)
Note:		*p<0.1; **p<0.05; ***p<0.01

Table 13: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
345	8.81	NA	NA	NA	NA
333	8.099	12	0.7113	2.437	0.004751

Wearing Off Effects

```
# TODO add within subjects design
# TODO d_respondents[ , lm(mean(TaskPhase3_Score,TaskPhase2_Score) ~  Assignment_Group + TaskPhase1_Sco
# TODO d_respondents[ , lm(TaskPhaseB ~  Assignment_Group + TaskPhaseA + as.factor(AmazonTurk_ID))] whe
mod_task3_e <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase2_Score)]
mod_task3_f <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase2_Score + Treatment_Dummy)]
mod_task3_g <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase2_Score + as.factor(Assignment_Group))]
mod_task3_h <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase2_Score +
                                                      as.factor(Assignment_Group) +
                                                      as.factor(Gender) +
                                                      as.factor(Education_Level) +
                                                      as.factor(Age_Range))]


stargazer(mod_task3_e,
          mod_task3_f,
          mod_task3_g,
          mod_task3_h,
          se = list(get_robust_se(mod_task3_e),
                    get_robust_se(mod_task3_f),
                    get_robust_se(mod_task3_h)),
                    get_robust_se(mod_task3_g),
          omit = c("Education_Level","Age_Range"),
          add.lines = list(c('Education Fixed Effects', 'No','No','No','Yes'),
                           c('Age Fixed Effects','No','No','No','Yes')),
          header=FALSE,
          type='text')
```

==

Dependent variable:

——————————————————————————– TaskPhase3_Score

(1) (2) (3) (4)

TaskPhase2_Score 0.239*** 0.242*** 0.238*** 0.241***
(0.050) (0.051) (0.052) (0.051)

Treatment_Dummy -0.009
(0.019)

as.factor(Assignment_Group)Medical Feedback 0.008 0.001
(0.027) (0.027)

as.factor(Assignment_Group)Negative Images -0.023 -0.023
(0.026) (0.026)

as.factor(Assignment_Group)Positive Images -0.013 -0.007
(0.025) (0.026)

as.factor(Assignment_Group)Self-Reflect -0.005 -0.010

(0.025) (0.027)

as.factor(Gender)Male -0.003
(0.017)

Constant 0.420*** 0.426*** 0.428*** 0.520***
(0.026) (0.028) (0.062) (0.062)

Education Fixed Effects No No No Yes Age Fixed Effects No No No Yes Observations 350 350 350 350 R2 0.061 0.061 0.065 0.113 Adjusted R2 0.058 0.056 0.052 0.070 Residual Std. Error 0.155 (df = 348) 0.155 (df = 347) 0.155 (df = 344) 0.154 (df = 333) F Statistic 22.540*** (df = 1; 348) 11.330*** (df = 2; 347) 4.815*** (df = 5; 344) 2.654*** (df = 16; 333)
==
Note: *p<0.1;* ***p<0.05;*** p<0.01
==
(Intercept) TaskPhase2_Score as.factor(Assignment_Group)Medical Feedback as.factor(Assignment_Group)Negative Images as.factor(Assignment_Group)Positive Images as.factor(Assignment_Group)Self-Reflect

0.028 0.051 0.026 0.026 0.025 0.024

```
pander(anova(mod_task3_e, mod_task3_f, test='F'),style='rmarkdown')
```

Table 15: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
348	8.326	NA	NA	NA	NA
347	8.322	1	0.004358	0.1817	0.6702

```
pander(anova(mod_task3_g, mod_task3_h, test='F'),style='rmarkdown')
```

Table 16: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
344	8.286	NA	NA	NA	NA
333	7.863	11	0.4227	1.627	0.08955

```
##
mod_task3_i <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase1_Score + TaskPhase2_Score)]
mod_task3_j <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase1_Score + TaskPhase2_Score + Treatment_Du
mod_task3_k <- d_respondents[ , lm(TaskPhase3_Score ~ TaskPhase1_Score + TaskPhase2_Score + as.factor(As
mod_task3_l <- d_respondents[, lm(TaskPhase3_Score ~ TaskPhase1_Score + TaskPhase2_Score +
                                                     as.factor(Assignment_Group) +
                                                     as.factor(Gender) +
                                                     as.factor(Education_Level) +
                                                     as.factor(Age_Range))]

stargazer(mod_task3_i,
          mod_task3_j,
          mod_task3_k,
          mod_task3_l,
```

```r
         se = list(get_robust_se(mod_task3_i),
                   get_robust_se(mod_task3_j),
                   get_robust_se(mod_task3_k),
                   get_robust_se(mod_task3_l)),
         header=FALSE,
         type='text')
```

===
Dependent variable:

———————————————————————————————————— TaskPhase3_Score

(1) (2) (3) (4)

———

—- TaskPhase1_Score 0.113** 0.113** 0.109** 0.108**
(0.046) (0.046) (0.046) (0.048)

TaskPhase2_Score 0.202*** 0.204*** 0.202*** 0.208***
(0.053) (0.054) (0.053) (0.054)

Treatment_Dummy -0.007
(0.019)

as.factor(Assignment_Group)Medical Feedback 0.007 -0.001
(0.026) (0.026)

as.factor(Assignment_Group)Negative Images -0.019 -0.019
(0.026) (0.026)

as.factor(Assignment_Group)Positive Images -0.012 -0.007
(0.024) (0.025)

as.factor(Assignment_Group)Self-Reflect -0.002 -0.007
(0.024) (0.025)

as.factor(Gender)Male -0.002
(0.016)

as.factor(Education_Level)Bachelor's degree -0.043
(0.046)

as.factor(Education_Level)High school -0.058
(0.054)

as.factor(Education_Level)Master's degree and above -0.065
(0.047)

as.factor(Education_Level)Some high school 0.133***
(0.051)

as.factor(Education_Level)Trade school -0.131**
(0.062)

as.factor(Age_Range)25-34 -0.021
(0.033)

as.factor(Age_Range)35-44 -0.062*
(0.036)

as.factor(Age_Range)45-54 -0.049
(0.043)

as.factor(Age_Range)55-64 -0.056
(0.036)

as.factor(Age_Range)Above 65 0.201***
(0.050)

Constant 0.370*** 0.375*** 0.378*** 0.460***
(0.032) (0.034) (0.034) (0.067)

Observations 350 350 350 350
R2 0.077 0.078 0.081 0.127
Adjusted R2 0.072 0.070 0.064 0.082
Residual Std. Error 0.154 (df = 347) 0.154 (df = 346) 0.154 (df = 343) 0.153 (df = 332)
F Statistic 14.520*** (df = 2; 347) 9.693*** (df = 3; 346) 5.010*** (df = 6; 343) 2.844*** (df = 17; 332)
==
Note: *p<0.1;* ***p<0.05;*** p<0.01

```
pander(anova(mod_task3_i, mod_task3_j, test = 'F'),style='rmarkdown')
```

Table 17: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
347	8.181	NA	NA	NA	NA
346	8.178	1	0.002531	0.1071	0.7437

```
pander(anova(mod_task3_k, mod_task3_l, test = 'F'),style='rmarkdown')
```

Table 18: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
343	8.151	NA	NA	NA	NA
332	7.739	11	0.4128	1.61	0.09435

```
# lm(TaskPhase3_Score ~ TaskPhase2_Score) vs lm(TaskPhase3_Score ~ TaskPhase1_Score + TaskPhase2_Score)
pander(anova(mod_task3_e, mod_task3_i, test = 'F'),style='rmarkdown')
```

Table 19: Analysis of Variance Table

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
348	8.326	NA	NA	NA	NA
347	8.181	1	0.1455	6.172	0.01345

Playground

```
# compare self-reflect against medical feedback groups?
#make dummies
d_respondents[ , Self_Reflect_Dummy := ifelse(Assignment_Group == "Self-Reflect", 1, 0)]
d_respondents[ , Med_Feedback_Dummy := ifelse(Assignment_Group == "Medical Feedback", 1, 0)]

mod_test_dummies1 <- d_respondents[ , lm(TaskPhase2_Score ~ Treatment_Dummy + Self_Reflect_Dummy)]
mod_test_dummies2 <- d_respondents[ , lm(TaskPhase2_Score ~ Treatment_Dummy + Med_Feedback_Dummy)]
```

```r
stargazer(mod_test_dummies1,
          mod_test_dummies2,
          se = list(get_robust_se(mod_test_dummies1),
                    get_robust_se(mod_test_dummies2)),
          header=FALSE,
          type = 'latex')
```

```
##
## \begin{table}[!htbp] \centering
##   \caption{}
##   \label{}
## \begin{tabular}{@{\extracolsep{5pt}}lcc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
##  & \multicolumn{2}{c}{\textit{Dependent variable:}} \\
## \cline{2-3}
## \\[-1.8ex] & \multicolumn{2}{c}{TaskPhase2\_Score} \\
## \\[-1.8ex] & (1) & (2)\\
## \hline \\[-1.8ex]
##  Treatment\_Dummy & 0.050$^{**}$ & 0.051$^{**}$ \\
##   & (0.022) & (0.023) \\
##   & & \\
##  Self\_Reflect\_Dummy & 0.016 &  \\
##   & (0.023) &  \\
##   & & \\
##  Med\_Feedback\_Dummy &  & 0.011 \\
##   &  & (0.022) \\
##   & & \\
##  Constant & 0.461$^{***}$ & 0.461$^{***}$ \\
##   & (0.019) & (0.019) \\
##   & & \\
## \hline \\[-1.8ex]
## Observations & 350 & 350 \\
## R$^{2}$ & 0.018 & 0.017 \\
## Adjusted R$^{2}$ & 0.012 & 0.012 \\
## Residual Std. Error (df = 347) & 0.163 & 0.164 \\
## F Statistic (df = 2; 347) & 3.192$^{**}$ & 3.079$^{**}$ \\
## \hline
## \hline \\[-1.8ex]
## \textit{Note:}  & \multicolumn{2}{r}{$^{*}$p$<$0.1; $^{**}$p$<$0.05; $^{***}$p$<$0.01} \\
## \end{tabular}
## \end{table}
```

```r
# compare positive images against negative images feedback groups?
#make dummies
d_respondents[ , Positive_Images_Dummy := ifelse(Assignment_Group == "Positive Images", 1, 0)]
d_respondents[ , Negative_Images_Dummy := ifelse(Assignment_Group == "Negative Images", 1, 0)]

mod_test_dummies3 <- d_respondents[ , lm(TaskPhase2_Score ~ Treatment_Dummy + Positive_Images_Dummy)]
mod_test_dummies4 <- d_respondents[ , lm(TaskPhase2_Score ~ Treatment_Dummy + Negative_Images_Dummy)]

stargazer(mod_test_dummies3,
          mod_test_dummies4,
          se = list(get_robust_se(mod_test_dummies3),
```

```r
                    get_robust_se(mod_test_dummies4)),
          type = 'text')
```

```
##
## ============================================================
##                                  Dependent variable:
##                               ----------------------------
##                                    TaskPhase2_Score
##                                    (1)            (2)
## ------------------------------------------------------------
## Treatment_Dummy                  0.053**       0.060***
##                                  (0.022)        (0.023)
##
## Positive_Images_Dummy             0.0001
##                                  (0.024)
##
## Negative_Images_Dummy                           -0.027
##                                                 (0.022)
##
## Constant                         0.461***      0.461***
##                                  (0.019)        (0.019)
##
## ------------------------------------------------------------
## Observations                       350            350
## R2                                0.017          0.021
## Adjusted R2                       0.011          0.015
## Residual Std. Error (df = 347)    0.164          0.163
## F Statistic (df = 2; 347)         2.947*         3.670**
## ============================================================
## Note:                           *p<0.1; **p<0.05; ***p<0.01
```

Playground 2

```r
### linear model playground
d_test <- d_respondents[,c("Assignment_Group","TaskPhase1_Score","TaskPhase2_Score","TaskPhase3_Score",

#does treatment have an effect on total score?
mod_test1 <- d_test[ , lm(TaskPhase2_Score ~ TaskPhase1_Score + Treatment_Dummy)]


mod_test2 <- d_test[, lm(TaskPhase2_Score ~ TaskPhase1_Score + Treatment_Dummy + (TaskPhase1_Score * Tr

#does treatment and pretreatment score have an effect on total score?


###
# seems that if i ad in TaskPhase1 to the linear model, the RSEs disappear...
mod_test3 <- d_test[, lm(TaskPhase2_Score ~  Treatment_Dummy  +
                                   TaskPhase1_Score +
                                   as.factor(Education_Level) +
                                   as.factor(Gender) +
                                   as.factor(Age_Range)
                          )]
```

```r
coeftest(mod_test3, vcov = vcovHC(mod_test3,"HC1"))
```

```
##
## t test of coefficients:
##
##                                                       Estimate Std. Error t value
## (Intercept)                                            0.28108    0.07213    3.90
## Treatment_Dummy                                        0.05071    0.02217    2.29
## TaskPhase1_Score                                       0.24027    0.04682    5.13
## as.factor(Education_Level)Bachelor's degree           -0.00683    0.04856   -0.14
## as.factor(Education_Level)High school                  0.04068    0.05619    0.72
## as.factor(Education_Level)Master's degree and above -0.01698    0.05128   -0.33
## as.factor(Education_Level)Some high school            -0.12065    0.05108   -2.36
## as.factor(Education_Level)Trade school                 0.02867    0.06926    0.41
## as.factor(Gender)Male                                 -0.00995    0.01735   -0.57
## as.factor(Age_Range)25-34                              0.04469    0.03768    1.19
## as.factor(Age_Range)35-44                              0.04198    0.03952    1.06
## as.factor(Age_Range)45-54                              0.06975    0.04178    1.67
## as.factor(Age_Range)55-64                              0.08035    0.04252    1.89
## as.factor(Age_Range)Above 65                           0.12575    0.05172    2.43
##                                                       Pr(>|t|)
## (Intercept)                                            0.00012 ***
## Treatment_Dummy                                        0.02281 *
## TaskPhase1_Score                                       4.9e-07 ***
## as.factor(Education_Level)Bachelor's degree            0.88827
## as.factor(Education_Level)High school                  0.46957
## as.factor(Education_Level)Master's degree and above   0.74080
## as.factor(Education_Level)Some high school             0.01874 *
## as.factor(Education_Level)Trade school                 0.67922
## as.factor(Gender)Male                                  0.56658
## as.factor(Age_Range)25-34                              0.23642
## as.factor(Age_Range)35-44                              0.28890
## as.factor(Age_Range)45-54                              0.09593 .
## as.factor(Age_Range)55-64                              0.05968 .
## as.factor(Age_Range)Above 65                           0.01556 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(d_respondents$TaskPhase1_Score)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.200   0.500   0.600   0.606   0.700   1.000
```

```r
stargazer(mod_test1,
          mod_test2,
          mod_test3,
          se = list(get_robust_se(mod_test1),get_robust_se(mod_test2), get_robust_se(mod_test3)),
          type='latex')
```

```
##
## % Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harva
## % Date and time: Sun, Dec 06, 2020 - 12:09:51
## \begin{table}[!htbp] \centering
##   \caption{}
##   \label{}
```

```
## \begin{tabular}{@{\extracolsep{5pt}}lccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
##  & \multicolumn{3}{c}{\textit{Dependent variable:}} \\
## \cline{2-4}
## \\[-1.8ex] & \multicolumn{3}{c}{TaskPhase2\_Score} \\
## \\[-1.8ex] & (1) & (2) & (3)\\
## \hline \\[-1.8ex]
##  TaskPhase1\_Score & 0.249$^{***}$ & 0.153 & 0.240$^{***}$ \\
##   & (0.044) & (0.095) & (0.047) \\
##   & & & \\
##  as.factor(Education\_Level)Bachelor's degree &  &  & $-$0.007 \\
##   &  &  & (0.049) \\
##   & & & \\
##  as.factor(Education\_Level)High school &  &  & 0.041 \\
##   &  &  & (0.056) \\
##   & & & \\
##  as.factor(Education\_Level)Master's degree and above &  &  & $-$0.017 \\
##   &  &  & (0.051) \\
##   & & & \\
##  as.factor(Education\_Level)Some high school &  &  & $-$0.121$^{**}$ \\
##   &  &  & (0.051) \\
##   & & & \\
##  as.factor(Education\_Level)Trade school &  &  & 0.029 \\
##   &  &  & (0.069) \\
##   & & & \\
##  as.factor(Gender)Male &  &  & $-$0.010 \\
##   &  &  & (0.017) \\
##   & & & \\
##  as.factor(Age\_Range)25-34 &  &  & 0.045 \\
##   &  &  & (0.038) \\
##   & & & \\
##  as.factor(Age\_Range)35-44 &  &  & 0.042 \\
##   &  &  & (0.040) \\
##   & & & \\
##  as.factor(Age\_Range)45-54 &  &  & 0.070$^{*}$ \\
##   &  &  & (0.042) \\
##   & & & \\
##  as.factor(Age\_Range)55-64 &  &  & 0.080$^{*}$ \\
##   &  &  & (0.043) \\
##   & & & \\
##  as.factor(Age\_Range)Above 65 &  &  & 0.126$^{**}$ \\
##   &  &  & (0.052) \\
##   & & & \\
##  Treatment\_Dummy & 0.054$^{**}$ & $-$0.019 & 0.051$^{**}$ \\
##   & (0.021) & (0.065) & (0.022) \\
##   & & & \\
##  TaskPhase1\_Score:Treatment\_Dummy &  & 0.120 &  \\
##   &  & (0.107) &  \\
##   & & & \\
##  Constant & 0.310$^{***}$ & 0.368$^{***}$ & 0.281$^{***}$ \\
##   & (0.032) & (0.057) & (0.072) \\
##   & & & \\
## \hline \\[-1.8ex]
```

```
## Observations & 350 & 350 & 350 \\
## R$^{2}$ & 0.098 & 0.101 & 0.117 \\
## Adjusted R$^{2}$ & 0.092 & 0.093 & 0.083 \\
## Residual Std. Error & 0.157 (df = 347) & 0.157 (df = 346) & 0.158 (df = 336) \\
## F Statistic & 18.780$^{***}$ (df = 2; 347) & 12.920$^{***}$ (df = 3; 346) & 3.433$^{***}$ (df = 13; 3
## \hline
## \hline \\[-1.8ex]
## \textit{Note:}  & \multicolumn{3}{r}{$^{*}$p$<$0.1; $^{**}$p$<$0.05; $^{***}$p$<$0.01} \\
## \end{tabular}
## \end{table}
```

```
mod_test4 <- d_test[ , lm(TaskPhase3_Score ~ TaskPhase2_Score)]
coeftest(mod_test4)
```

```
##
## t test of coefficients:
##
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)        0.4205     0.0267   15.77   <2e-16 ***
## TaskPhase2_Score   0.2389     0.0503    4.75    3e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# use Robust SE
mod_test2 <- d_respondents[, lm(TaskPhase2_Score ~ Treatment_Dummy  + as.factor(Education_Level) + (Trea
mod_test2$vcovHC_ <- vcovHC(mod_test2)
coeftest(mod_test2, vcov = mod_test2$vcovHC_)
```

```
##
## t test of coefficients:
##
##                                                                   Estimate
## (Intercept)                                                        0.53333
## Treatment_Dummy                                                    0.00667
## as.factor(Education_Level)Bachelor's degree                       -0.07424
## as.factor(Education_Level)High school                             -0.03333
## as.factor(Education_Level)Master's degree and above               -0.07333
## as.factor(Education_Level)Some high school                        -0.14000
## as.factor(Education_Level)Trade school                            -0.23333
## Treatment_Dummy:as.factor(Education_Level)Bachelor's degree        0.04142
## Treatment_Dummy:as.factor(Education_Level)High school              0.07515
## Treatment_Dummy:as.factor(Education_Level)Master's degree and above  0.04386
## Treatment_Dummy:as.factor(Education_Level)Trade school             0.30762
##                                                                   Std. Error
## (Intercept)                                                               NA
## Treatment_Dummy                                                           NA
## as.factor(Education_Level)Bachelor's degree                               NA
## as.factor(Education_Level)High school                                     NA
## as.factor(Education_Level)Master's degree and above                       NA
## as.factor(Education_Level)Some high school                                NA
## as.factor(Education_Level)Trade school                                    NA
## Treatment_Dummy:as.factor(Education_Level)Bachelor's degree               NA
## Treatment_Dummy:as.factor(Education_Level)High school                     NA
## Treatment_Dummy:as.factor(Education_Level)Master's degree and above       NA
## Treatment_Dummy:as.factor(Education_Level)Trade school                    NA
##                                                                   t value
```

```
## (Intercept)                                                              NA
## Treatment_Dummy                                                          NA
## as.factor(Education_Level)Bachelor's degree                              NA
## as.factor(Education_Level)High school                                    NA
## as.factor(Education_Level)Master's degree and above                      NA
## as.factor(Education_Level)Some high school                               NA
## as.factor(Education_Level)Trade school                                   NA
## Treatment_Dummy:as.factor(Education_Level)Bachelor's degree              NA
## Treatment_Dummy:as.factor(Education_Level)High school                    NA
## Treatment_Dummy:as.factor(Education_Level)Master's degree and above      NA
## Treatment_Dummy:as.factor(Education_Level)Trade school                   NA
##                                                                    Pr(>|t|)
## (Intercept)                                                               NA
## Treatment_Dummy                                                           NA
## as.factor(Education_Level)Bachelor's degree                               NA
## as.factor(Education_Level)High school                                     NA
## as.factor(Education_Level)Master's degree and above                       NA
## as.factor(Education_Level)Some high school                                NA
## as.factor(Education_Level)Trade school                                    NA
## Treatment_Dummy:as.factor(Education_Level)Bachelor's degree               NA
## Treatment_Dummy:as.factor(Education_Level)High school                     NA
## Treatment_Dummy:as.factor(Education_Level)Master's degree and above       NA
## Treatment_Dummy:as.factor(Education_Level)Trade school                    NA
```