

diff_models_new

```
knitr::opts_chunk$set(warning = FALSE, message = FALSE)
library(magrittr)
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(tidyr)

##
## Attaching package: 'tidyr'

## The following object is masked from 'package:magrittr':
##
##   extract

library(tidyverse)

## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v forcats   1.0.1      v readr     2.1.5
## v ggplot2    4.0.0      v stringr  1.5.2
## v lubridate  1.9.4      v tibble   3.3.0
## v purrr      1.1.0

## -- Conflicts ----- tidyverse_conflicts() --
## x tidyr::extract() masks magrittr::extract()
## x dplyr::filter()  masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## x purrr::set_names() masks magrittr::set_names()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(janitor)

##
## Attaching package: 'janitor'
##
## The following objects are masked from 'package:stats':
##
##   chisq.test, fisher.test

library(stringr)

rm(list = ls())
```

```

set.seed(1)

df <- read.csv("final_data_251023-complete.csv")
df_all <- read.csv("final_data_251023-allcases.csv")

#df_all <- final_tidy_data
#df <- final_tidy_data_complete

#hotfix for HHI- ONLY RUN ONCE

df$HHI <- df$HHI*(-2)+60

#data cleaning for regular models

tmt_df <- filter(df, df$`Treatment.or.Waitlist` == "T")

tmt_df <- group_by(tmt_df, record_id) %>%
  mutate(
    diff_EC = ECscore[redcap_event_name == "session_1_arm_1"] - ECscore,
    diff_BN = BNscore[redcap_event_name == "session_1_arm_1"] - BNscore,
    diff_RV = RVscore[redcap_event_name == "session_1_arm_1"] - RVscore,
    diff_AV = AVscore[redcap_event_name == "session_1_arm_1"] - AVscore,
    diff_global = global[redcap_event_name == "session_1_arm_1"] - global,
    diff_suscept = susceptibility[redcap_event_name == "session_1_arm_1"] - susceptibility,
    diff_sever = severity[redcap_event_name == "session_1_arm_1"] - severity,
    diff_bene = benefits[redcap_event_name == "session_1_arm_1"] - benefits,
    diff_barr = barriers[redcap_event_name == "session_1_arm_1"] - barriers,
    diff_cues = cues_action[redcap_event_name == "session_1_arm_1"] - cues_action,
    diff_eff = efficacy[redcap_event_name == "session_1_arm_1"] - efficacy,
    diff_HHI = HHI[redcap_event_name == "session_1_arm_1"] - HHI
  ) %>% ungroup()

wl_df <- filter(df, df$`Treatment.or.Waitlist` == "W")

wl_df <- group_by(wl_df, record_id) %>%
  mutate(
    diff_EC = ECscore[redcap_event_name == "session_2_arm_1"] - ECscore,
    diff_BN = BNscore[redcap_event_name == "session_2_arm_1"] - BNscore,
    diff_RV = RVscore[redcap_event_name == "session_2_arm_1"] - RVscore,
    diff_AV = AVscore[redcap_event_name == "session_2_arm_1"] - AVscore,
    diff_global = global[redcap_event_name == "session_2_arm_1"] - global,
    diff_suscept = susceptibility[redcap_event_name == "session_2_arm_1"] - susceptibility,
    diff_sever = severity[redcap_event_name == "session_2_arm_1"] - severity,
    diff_bene = benefits[redcap_event_name == "session_2_arm_1"] - benefits,
    diff_barr = barriers[redcap_event_name == "session_2_arm_1"] - barriers,
    diff_cues = cues_action[redcap_event_name == "session_2_arm_1"] - cues_action,
    diff_eff = efficacy[redcap_event_name == "session_2_arm_1"] - efficacy,
    diff_HHI = HHI[redcap_event_name == "session_2_arm_1"] - HHI
  ) %>% ungroup()

diff_tmt <- tmt_df %>% select(record_id, diff_EC:diff_HHI)

diff_df <- rbind(filter(tmt_df, redcap_event_name == "session_2_arm_1"), filter(wl_df, redcap_event_name

```

```
fit_diff_aphab <- lm(diff_global ~ diff_suscept + diff_sever + diff_bene + diff_barr + diff_cues + diff_eff, data = diff_df)
summary(fit_diff_aphab)
```

```
##
## Call:
## lm(formula = diff_global ~ diff_suscept + diff_sever + diff_bene +
##     diff_barr + diff_cues + diff_eff, data = diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.17765 -0.10352 -0.01249  0.06220  0.41639
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.186125   0.034081   5.461 8.84e-06 ***
## diff_suscept   0.015563   0.027508   0.566  0.576
## diff_sever    -0.014671   0.014325  -1.024  0.315
## diff_bene     -0.014950   0.027687  -0.540  0.594
## diff_barr      0.038887   0.026901   1.446  0.160
## diff_cues     -0.001946   0.014053  -0.138  0.891
## diff_eff       0.007907   0.013677   0.578  0.568
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1561 on 27 degrees of freedom
## Multiple R-squared:  0.2058, Adjusted R-squared:  0.02926
## F-statistic: 1.166 on 6 and 27 DF,  p-value: 0.3533
```

```
fit_diff_hhi <- lm(diff_HHI ~ diff_suscept + diff_sever + diff_bene + diff_barr + diff_cues + diff_eff, data = diff_df)
summary(fit_diff_hhi)
```

```
##
## Call:
## lm(formula = diff_HHI ~ diff_suscept + diff_sever + diff_bene +
##     diff_barr + diff_cues + diff_eff, data = diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -17.918  -8.676  -1.711   6.278  29.752
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  13.1504    2.8737   4.576 9.51e-05 ***
## diff_suscept   1.4732    2.3194   0.635  0.531
## diff_sever    -0.6283    1.2078  -0.520  0.607
## diff_bene     -1.9780    2.3345  -0.847  0.404
## diff_barr      1.1482    2.2683   0.506  0.617
## diff_cues      0.1472    1.1849   0.124  0.902
## diff_eff       1.3553    1.1532   1.175  0.250
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 13.16 on 27 degrees of freedom
## Multiple R-squared:  0.1539, Adjusted R-squared: -0.03417
```

```
## F-statistic: 0.8183 on 6 and 27 DF, p-value: 0.5654
```

```
#filter(df, df$`Treatment or Waitlist` == "T")
diff_tmt <- tmt_df %>% filter(redcap_event_name == "session_2_arm_1") %>% select(record_id, diff_EC:diff_I)
base_tmt <- inner_join(filter(df, redcap_event_name == "session_1_arm_1" & `Treatment.or.Waitlist` == "T"), diff_tmt)

diff_wl <- wl_df %>% filter(redcap_event_name == "session_3_arm_1") %>% select(record_id, diff_EC:diff_I)
base_wl <- inner_join(filter(df, redcap_event_name == "session_2_arm_1" & `Treatment.or.Waitlist` == "W"), diff_wl)

base_diff_df <- rbind(base_tmt, base_wl)

fit_base_aphab_both <- lm(diff_global ~ susceptibility + severity + benefits + barriers + cues_action +
summary(fit_base_aphab_both)
```

```
##
## Call:
## lm(formula = diff_global ~ susceptibility + severity + benefits +
##     barriers + cues_action + efficacy + HHI + global, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.274778 -0.062937  0.009656  0.062037  0.146084
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.012119   0.154855  -0.078 0.938245
## susceptibility -0.039355   0.018761  -2.098 0.046209 *
## severity      0.008214   0.009621   0.854 0.401350
## benefits     -0.001268   0.017731  -0.071 0.943579
## barriers     -0.015087   0.016263  -0.928 0.362459
## cues_action    0.016497   0.009005   1.832 0.078912 .
## efficacy     -0.002292   0.012077  -0.190 0.850990
## HHI          -0.001144   0.002402  -0.476 0.637859
## global        0.846628   0.198858   4.257 0.000255 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1106 on 25 degrees of freedom
## Multiple R-squared:  0.6311, Adjusted R-squared:  0.5131
## F-statistic: 5.346 on 8 and 25 DF, p-value: 0.0005593
```

```
fit_base_aphab_other <- lm(diff_global ~ susceptibility + severity + benefits + barriers + cues_action +
summary(fit_base_aphab_other)
```

```
##
## Call:
## lm(formula = diff_global ~ susceptibility + severity + benefits +
##     barriers + cues_action + efficacy + HHI, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.26613 -0.05430  0.00758  0.09536  0.25331
##
## Coefficients:
```

```
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.109868   0.195994   0.561  0.57989
## susceptibility -0.009621   0.022426  -0.429  0.67144
## severity       0.019265   0.011931   1.615  0.11844
## benefits      -0.013462   0.022536  -0.597  0.55543
## barriers       -0.006699   0.020791  -0.322  0.74987
## cues_action    0.001662   0.010695   0.155  0.87773
## efficacy      -0.007112   0.015485  -0.459  0.64987
## HHI           0.006548   0.002038   3.213  0.00349 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1424 on 26 degrees of freedom
## Multiple R-squared:  0.3636, Adjusted R-squared:  0.1923
## F-statistic: 2.123 on 7 and 26 DF,  p-value: 0.07689

fit_base_aphab_same <- lm(diff_global ~ susceptibility + severity + benefits + barriers + cues_action +
summary(fit_base_aphab_same)

##
## Call:
## lm(formula = diff_global ~ susceptibility + severity + benefits +
##     barriers + cues_action + efficacy + global, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.28223 -0.06718  0.01438  0.06677  0.14897
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.007206   0.152197  -0.047   0.9626
## susceptibility -0.036747   0.017677  -2.079   0.0476 *
## severity       0.008719   0.009419   0.926   0.3631
## benefits      -0.002635   0.017235  -0.153   0.8797
## barriers      -0.014415   0.015959  -0.903   0.3747
## cues_action    0.015297   0.008517   1.796   0.0841 .
## efficacy      -0.002921   0.011825  -0.247   0.8069
## global        0.775347   0.129059   6.008 2.41e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1089 on 26 degrees of freedom
## Multiple R-squared:  0.6278, Adjusted R-squared:  0.5275
## F-statistic: 6.264 on 7 and 26 DF,  p-value: 0.0002295

fit_base_HHI_both <- lm(diff_HHI ~ susceptibility + severity + benefits + barriers + cues_action + effi
summary(fit_base_HHI_both)

##
## Call:
## lm(formula = diff_HHI ~ susceptibility + severity + benefits +
##     barriers + cues_action + efficacy + HHI + global, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```

## -17.321  -4.860   1.527   5.064  13.729
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.33073   11.72949   0.369   0.715
## susceptibility  0.04231    1.42108   0.030   0.976
## severity       -0.66007    0.72872  -0.906   0.374
## benefits       -1.43201    1.34304  -1.066   0.297
## barriers       -0.29666    1.23187  -0.241   0.812
## cues_action     0.34697    0.68212   0.509   0.615
## efficacy        0.50015    0.91475   0.547   0.589
## HHI             0.85269    0.18193   4.687 8.39e-05 ***
## global          1.34457   15.06253   0.089   0.930
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.376 on 25 degrees of freedom
## Multiple R-squared:  0.6829, Adjusted R-squared:  0.5814
## F-statistic: 6.728 on 8 and 25 DF,  p-value: 0.0001042

fit_base_HHI_other <- lm(diff_HHI ~ susceptibility + severity + benefits + barriers + cues_action + effi
summary(fit_base_HHI_other)

##
## Call:
## lm(formula = diff_HHI ~ susceptibility + severity + benefits +
##     barriers + cues_action + efficacy + global, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -15.792  -5.970  -1.876   7.733  27.442
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.6705   15.7301   0.043 0.966327
## susceptibility -1.9005    1.8269  -1.040 0.307803
## severity       -1.0365    0.9735  -1.065 0.296782
## benefits       -0.4135    1.7813  -0.232 0.818258
## barriers       -0.7971    1.6495  -0.483 0.632970
## cues_action     1.2407    0.8803   1.409 0.170554
## efficacy        0.9682    1.2221   0.792 0.435388
## global          54.4529   13.3387   4.082 0.000377 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 11.26 on 26 degrees of freedom
## Multiple R-squared:  0.4042, Adjusted R-squared:  0.2437
## F-statistic: 2.519 on 7 and 26 DF,  p-value: 0.04051

fit_base_HHI_same <- lm(diff_HHI ~ susceptibility + severity + benefits + barriers + cues_action + effi
summary(fit_base_HHI_same)

##
## Call:
## lm(formula = diff_HHI ~ susceptibility + severity + benefits +

```

```
## barriers + cues_action + efficacy + HHI, data = base_diff_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -17.308  -4.926   1.490   4.861  13.840
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.52446   11.30491   0.400   0.692
## susceptibility  0.08953    1.29354   0.069   0.945
## severity       -0.64252    0.68817  -0.934   0.359
## benefits       -1.45138    1.29987  -1.117   0.274
## barriers       -0.28334    1.19924  -0.236   0.815
## cues_action     0.32341    0.61687   0.524   0.605
## efficacy        0.49249    0.89318   0.551   0.586
## HHI             0.86491    0.11756   7.357 8.19e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.214 on 26 degrees of freedom
## Multiple R-squared:  0.6828, Adjusted R-squared:  0.5973
## F-statistic: 7.994 on 7 and 26 DF,  p-value: 3.462e-05

#t tests

wl_control <- filter(df, df$`Treatment.or.Waitlist` == "W")

wl_control <- group_by(wl_df, record_id) %>%
  mutate(
    diff_EC = ECscore[redcap_event_name == "session_1_arm_1"] - ECscore,
    diff_BN = BNscore[redcap_event_name == "session_1_arm_1"] - BNscore,
    diff_RV = RVscore[redcap_event_name == "session_1_arm_1"] - RVscore,
    diff_AV = AVscore[redcap_event_name == "session_1_arm_1"] - AVscore,
    diff_global = global[redcap_event_name == "session_1_arm_1"] - global,
    diff_suscept = susceptibility[redcap_event_name == "session_1_arm_1"] - susceptibility,
    diff_sever = severity[redcap_event_name == "session_1_arm_1"] - severity,
    diff_bene = benefits[redcap_event_name == "session_1_arm_1"] - benefits,
    diff_barr = barriers[redcap_event_name == "session_1_arm_1"] - barriers,
    diff_cues = cues_action[redcap_event_name == "session_1_arm_1"] - cues_action,
    diff_eff = efficacy[redcap_event_name == "session_1_arm_1"] - efficacy,
    diff_HHI = HHI[redcap_event_name == "session_1_arm_1"] - HHI
  ) %>% ungroup()

(t_test_HHI <- t.test(filter(tmt_df, redcap_event_name == "session_2_arm_1")$diff_HHI, filter(wl_control, redcap_event_name == "session_2_arm_1")$diff_HHI))

##
## Welch Two Sample t-test
##
## data:  filter(tmt_df, redcap_event_name == "session_2_arm_1")$diff_HHI and filter(wl_control, redcap_event_name == "session_2_arm_1")$diff_HHI
## t = 3.5572, df = 31.999, p-value = 0.001193
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5.794046 21.320240
## sample estimates:
## mean of x mean of y
```

```
## 11.700000 -1.857143
```

```
(t_test_APHAB <- t.test(filter(tmt_df, redcap_event_name == "session_2_arm_1")$diff_global, filter(wl_c
```

```
##
```

```
## Welch Two Sample t-test
```

```
##
```

```
## data: filter(tmt_df, redcap_event_name == "session_2_arm_1")$diff_global and filter(wl_control, red
```

```
## t = 4.3798, df = 29.489, p-value = 0.0001373
```

```
## alternative hypothesis: true difference in means is not equal to 0
```

```
## 95 percent confidence interval:
```

```
## 0.1106969 0.3043904
```

```
## sample estimates:
```

```
## mean of x mean of y
```

```
## 0.16063889 -0.04690476
```