

## 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: 'tidyverse'

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

library(tidyverse)

## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## vforcats    1.0.1      vreadr     2.1.5
## vggplot2    4.0.0      vstringr   1.5.2
## vlubridate  1.9.4      vtibble    3.3.0
## vpurrr     1.1.0

## -- Conflicts ----- tidyverse_conflicts() --
## xtidyr::extract() masks magrittr::extract()
## xdplyr::filter()  masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## xpurrr::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 == "session_2_arm_1"))

```

```

fit_diff_aphab <- lm(diff_global ~ diff_suscept + diff_sever + diff_bene + diff_barr + diff_cues + diff_eff,
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,
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 

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```

## 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_L)
base_tmt <- inner_join(filter(df, redcap_event_name == "session_1_arm_1" & `Treatment.or.Waitlist` == "W"))
base_wl <- wl_df %>% filter(redcap_event_name == "session_3_arm_1") %>% select(record_id, diff_EC:diff_L)
base_wl <- inner_join(filter(df, redcap_event_name == "session_2_arm_1" & `Treatment.or.Waitlist` == "W"))

base_diff_df <- rbind(base_tmt, base_wl)

fit_base_aphab_both <- lm(diff_global ~ susceptibility + severity + benefits + barriers + cues_action + HHI + global, data = base_diff_df)
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 + HHI, data = base_diff_df)
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 + efficacy +
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 + efficacy + global)
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 + efficacy + global)
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")$diff_HHI, filter(wl_control,
  ## Welch Two Sample t-test
  ## data: filter(tmt_df, redcap_event_name == "session_2_arm_1")$diff_HHI and filter(wl_control, redcap_
  ## 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_ttest_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
```