

Pre/post/follow up Questionnaires in MLM

```
library(lme4)
```

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

```
library(lmerTest)
```

```
## Registered S3 methods overwritten by 'ggplot2':  
##   method          from  
##   [.quosures      rlang  
##   c.quosures       rlang  
##   print.quosures  rlang
```

```
##  
## Attaching package: 'lmerTest'
```

```
## The following object is masked from 'package:lme4':  
##  
##   lmer
```

```
## The following object is masked from 'package:stats':  
##  
##   step
```

```
#install.packages("plotrix")  
library(plotrix)
```

```
## Warning: package 'plotrix' was built under R version 3.6.2
```

```
library(psych)
```

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

```
## The following object is masked from 'package:plotrix':  
##  
##   rescale
```

```
setwd("~/Dropbox (Roybal App Study)/Roybal App Study Team Folder/Data/Data/Intent to Treat")
```

```
##Questionnaires 2 timepoints
```

```
itt<-read.csv('QualtricsLong_ITT.csv', header = TRUE, sep = ",")
```

```
##daily steps with no baseline
```

```
Fullnbase<-read.csv('StepsNoBase.csv', header = TRUE, sep = ",")
```

```
##daily steps with baseline
```

```
Fullbase<-read.csv('StepsBase.csv', header = TRUE, sep = ",")
```

```
(aggregate(Steps ~ Week + Condition, Fullbase,FUN = function(x) c(mean = mean(x), se = std.error(x))))
```

```
##      Week Condition Steps.mean  Steps.se
## 1      1          0  4048.1581  224.3855
## 2      2          0  5595.5370  196.2840
## 3      3          0  5109.9569  192.0958
## 4      4          0  5719.1224  210.2036
## 5      5          0  5183.1733  217.5703
## 6      1          1  3457.8776  166.7649
## 7      2          1  5111.2667  193.2026
## 8      3          1  5157.1506  223.3805
## 9      4          1  4938.4260  244.3691
## 10     5          1  5167.0631  270.2104
```

```
aggregate(mood ~ Condition, Fullbase,FUN = function(x) c(mean = mean(x, na.rm=T), sd = sd(x)))
```

```
##      Condition mood.mean  mood.sd
## 1              0  6.850757  1.994196
## 2              1  6.562025  2.103122
```

```
aggregate(energy ~ Condition, Fullbase,FUN = function(x) c(mean = mean(x, na.rm=T), sd = sd(x)))
```

```
##      Condition energy.mean  energy.sd
## 1              0   5.731013  2.065684
## 2              1   5.801149  2.240449
```

```
mean(Fullbase$mood, na.rm=T)
```

```
## [1] 6.714587
```

```
mean(Fullbase$energy, na.rm=T)
```

```
## [1] 5.76409
```

```
sd(Fullbase$mood, na.rm=T)
```

```
## [1] 2.0507
```

```
sd(Fullbase$energy, na.rm=T)
```

```
## [1] 2.149461
```

```
Fullnobase$StepsRC<-Fullnobase$Steps/1000
```

```
Fullbase$StepsRC<-Fullbase$Steps/1000
```

R Markdown

```
m1<-lmer(StepsRC~ Week + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + DaysUse + Condition*Week + (1|SubjectID), Fullnobase, REML=FALSE)
summary(m1)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## StepsRC ~ Week + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Week + (1 | SubjectID)
## Data: Fullnobase
##
##      AIC      BIC    logLik deviance df.resid
##  9038.6   9099.8  -4508.3   9016.6     1907
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.2169 -0.6086 -0.1001  0.4970  5.0577
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 4.977     2.231
## Residual              5.671     2.381
## Number of obs: 1918, groups: SubjectID, 80
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      5.47443    2.77646   82.39940    1.972  0.0520 .
## Week              -0.11518    0.07002 1841.53197   -1.645  0.1001
## Age               -0.01022    0.03530   80.62659   -0.289  0.7730
## Gender            -1.15745    0.55435   80.36995   -2.088  0.0400 *
## Condition         -0.56709    0.63376  156.72590   -0.895  0.3723
## EdYrs             -0.03333    0.10282   80.17840   -0.324  0.7466
## Tlsf_GeneralHealth 0.03179    0.01487   81.44265    2.137  0.0356 *
## DaysUse           0.04439    0.05198   82.55777    0.854  0.3955
## Week:Condition     0.02299    0.10002 1847.40998    0.230  0.8182
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Week   Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Week      -0.076
## Age       -0.515 -0.009
## Gender    -0.297  0.003 -0.045
## Condition -0.203  0.378  0.009  0.048
## EdYrs     -0.375  0.001 -0.222  0.018  0.033
## Tlsf_GnrlHl -0.202 -0.004 -0.151 -0.073 -0.143 -0.016
## DaysUse   -0.315 -0.008 -0.145  0.013  0.196 -0.132  0.003
## Week:Condtn 0.075 -0.700 -0.004  0.005 -0.537 -0.009  0.004 -0.017

```

```
anova(m1)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value  Pr(>F)
## Week          15.3455  15.3455     1 1841.53  2.7060 0.10014
## Age            0.4748   0.4748     1   80.63  0.0837 0.77305
## Gender        24.7225  24.7225     1   80.37  4.3595 0.03997 *
## Condition      4.5406   4.5406     1  156.73  0.8007 0.37226
## EdYrs          0.5961   0.5961     1   80.18  0.1051 0.74663
## T1sf_GeneralHealth 25.9065 25.9065     1   81.44  4.5683 0.03557 *
## DaysUse        4.1369   4.1369     1   82.56  0.7295 0.39552
## Week:Condition  0.2996   0.2996     1 1847.41  0.0528 0.81825
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m2<-lmer(StepsRC~ Week + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + DaysUse + Condition*Week + (1|SubjectID), Fullbase, REML=FALSE)
summary(m2)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## StepsRC ~ Week + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Week + (1 | SubjectID)
## Data: Fullbase
##
##      AIC      BIC    logLik deviance df.resid
## 11319.5 11383.1 -5648.8 11297.5    2371
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.8483 -0.6166 -0.0890  0.5408  5.7116
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 4.442    2.108
## Residual              6.054    2.461
## Number of obs: 2382, groups: SubjectID, 80
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      5.13028    2.61287    81.13295    1.963  0.0530 .
## Week              0.24230    0.05205 2306.55250    4.655 3.42e-06 ***
## Age              -0.01590    0.03332   80.27145   -0.477  0.6345
## Gender            -1.13174    0.52328   80.08758   -2.163  0.0335 *
## Condition         -0.51392    0.55054 112.74708   -0.933  0.3526
## EdYrs            -0.03417    0.09702   79.79233   -0.352  0.7256
## Tlsf_GeneralHealth 0.02612    0.01402   80.68322    1.863  0.0661 .
## DaysUse           0.03182    0.04894   81.46865    0.650  0.5174
## Week:Condition    0.02271    0.07433 2310.43994    0.306  0.7600
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Week  Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Week      -0.049
## Age       -0.516 -0.008
## Gender    -0.300  0.003 -0.043
## Condition -0.198  0.280  0.007  0.053
## EdYrs     -0.376  0.000 -0.222  0.017  0.034
## Tlsf_GnrlHl -0.202 -0.004 -0.151 -0.072 -0.156 -0.017
## DaysUse   -0.313 -0.006 -0.147  0.014  0.211 -0.132  0.003
## Week:Condtn 0.051 -0.700 -0.001  0.004 -0.399 -0.007  0.006 -0.016

```

```
anova(m2)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value    Pr(>F)
## Week          131.205  131.205     1 2306.55 21.6721 3.418e-06 ***
## Age             1.379    1.379     1   80.27  0.2277  0.63450
## Gender          28.319  28.319     1   80.09  4.6776  0.03354 *
## Condition        5.275    5.275     1  112.75  0.8714  0.35257
## EdYrs           0.751    0.751     1   79.79  0.1240  0.72562
## T1sf_GeneralHealth 21.018  21.018     1   80.68  3.4717  0.06607 .
## DaysUse         2.560    2.560     1   81.47  0.4228  0.51736
## Week:Condition   0.565    0.565     1 2310.44  0.0934  0.75999
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m3<-lmer(BTACT_COMP~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + Days
Use + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m3)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## BTACT_COMP ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
##  189.8    222.6    -83.9   167.8     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.82437 -0.49172 -0.04002  0.49257  2.05015
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
##  SubjectID (Intercept) 0.14628  0.3825
##  Residual              0.08322  0.2885
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)   -0.165266  0.507512  87.448912  -0.326  0.74547
## Time           0.172519  0.074155  58.735430   2.326  0.02346 *
## Age           -0.018384  0.006833  81.151488  -2.691  0.00866 **
## Gender         0.032566  0.103736  81.191715   0.314  0.75438
## Condition     -0.012417  0.172048 110.867517  -0.072  0.94259
## EdYrs         0.048815  0.019706  81.780086   2.477  0.01530 *
## Tlsf_GeneralHealth 0.003006  0.002900  84.802122   1.036  0.30297
## DaysUse       0.004799  0.006444  97.451059   0.745  0.45821
## Time:Condition -0.025117  0.104048  60.560373  -0.241  0.81006
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time  Age  Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.123
## Age       -0.531 -0.049
## Gender    -0.304  0.007 -0.035
## Condition -0.188  0.578  0.007 -0.004
## EdYrs     -0.455 -0.003 -0.216  0.031  0.080
## Tlsf_GnrlHl -0.237 -0.023 -0.153 -0.073 -0.112 -0.020
## DaysUse   -0.062 -0.088 -0.270 -0.016  0.016 -0.054  0.080
## Time:Condtn 0.143 -0.703 -0.001  0.020 -0.824 -0.040  0.038  0.007

```

```
anova(m3)
```



```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value    Pr(>F)
## Time          0.45044  0.45044     1   58.735   5.4124 0.023465 *
## Age           0.60246  0.60246     1   81.151   7.2389 0.008659 **
## Gender        0.00820  0.00820     1   81.192   0.0986 0.754380
## Condition     0.00043  0.00043     1  110.868   0.0052 0.942594
## EdYrs         0.51068  0.51068     1   81.780   6.1362 0.015305 *
## T1sf_GeneralHealth 0.08939  0.08939     1   84.802   1.0741 0.302971
## DaysUse       0.04616  0.04616     1   97.451   0.5547 0.458205
## Time:Condition 0.00485  0.00485     1   60.560   0.0583 0.810059
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m4<-lmer(LSNS_COMP~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + DaysU
se + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m4)
```

```
## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## LSNS_COMP ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
## 1014.6   1047.3   -496.3   992.6     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.76159 -0.45756  0.08327  0.43695  2.01729
##
## Random effects:
## Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 72.39   8.508
## Residual              15.02   3.876
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)    21.71888   10.20259  89.61114   2.129   0.036 *
## Time           -0.92472    1.00774  60.83815  -0.918   0.362
## Age            0.11067    0.13870  86.99416   0.798   0.427
## Gender         1.11677    2.10553  87.02270   0.530   0.597
## Condition     -2.83753    2.75756 141.62963  -1.029   0.305
## EdYrs         0.44231    0.39955  87.34797   1.107   0.271
## Tlsf_GeneralHealth 0.05971    0.05852  88.72664   1.020   0.310
## DaysUse       -0.18939    0.12762  93.89680  -1.484   0.141
## Time:Condition -0.59634    1.41998  61.69761  -0.420   0.676
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time   Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.081
## Age       -0.537 -0.034
## Gender    -0.318  0.004 -0.028
## Condition -0.156  0.490  0.007  0.002
## EdYrs     -0.456 -0.002 -0.219  0.032  0.085
## Tlsf_GnrlHl -0.240 -0.016 -0.154 -0.065 -0.126 -0.024
## DaysUse   -0.050 -0.059 -0.289 -0.013  0.021 -0.056  0.087
## Time:Condtn 0.096 -0.705 -0.001  0.015 -0.696 -0.028  0.027  0.005
```

```
anova(m4)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value Pr(>F)
## Time          12.649  12.649     1  60.838  0.8420 0.3624
## Age            9.563   9.563     1  86.994  0.6366 0.4271
## Gender         4.226   4.226     1  87.023  0.2813 0.5972
## Condition     15.906  15.906     1 141.630  1.0588 0.3052
## EdYrs         18.409  18.409     1  87.348  1.2255 0.2713
## T1sf_GeneralHealth 15.640  15.640     1  88.727  1.0412 0.3103
## DaysUse       33.083  33.083     1  93.897  2.2023 0.1412
## Time:Condition   2.649   2.649     1  61.698  0.1764 0.6760
```

```
m5<-lmer(ExCon_Avg~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + DaysU
se + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m5)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## ExCon_Avg ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
##    254.2    286.9   -116.1   232.2     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.25451 -0.43655  0.07497  0.57606  1.70993
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 0.09702  0.3115
## Residual              0.20617  0.4541
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      3.320274   0.550075  95.056751    6.036 3.04e-08 ***
## Time              -0.156127   0.114388  66.207981   -1.365 0.176910
## Age                0.001245   0.007252  81.056011    0.172 0.864128
## Gender             0.019201   0.110104  80.993195    0.174 0.861995
## Condition          0.069940   0.243184  91.043309    0.288 0.774306
## EdYrs              0.018453   0.020947  81.658645    0.881 0.380951
## Tlsf_GeneralHealth 0.010728   0.003112  87.138843    3.448 0.000873 ***
## DaysUse            0.001728   0.007189 114.322866    0.240 0.810501
## Time:Condition    -0.151844   0.159298  69.647345   -0.953 0.343782
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time  Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.182
## Age       -0.519 -0.067
## Gender    -0.279  0.012 -0.049
## Condition -0.239  0.632  0.007 -0.010
## EdYrs     -0.452 -0.004 -0.211  0.029  0.075
## Tlsf_GnrlHl -0.231 -0.029 -0.151 -0.087 -0.100 -0.013
## DaysUse   -0.089 -0.124 -0.232 -0.024  0.013 -0.051  0.066
## Time:Condtn 0.206 -0.699 -0.002  0.026 -0.905 -0.051  0.050  0.008

```

```
anova(m5)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value    Pr(>F)
## Time          0.38408 0.38408     1  66.208  1.8629 0.1769102
## Age           0.00608 0.00608     1  81.056  0.0295 0.8641279
## Gender        0.00627 0.00627     1  80.993  0.0304 0.8619945
## Condition     0.01705 0.01705     1  91.043  0.0827 0.7743060
## EdYrs         0.15999 0.15999     1  81.659  0.7760 0.3809509
## T1sf_GeneralHealth 2.45063 2.45063     1  87.139 11.8863 0.0008729 ***
## DaysUse       0.01191 0.01191     1 114.323  0.0578 0.8105010
## Time:Condition 0.18733 0.18733     1  69.647  0.9086 0.3437818
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m6<-lmer(ESE_Avg~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + DaysUse
+ Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m6)
```

```
## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## ESE_Avg ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
##    333.6    366.3   -155.8   311.6     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.04295 -0.50393  0.09647  0.48038  2.20923
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 0.3934   0.6272
## Residual              0.2245   0.4739
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)    2.034231   0.832661  92.645809   2.443   0.0165 *
## Time           -0.212969   0.121798  64.127337  -1.749   0.0852 .
## Age            0.014116   0.011210  86.521464   1.259   0.2113
## Gender         -0.092806   0.170190  86.560719  -0.545   0.5869
## Condition      0.311908   0.282484 114.592821   1.104   0.2718
## EdYrs         -0.025450   0.032330  87.135555  -0.787   0.4333
## Tlsf_GeneralHealth 0.006017   0.004758  90.079503   1.264   0.2093
## DaysUse       0.002358   0.010573 102.209172   0.223   0.8239
## Time:Condition -0.098399   0.170893  65.995503  -0.576   0.5667
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time   Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.123
## Age       -0.531 -0.049
## Gender    -0.304  0.007 -0.035
## Condition -0.188  0.579  0.007 -0.004
## EdYrs    -0.455 -0.003 -0.216  0.031  0.080
## Tlsf_GnrlHl -0.237 -0.023 -0.153 -0.073 -0.112 -0.020
## DaysUse  -0.062 -0.088 -0.270 -0.016  0.016 -0.054  0.080
## Time:Condtn 0.144 -0.703 -0.001  0.020 -0.825 -0.040  0.038  0.007
```

```
anova(m6)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value  Pr(>F)
## Time          0.68650  0.68650     1   64.127   3.0574  0.08515 .
## Age           0.35602  0.35602     1   86.521   1.5856  0.21135
## Gender        0.06677  0.06677     1   86.561   0.2974  0.58694
## Condition     0.27375  0.27375     1  114.593   1.2192  0.27184
## EdYrs         0.13914  0.13914     1   87.136   0.6197  0.43331
## T1sf_GeneralHealth 0.35902  0.35902     1   90.080   1.5989  0.20932
## DaysUse       0.01117  0.01117     1  102.209   0.0498  0.82394
## Time:Condition 0.07444  0.07444     1   65.996   0.3315  0.56671
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m7<-lmer(SleepDuration~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + D
aysUse + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m7)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## SleepDuration ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
##    404.7    437.5   -191.4   382.7     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.0663 -0.3712  0.0210  0.3507  1.8921
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 0.8933   0.9451
## Residual              0.2736   0.5231
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      5.927303   1.167849  88.954041   5.075  2.1e-06 ***
## Time              0.021506   0.135498  60.214107   0.159  0.8744
## Age              -0.005851   0.015829  85.226927  -0.370  0.7126
## Gender            -0.220100   0.240299  85.262691  -0.916  0.3623
## Condition         0.266617   0.343228 131.656793   0.777  0.4387
## EdYrs             0.094319   0.045616  85.687791   2.068  0.0417 *
## Tlsf_GeneralHealth 0.000457   0.006691  87.596707   0.068  0.9457
## DaysUse          -0.006910   0.014677  94.998755  -0.471  0.6388
## Time:Condition   -0.017313   0.190666  61.391599  -0.091  0.9279
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time   Age     Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.096
## Age       -0.535 -0.039
## Gender    -0.313  0.005 -0.030
## Condition -0.167  0.530  0.007  0.000
## EdYrs     -0.456 -0.002 -0.218  0.032  0.083
## Tlsf_GnrlHl -0.239 -0.019 -0.154 -0.067 -0.120 -0.023
## DaysUse   -0.054 -0.069 -0.283 -0.014  0.019 -0.055  0.085
## Time:Condtn 0.113 -0.704 -0.001  0.017 -0.753 -0.032  0.031  0.006

```

```
anova(m7)
```



```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value  Pr(>F)
## Time          0.00689  0.00689     1   60.214  0.0252  0.87442
## Age           0.03738  0.03738     1   85.227  0.1366  0.71256
## Gender        0.22953  0.22953     1   85.263  0.8389  0.36228
## Condition     0.16509  0.16509     1  131.657  0.6034  0.43868
## EdYrs         1.16969  1.16969     1   85.688  4.2752  0.04169 *
## T1sf_GeneralHealth 0.00128  0.00128     1   87.597  0.0047  0.94570
## DaysUse       0.06065  0.06065     1   94.999  0.2217  0.63885
## Time:Condition 0.00226  0.00226     1   61.392  0.0082  0.92794
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m8<-lmer(SleepLatency~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + Da
ysUse + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m8)
```

```
## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## SleepLatency ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
## 1266.9  1299.6   -622.4  1244.9     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.8235 -0.3072 -0.0568  0.1841  4.0811
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 350.5    18.72
## Residual              101.8    10.09
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)   6.439e+01  2.303e+01  8.523e+01  2.797  0.00638 **
## Time          6.933e-01  2.615e+00  5.647e+01  0.265  0.79188
## Age           9.741e-04  3.122e-01  8.160e+01  0.003  0.99752
## Gender        1.804e+00  4.740e+00  8.164e+01  0.381  0.70452
## Condition     1.699e+00  6.687e+00  1.320e+02  0.254  0.79986
## EdYrs        -2.271e+00  8.997e-01  8.206e+01 -2.525  0.01351 *
## Tlsf_GeneralHealth -1.897e-01  1.319e-01  8.392e+01 -1.438  0.15427
## DaysUse       1.854e-02  2.892e-01  9.116e+01  0.064  0.94901
## Time:Condition  4.641e+00  3.681e+00  5.758e+01  1.261  0.21241
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time   Age    Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.094
## Age       -0.535 -0.038
## Gender    -0.314  0.005 -0.030
## Condition -0.166  0.525  0.007  0.000
## EdYrs     -0.456 -0.002 -0.218  0.032  0.083
## Tlsf_GnrlHl -0.239 -0.019 -0.154 -0.067 -0.121 -0.023
## DaysUse   -0.053 -0.068 -0.284 -0.014  0.019 -0.055  0.085
## Time:Condtn 0.111 -0.704 -0.001  0.016 -0.746 -0.032  0.031  0.006
```

```
anova(m8)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF   DenDF F value  Pr(>F)
## Time              7.16    7.16     1  56.473  0.0703 0.79188
## Age                0.00    0.00     1  81.604  0.0000 0.99752
## Gender             14.74   14.74     1  81.640  0.1448 0.70452
## Condition          6.57    6.57     1 132.043  0.0645 0.79986
## EdYrs             648.83  648.83     1  82.058  6.3735 0.01351 *
## T1sf_GeneralHealth 210.39  210.39     1  83.921  2.0667 0.15427
## DaysUse            0.42    0.42     1  91.159  0.0041 0.94901
## Time:Condition    161.87  161.87     1  57.580  1.5900 0.21241
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m9<-lmer(PSQIglobal~Time + Age + Gender + Condition + EdYrs + T1sf_GeneralHealth + Days
Use + Condition*Time + (1|SubjectID), itt, REML=FALSE)
summary(m9)
```

```

## Linear mixed model fit by maximum likelihood . t-tests use
## Satterthwaite's method [lmerModLmerTest]
## Formula:
## PSQIglobal ~ Time + Age + Gender + Condition + EdYrs + Tlsf_GeneralHealth +
## DaysUse + Condition * Time + (1 | SubjectID)
## Data: itt
##
##      AIC      BIC    logLik deviance df.resid
##    755.0    787.8   -366.5   733.0     134
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.49664 -0.39054 -0.09391  0.37951  2.63171
##
## Random effects:
##  Groups      Name      Variance Std.Dev.
## SubjectID (Intercept) 11.266   3.357
## Residual              2.709   1.646
## Number of obs: 145, groups: SubjectID, 87
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)    14.048798   4.066291  88.193117   3.455 0.000848 ***
## Time            0.107882   0.427409  59.406560   0.252 0.801596
## Age             0.006953   0.055223  85.175015   0.126 0.900097
## Gender          1.081538   0.838312  85.206571   1.290 0.200493
## Condition      -0.712334   1.133405 138.248477  -0.628 0.530720
## EdYrs          -0.448473   0.159101  85.570587  -2.819 0.005987 **
## Tlsf_GeneralHealth -0.057199   0.023314  87.145045  -2.453 0.016142 *
## DaysUse         0.021671   0.050947  93.128393   0.425 0.671550
## Time:Condition   0.451090   0.601962  60.372131   0.749 0.456547
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) Time   Age      Gender Condtn EdYrs  Tls_GH DaysUs
## Time      -0.087
## Age       -0.536 -0.036
## Gender    -0.316  0.004 -0.029
## Condition -0.160  0.506  0.007  0.001
## EdYrs     -0.456 -0.002 -0.219  0.032  0.084
## Tlsf_GnrlHl -0.239 -0.017 -0.154 -0.066 -0.123 -0.024
## DaysUse   -0.051 -0.063 -0.287 -0.013  0.020 -0.056  0.086
## Time:Condtn 0.103 -0.705 -0.001  0.015 -0.719 -0.030  0.029  0.005

```

```
anova(m9)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF   DenDF F value   Pr(>F)
## Time           0.1726  0.1726     1  59.407  0.0637 0.801596
## Age            0.0430  0.0430     1  85.175  0.0159 0.900097
## Gender         4.5093  4.5093     1  85.207  1.6645 0.200493
## Condition      1.0701  1.0701     1 138.248  0.3950 0.530720
## EdYrs          21.5259 21.5259     1  85.571  7.9456 0.005987 **
## T1sf_GeneralHealth 16.3072 16.3072     1  87.145  6.0193 0.016142 *
## DaysUse        0.4902  0.4902     1  93.128  0.1809 0.671550
## Time:Condition  1.5213  1.5213     1  60.372  0.5615 0.456547
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```