Pain Research - Dr. Jamison Data

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Objective 1.1 Day-to-day (Concurrent) associations

```
#Analyses; Day-to-day; Univariate multilevel linear regressions
#- Outcome: Lev1 daily pain intensity
#- Examine Lev1 association; between daily mood and pain (Same-day Lev1 units)
#- Examine Lev1 association; between daily sleep and pain (Same-day Lev1 units)
#- All these multlev must be done with Lev1 centered data
model_Pain1 <- lmer(Today_PainAve ~ Today_Mood_c  + (1|ID), data = df_new)
summary(model_Pain1)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_PainAve ~ Today_Mood_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 14961.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.6727 -0.5716 -0.0472  0.5365  5.7940
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 2.902    1.704
##  Residual             1.302    1.141
## Number of obs: 4550, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)     5.3035     0.1158  219.8803   45.81   <2e-16 ***
## Today_Mood_c    0.2671     0.0143 4512.1532   18.68   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Today_Mod_c -0.011
```

```
confint(model_Pain1)
```

```
## Computing profile confidence intervals ...
```

```
##                 2.5 %    97.5 %
## .sig01       1.5485739 1.8752167
```

```
## .sigma       1.1173837 1.1654768
## (Intercept)  5.0761681 5.5308751
## Today_Mood_c 0.2389722 0.2952427
```

```
model_Pain2 <- lmer(Today_PainAve ~ Today_Sleep_c  + (1|ID), data = df_new)
summary(model_Pain2)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_PainAve ~ Today_Sleep_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 10717.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.9784 -0.5951 -0.0270  0.5385  4.9482
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 3.161    1.778
##  Residual             1.278    1.131
## Number of obs: 3233, groups:  ID, 217
##
## Fixed effects:
##                Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)   5.267e+00  1.237e-01 1.917e+02  42.586  < 2e-16 ***
## Today_Sleep_c 7.896e-02  1.538e-02 3.114e+03   5.134 3.01e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Today_Slp_c -0.013
```

```
confint(model_Pain2)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %    97.5 %
## .sig01        1.60019958 1.9728295
## .sigma        1.10239463 1.1597176
## (Intercept)   5.02413660 5.5099807
## Today_Sleep_c 0.04729616 0.1112433
```

```
# Analyses; Multivariable models
#- Outcome: Lev1 daily pain intensity
#- Ivs entered simulatenously: daily (Lev1) mood, sleep
#- All these multlev must be done with Lev1 centered data
#- Same-day Lev1 units
model_Pain3 <- lmer(Today_PainAve ~ Today_Sleep_c + Today_Mood_c + (1|ID), data = df_new)
summary(model_Pain3)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_PainAve ~ Today_Sleep_c + Today_Mood_c + (1 | ID)
##    Data: df_new
```

```
##
## REML criterion at convergence: 10499.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.1033 -0.5839 -0.0289  0.5329  5.1037
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 2.563    1.601
##  Residual             1.206    1.098
## Number of obs: 3232, groups:  ID, 217
##
## Fixed effects:
##                Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)   5.245e+00  1.118e-01 1.947e+02  46.920  < 2e-16 ***
## Today_Sleep_c 7.320e-02  1.483e-02 3.067e+03   4.934 8.48e-07 ***
## Today_Mood_c  2.598e-01  1.716e-02 3.159e+03  15.137  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Tdy_S_
## Today_Slp_c -0.012
## Today_Mod_c -0.013 -0.059
```

```
confint(model_Pain3)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %    97.5 %
## .sig01        1.44091135 1.7758926
## .sigma        1.07043889 1.1260706
## (Intercept)   5.02515008 5.4641015
## Today_Sleep_c 0.04293039 0.1039742
## Today_Mood_c  0.22616332 0.2936014
```

```
# Analyses; Day-to-day; Univariate multilevel linear regressions
#-Outcome: Lev1 Sleep
#-Examine Lev1 association; between daily mood and sleep (Same-day Lev1 units)
#-Examine Lev1 association; between daily pain and sleep (Same-day Lev1 units)
#-All these multlev must be done with Lev1 centered data
model_Pain4 <- lmer(Today_Sleep ~ Today_Mood_c + (1|ID), data = df_new)
summary(model_Pain4)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_Sleep ~ Today_Mood_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 11543.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.7278 -0.4645 -0.0518  0.3875  5.1136
##
```

```
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 6.919    2.630
##  Residual             1.592    1.262
## Number of obs: 3233, groups:  ID, 217
##
## Fixed effects:
##               Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)  4.270e+00  1.812e-01 2.087e+02  23.572   <2e-16 ***
## Today_Mood_c 3.690e-02  2.024e-02 3.227e+03   1.823   0.0684 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## Today_Mod_c -0.011
```

```
confint(model_Pain4)
```

```
## Computing profile confidence intervals ...
```

```
##                     2.5 %     97.5 %
## .sig01        2.383821606 2.90296994
## .sigma        1.230361167 1.29413439
## (Intercept)   3.914828203 4.62646709
## Today_Mood_c -0.003183042 0.07734238
```

```
model_Pain5 <- lmer(Today_Sleep ~ Today_PainAve_c + (1|ID), data = df_new)
summary(model_Pain5)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_Sleep ~ Today_PainAve_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 11533.6
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.7006 -0.4724 -0.0549  0.4136  5.1956
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 6.569    2.563
##  Residual             1.592    1.262
## Number of obs: 3233, groups:  ID, 217
##
## Fixed effects:
##                  Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)     4.273e+00  1.767e-01 2.037e+02  24.191  < 2e-16 ***
## Today_PainAve_c 7.438e-02  1.986e-02 3.214e+03   3.745 0.000183 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
```

```
## Tody_PnAv_c 0.000
```

```
confint(model_Pain5)
```

```
## Computing profile confidence intervals ...
```

```
##                     2.5 %    97.5 %
## .sig01          2.3194212 2.8320663
## .sigma          1.2304950 1.2943334
## (Intercept)     3.9265100 4.6204488
## Today_PainAve_c 0.0346522 0.1146373
```

```
# Analyses; Multivariable models
#- Outcome: Lev1 sleep
#- Ivs entered simulatenously: daily (Lev1) mood, pain
#- All these multlev must be done with Lev1 centered data
#- Same-day Lev1 units
model_Pain6 <- lmer(Today_Sleep ~ Today_PainAve_c + Today_Mood_c + (1|ID), data = df_new)
summary(model_Pain6)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_Sleep ~ Today_PainAve_c + Today_Mood_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 11536
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.6987 -0.4755 -0.0558  0.4043  5.2031
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 6.488    2.547
##  Residual             1.594    1.263
## Number of obs: 3232, groups:  ID, 217
##
## Fixed effects:
##                  Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)     4.271e+00  1.756e-01 2.006e+02  24.325  < 2e-16 ***
## Today_PainAve_c 6.955e-02  2.053e-02 3.197e+03   3.388 0.000713 ***
## Today_Mood_c    2.120e-02  2.089e-02 3.221e+03   1.015 0.310133
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Td_PA_
## Tody_PnAv_c  0.003
## Today_Mod_c -0.012 -0.251
```

```
confint(model_Pain6)
```

```
## Computing profile confidence intervals ...
```

```
##                      2.5 %     97.5 %
## .sig01          2.30258137 2.81611822
## .sigma          1.23098973 1.29490350
```

```
## (Intercept)      3.92654788 4.61628739
## Today_PainAve_c  0.02875253 0.11080131
## Today_Mood_c    -0.01992906 0.06260863
```

Objective 1.2: Time-lag effects

```
# Yesterday sleep -> Toady Pain
model_SleepPain <- lmer(Today_PainAve ~ LastDay_Sleep_c + (1|ID), data = df_new)
summary(model_SleepPain)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_PainAve ~ LastDay_Sleep_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 14001.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -6.8170 -0.5981 -0.0231  0.5433  5.6515
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.580    1.257
##  Residual             1.076    1.037
## Number of obs: 4549, groups:  ID, 222
##
## Fixed effects:
##                  Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)     5.290e+00  8.596e-02 2.185e+02   61.54   <2e-16 ***
## LastDay_Sleep_c 4.421e-01  1.123e-02 4.113e+03   39.36   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## LstDy_Slp_c -0.011
```

```
confint(model_SleepPain)
```

```
## Computing profile confidence intervals ...
```

```
##                     2.5 %    97.5 %
## .sig01          1.1405586 1.3853322
## .sigma          1.0158020 1.0595351
## (Intercept)     5.1215226 5.4591053
## LastDay_Sleep_c 0.4199764 0.4643572
```

```
# Yesterday pain -> Today sleep
model_PainSleep <- lmer(Today_Sleep ~ LastDay_PainAve_c + (1|ID), data = df_new)
summary(model_PainSleep)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Today_Sleep ~ LastDay_PainAve_c + (1 | ID)
##    Data: df_new
```

```
##
## REML criterion at convergence: 11270.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.1764 -0.4561 -0.0533  0.4277  4.4534
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 6.367    2.523
##  Residual             1.615    1.271
## Number of obs: 3142, groups:  ID, 220
##
## Fixed effects:
##                     Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)       4.252e+00  1.729e-01 2.073e+02  24.591  < 2e-16 ***
## LastDay_PainAve_c 6.080e-02  2.011e-02 3.125e+03   3.023  0.00253 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## LstDy_PnAv_ -0.005
```

```
confint(model_PainSleep)
```

```
## Computing profile confidence intervals ...
```

```
##                        2.5 %    97.5 %
## .sig01            2.28501891 2.7863472
## .sigma            1.23862280 1.3039321
## (Intercept)       3.91216604 4.5913196
## LastDay_PainAve_c 0.02050172 0.1016527
```

Objective 2: Anayses: Perceived Improvement

```
# Analyses; Univariate multilevel linear regressions
# Outcome: Lev1 perceived improvement
# Examine Lev1 association; between daily pain and perceived improvement (Same-day Lev1 units)
model_painimprove <- lmer(GlobalImprovement ~ AvePain_c + (1|ID), data = df_new)
summary(model_painimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ AvePain_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 15734.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.7897 -0.4999 -0.0299  0.4527  5.9611
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
```

```
##  ID       (Intercept) 1.016    1.008
##  Residual             1.636    1.279
## Number of obs: 4551, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)    6.04819    0.07061  207.07264   85.65   <2e-16 ***
## AvePain_c     -0.52336    0.01503 3388.96017  -34.83   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## AvePain_c -0.010
```

```
confint(model_painimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                  2.5 %     97.5 %
## .sig01       0.9070964  1.1184544
## .sigma       1.2525387  1.3065269
## (Intercept)  5.9096036  6.1869183
## AvePain_c   -0.5536214 -0.4928049
```

```
# Examine Lev1 association; between daily mood and perceived improvement (Same-day Lev1 units)
model_moodimprove <- lmer(GlobalImprovement ~ Mood_c + (1|ID), data = df_new)
summary(model_moodimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ Mood_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16288.6
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.7427 -0.4621 -0.0184  0.4494  4.6918
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.142    1.068
##  Residual             1.849    1.360
## Number of obs: 4551, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)    6.05390    0.07486  210.53362   80.87   <2e-16 ***
## Mood_c        -0.37230    0.01580 3019.89850  -23.56   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##        (Intr)
## Mood_c -0.017
```

```r
confint(model_moodimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                  2.5 %     97.5 %
## .sig01       0.9621732  1.1844216
## .sigma       1.3313999  1.3887611
## (Intercept)  5.9069991  6.2009689
## Mood_c      -0.4039502 -0.3404149
```

```r
# Examine Lev1 association; between daily sleep and perceived improvement (Same-day Lev1 unit)
model_sleepimprove <- lmer(GlobalImprovement ~ Sleep_c + (1|ID), data = df_new)
summary(model_sleepimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ Sleep_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16155.2
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.0151 -0.4761 -0.0311  0.4552  5.5180
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 0.9864   0.9932
##  Residual             1.8065   1.3441
## Number of obs: 4550, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)    6.04797    0.06996  204.91058   86.45   <2e-16 ***
## Sleep_c       -0.35382    0.01339 2293.73974  -26.43   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##         (Intr)
## Sleep_c -0.014
```

```r
confint(model_sleepimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                  2.5 %     97.5 %
## .sig01       0.8917293  1.1032826
## .sigma       1.3160794  1.3728283
## (Intercept)  5.9107152  6.1854024
## Sleep_c     -0.3809301 -0.3265208
```

```r
# Examine Lev1 association; between daily ActivityInt and perceived improvement (Same-day Lev1 unit)
model_actimprove <- lmer(GlobalImprovement ~ ActivityInt_c + (1|ID), data = df_new)
summary(model_actimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
```

```
## lmerModLmerTest]
## Formula: GlobalImprovement ~ ActivityInt_c + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 15881
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.7426 -0.4779 -0.0199  0.4551  5.8133
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.018    1.009
##  Residual             1.692    1.301
## Number of obs: 4551, groups:  ID, 222
##
## Fixed effects:
##                 Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)      6.06873    0.07078  202.04785   85.74   <2e-16 ***
## ActivityInt_c   -0.44594    0.01388 2803.36991  -32.12   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## ActvtyInt_c -0.020
```

```
confint(model_actimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %     97.5 %
## .sig01         0.9061747  1.1208892
## .sigma         1.2737576  1.3286986
## (Intercept)    5.9298853  6.2078455
## ActivityInt_c -0.4742119 -0.4173953
```

```
# All these multlev must be done with Lev1 centered data
```

```
# Analysis; Multvariable/multilevel linear regression
# Outcome: Perceived improvement
# Ivs entered simulatenously: daily (Lev1) pain, mood, sleep, ActivityInt
model_compimprove <- lmer(GlobalImprovement ~ Sleep_c + AvePain_c + Mood_c + ActivityInt_c + (1|ID), da
summary(model_compimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ Sleep_c + AvePain_c + Mood_c + ActivityInt_c +
##     (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 15340.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.9172 -0.4905 -0.0202  0.4401  5.3134
```

```
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.523    1.234
##  Residual             1.465    1.210
## Number of obs: 4547, groups:  ID, 222
##
## Fixed effects:
##                 Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)      6.07987    0.08503  185.48672  71.504  < 2e-16 ***
## Sleep_c         -0.10660    0.01559 4303.49683  -6.840 9.05e-12 ***
## AvePain_c       -0.30474    0.02011 4541.80547 -15.155  < 2e-16 ***
## Mood_c          -0.20452    0.01581 4181.65101 -12.935  < 2e-16 ***
## ActivityInt_c   -0.16159    0.01859 4529.63591  -8.694  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Slep_c AvPn_c Mood_c
## Sleep_c     -0.004
## AvePain_c    0.004 -0.284
## Mood_c      -0.009 -0.131 -0.039
## ActvtyInt_c -0.011 -0.223 -0.504 -0.190
```

```
confint(model_compimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %      97.5 %
## .sig01         1.1064893  1.37105938
## .sigma         1.1847307  1.23598984
## (Intercept)    5.9131069  6.24693869
## Sleep_c       -0.1373291 -0.07564025
## AvePain_c     -0.3441368 -0.26519056
## Mood_c        -0.2357967 -0.17295342
## ActivityInt_c -0.1981197 -0.12481501
```

```
# All these multlev must be done with Lev1 centered data
# Perhaps get some colinearity indicator to know to what extent colinearity is an issue
collinear_test <- check_collinearity(model_compimprove)
print(collinear_test)
```

```
## # Check for Multicollinearity
##
## Low Correlation
##
##           Term  VIF   VIF 95% CI Increased SE Tolerance Tolerance 95% CI
##        Sleep_c 1.48 [1.43, 1.54]         1.22      0.68     [0.65, 0.70]
##      AvePain_c 1.87 [1.79, 1.95]         1.37      0.54     [0.51, 0.56]
##         Mood_c 1.17 [1.13, 1.21]         1.08      0.86     [0.83, 0.88]
##  ActivityInt_c 1.89 [1.82, 1.98]         1.38      0.53     [0.51, 0.55]
```

```
## Some comments on how to read this result: The VIF is around 1 => Low Multicollinearity
## The VIF is between 2 to 5, Moderate Multicollinearity
## The VIF >5 (or 10 sometimes), High Multicollinearity
## Low Tolerance (~ 0), High Multicollinearity
```

We have low multicollinearity in this case!

Objective 2.2 Analyses: Moderators of perceived impovement

```
# Test if any of the baseline (Lev2) socio-demog variables are linked to perceived improvements; Univar
# B_Demog_Gender
model_genderimprove <- lmer(GlobalImprovement ~ B_Demog_Gender + (1|ID), data = df_new)
summary(model_genderimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Demog_Gender + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16807
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4120 -0.4415 -0.0034  0.4388  4.9641
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.129    1.063
##  Residual             2.084    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                Estimate Std. Error       df t value Pr(>|t|)
## (Intercept)      5.5544     0.3340 221.1168  16.630   <2e-16 ***
## B_Demog_Gender   0.2626     0.1823 220.5725   1.441    0.151
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Demg_Gndr -0.975
```

```
confint(model_genderimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                      2.5 %    97.5 %
## .sig01          0.95610501 1.1745618
## .sigma          1.41389130 1.4747295
## (Intercept)     4.89983087 6.2088010
## B_Demog_Gender -0.09460566 0.6199379
```

```
# B_Demog_Ethnicity
model_ethnimprove <- lmer(GlobalImprovement ~ B_Demog_Ethnicity + (1|ID), data = df_new)
summary(model_ethnimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Demog_Ethnicity + (1 | ID)
##    Data: df_new
##
```

```
## REML criterion at convergence: 16810.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4097 -0.4419 -0.0007  0.4351  4.9691
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.140    1.068
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                    Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)         6.00103    0.12719 217.53061  47.180   <2e-16 ***
## B_Demog_Ethnicity   0.01584    0.07313 216.10493   0.217    0.829
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Dmg_Ethnc -0.807
```

```
confint(model_ethnimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                        2.5 %    97.5 %
## .sig01             0.9608634 1.1802628
## .sigma             1.4139012 1.4747407
## (Intercept)        5.7518051 6.2502987
## B_Demog_Ethnicity -0.1274734 0.1591333
```

```
# B_Demog_Age
model_ageimprove <- lmer(GlobalImprovement ~ B_Demog_Age + (1|ID), data = df_new)
summary(model_ageimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Demog_Age + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16806.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4221 -0.4320  0.0060  0.4383  4.9723
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.085    1.042
##  Residual             2.084    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##              Estimate Std. Error        df t value Pr(>|t|)
```

```
## (Intercept) 5.174e+00  2.756e-01 2.192e+02  18.771  < 2e-16 ***
## B_Demog_Age 1.643e-02  5.139e-03 2.185e+02   3.197  0.00159 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Demog_Age -0.964
```

```
confint(model_ageimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %     97.5 %
## .sig01      0.936999138 1.15191933
## .sigma      1.413883734 1.47472084
## (Intercept) 4.633722247 5.71393232
## B_Demog_Age 0.006362664 0.02650471
```

Age tends to be associated with the improvement, older patients have better improvements.

```
# Test if any of the baseline (Lev2) clinical variables are linked to perceived improvements; Univariat
# B_Clin_PainDur"
model_paindurimprove <- lmer(GlobalImprovement ~ B_Clin_PainDur + (1|ID), data = df_new)
summary(model_paindurimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Clin_PainDur + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 15755.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4949 -0.4460  0.0026  0.4333  5.0739
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.140    1.068
##  Residual             2.009    1.417
## Number of obs: 4307, groups:  ID, 208
##
## Fixed effects:
##                 Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)    5.853e+00  1.150e-01 2.023e+02  50.897   <2e-16 ***
## B_Clin_PainDur 1.054e-02  6.443e-03 2.008e+02   1.636    0.103
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Clin_PnDr -0.739
```

```
confint(model_paindurimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                       2.5 %     97.5 %
## .sig01          0.957201879 1.18347983
## .sigma          1.387215156 1.44861026
## (Intercept)     5.627911643 6.07861770
## B_Clin_PainDur -0.002087504 0.02316534
```

```
# B_Clin_BMI"
model_BMIimprove <- lmer(GlobalImprovement ~ B_Clin_BMI + (1|ID), data = df_new)
summary(model_BMIimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Clin_BMI + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16744.6
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.3929 -0.4468 -0.0041  0.4384  4.9859
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.127    1.062
##  Residual             2.091    1.446
## Number of obs: 4530, groups:  ID, 221
##
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)   6.549705   0.307229 217.553447  21.319   <2e-16 ***
## B_Clin_BMI   -0.017618   0.009996 218.596596  -1.762   0.0794 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## B_Clin_BMI -0.970
```

```
confint(model_BMIimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                   2.5 %      97.5 %
## .sig01       0.95483504 1.173896041
## .sigma       1.41600771 1.477091251
## (Intercept)  5.94756133 7.151656409
## B_Clin_BMI  -0.03720348 0.001974141
```

```
# All the medications below;
# separately/independently; association with perceived improivement; Univariate
# B_Med_Tramadol
model_Tramadolimprove <- lmer(GlobalImprovement ~ B_Med_Tramadol + (1|ID), data = df_new)
summary(model_Tramadolimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Tramadol + (1 | ID)
```

```
##    Data: df_new
##
## REML criterion at convergence: 16803.3
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.3805 -0.4434 -0.0029  0.4466  4.9618
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.113    1.055
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                 Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)      6.06720    0.07706 218.39971  78.738   <2e-16 ***
## B_Med_Tramadol  -0.64456    0.29501 214.59198  -2.185     0.03 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Med_Trmdl -0.261
```

```
confint(model_Tramadolimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                      2.5 %      97.5 %
## .sig01           0.9490154  1.16639513
## .sigma           1.4139247  1.47476718
## (Intercept)      5.9162106  6.21819605
## B_Med_Tramadol -1.2226186 -0.06639294
```

```
# B_Med_Suboxone
model_Suboxoneimprove <- lmer(GlobalImprovement ~ B_Med_Suboxone + (1|ID), data = df_new)
summary(model_Suboxoneimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Suboxone + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16806.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4100 -0.4422 -0.0010  0.4347  4.9697
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.141    1.068
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
```

```
## Fixed effects:
##                 Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)      6.02424    0.07589 218.40728  79.378   <2e-16 ***
## B_Med_Suboxone  -0.05481    0.56592 219.61268  -0.097    0.923
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Med_Subxn -0.134
```

```
confint(model_Suboxoneimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                     2.5 %   97.5 %
## .sig01          0.9609876 1.180399
## .sigma          1.4138995 1.474739
## (Intercept)     5.8755257 6.172964
## B_Med_Suboxone -1.1638748 1.054071
```

```
# B_Med_Marijuana
model_Marijuanaimprove <- lmer(GlobalImprovement ~ B_Med_Marijuana + (1|ID), data = df_new)
summary(model_Marijuanaimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Marijuana + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16806
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4099 -0.4421 -0.0009  0.4349  4.9698
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.140    1.068
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                  Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)       6.02149    0.07553 218.34053  79.724   <2e-16 ***
## B_Med_Marijuana   0.19885    0.80349 227.64451   0.247    0.805
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Med_Marjn -0.094
```

```
confint(model_Marijuanaimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                       2.5 %   97.5 %
## .sig01           0.9608479 1.180237
## .sigma           1.4139001 1.474740
## (Intercept)      5.8734877 6.169513
## B_Med_Marijuana -1.3756156 1.773272
```

```
# B_Med_NSAIDS
model_NSAIDSimprove <- lmer(GlobalImprovement ~ B_Med_NSAIDS + (1|ID), data = df_new)
summary(model_NSAIDSimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_NSAIDS + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16807.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4105 -0.4427 -0.0016  0.4340  4.9685
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.138    1.067
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)    6.03765    0.07839 218.53613  77.018   <2e-16 ***
## B_Med_NSAIDS  -0.17721    0.27499 217.56200  -0.644     0.52
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_NSAIDS -0.285
```

```
confint(model_NSAIDSimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %   97.5 %
## .sig01         0.9600212 1.179243
## .sigma         1.4138980 1.474737
## (Intercept)    5.8840426 6.191277
## B_Med_NSAIDS -0.7161135 0.361628
```

```
# B_Med_Anticonvulsant
model_Anticonimprove <- lmer(GlobalImprovement ~ B_Med_Anticonvulsant + (1|ID), data = df_new)
summary(model_Anticonimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Anticonvulsant + (1 | ID)
##    Data: df_new
##
```

```
## REML criterion at convergence: 16805.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.3967 -0.4454 -0.0048  0.4421  4.9595
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.117    1.057
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                       Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)            6.11123    0.08635 217.49113  70.775   <2e-16 ***
## B_Med_Anticonvulsant  -0.34396    0.17071 219.00087  -2.015   0.0451 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_Antcnv -0.506
```

```
confint(model_Anticonimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                            2.5 %       97.5 %
## .sig01                 0.9505424  1.168264279
## .sigma                 1.4139343  1.474778015
## (Intercept)            5.9420200  6.280433914
## B_Med_Anticonvulsant -0.6784171 -0.009370955
```

```
# B_Med_MuscleRelaxer
model_MuscleRelimprove <- lmer(GlobalImprovement ~ B_Med_MuscleRelaxer + (1|ID), data = df_new)
summary(model_MuscleRelimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_MuscleRelaxer + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16807.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4115 -0.4391 -0.0029  0.4405  4.9801
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.132    1.064
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                       Estimate Std. Error        df t value Pr(>|t|)
```

```
## (Intercept)           6.06699    0.08328 218.74596  72.848   <2e-16 ***
## B_Med_MuscleRelaxer  -0.22996    0.19094 216.50015  -1.204     0.23
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_MsclRl -0.436
```

```
confint(model_MuscleRelimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                            2.5 %    97.5 %
## .sig01                 0.9571279 1.1759473
## .sigma                 1.4139180 1.4747596
## (Intercept)            5.9037877 6.2301813
## B_Med_MuscleRelaxer -0.6040729 0.1442792
```

```
# B_Med_Antidepressants
model_Antidepimprove <- lmer(GlobalImprovement ~ B_Med_Antidepressants + (1|ID), data = df_new)
summary(model_Antidepimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Antidepressants + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16808.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4058 -0.4428 -0.0016  0.4339  4.9685
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.139    1.067
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                          Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)              6.03880    0.08141 217.81423  74.182   <2e-16 ***
## B_Med_Antidepressants  -0.10539    0.21191 220.93127  -0.497    0.619
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_Antdpr -0.384
```

```
confint(model_Antidepimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                             2.5 %    97.5 %
## .sig01                 0.9602830 1.1796099
```

```
## .sigma                 1.4139059 1.4747460
## (Intercept)            5.8792776 6.1983259
## B_Med_Antidepressants -0.5205751 0.3099154
```

```
# B_Med_Benzodiazepine
model_Benzoimprove <- lmer(GlobalImprovement ~ B_Med_Benzodiazepine + (1|ID), data = df_new)
summary(model_Benzoimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Benzodiazepine + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16808.2
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4100 -0.4422 -0.0010  0.4348  4.9693
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.141    1.068
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                       Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)            6.02259    0.07847 218.53630   76.75   <2e-16 ***
## B_Med_Benzodiazepine   0.00818    0.27512 217.28821    0.03    0.976
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_Bnzdzp -0.285
```

```
confint(model_Benzoimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                           2.5 %    97.5 %
## .sig01                0.9610017 1.1804179
## .sigma                1.4138998 1.4747392
## (Intercept)           5.8688229 6.1763525
## B_Med_Benzodiazepine -0.5308821 0.5473554
```

```
# B_Med_Stimulants
model_Stimuimprove <- lmer(GlobalImprovement ~ B_Med_Stimulants + (1|ID), data = df_new)
summary(model_Stimuimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_Stimulants + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16804.8
##
```

```
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4087 -0.4413 -0.0004  0.4352  4.9687
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.130    1.063
##  Residual             2.085    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                   Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)        6.00902    0.07556 218.44470  79.524   <2e-16 ***
## B_Med_Stimulants   0.78498    0.56133 216.51366   1.398    0.163
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_Stmlnt -0.135
```

```
confint(model_Stimuimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                       2.5 %   97.5 %
## .sig01            0.9562009 1.174741
## .sigma            1.4139019 1.474741
## (Intercept)       5.8609556 6.157096
## B_Med_Stimulants -0.3149942 1.884988
```

```
# B_Med_OtherMed
model_OtherMedimprove <- lmer(GlobalImprovement ~ B_Med_OtherMed + (1|ID), data = df_new)
summary(model_OtherMedimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_OtherMed + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16738.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4002 -0.4395 -0.0022  0.4316  4.9531
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.131    1.063
##  Residual             2.094    1.447
## Number of obs: 4528, groups:  ID, 221
##
## Fixed effects:
##                 Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)      6.05563    0.07744 218.03753   78.20   <2e-16 ***
## B_Med_OtherMed  -0.53378    0.31773 213.76851   -1.68   0.0944 .
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Md_OthrMd -0.244
```

```
confint(model_OtherMedimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %     97.5 %
## .sig01          0.956518 1.17558861
## .sigma          1.417199 1.47834351
## (Intercept)     5.903905 6.20738424
## B_Med_OtherMed -1.156587 0.08870723
```

```
# B_Med_OTC
model_OTCimprove <- lmer(GlobalImprovement ~ B_Med_OTC + (1|ID), data = df_new)
summary(model_OTCimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Med_OTC + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16808.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4053 -0.4394  0.0028  0.4369  4.9746
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.134    1.065
##  Residual             2.084    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##             Estimate Std. Error       df t value Pr(>|t|)
## (Intercept)   5.9290     0.1113 219.0857  53.284   <2e-16 ***
## B_Med_OTC     0.1726     0.1506 218.5990   1.146    0.253
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##           (Intr)
## B_Med_OTC -0.739
```

```
confint(model_OTCimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                   2.5 %    97.5 %
## .sig01       0.9579311 1.1767401
## .sigma       1.4138921 1.4747306
## (Intercept)  5.7109624 6.1470576
```

```
## B_Med_OTC   -0.1224755 0.4678271
```

```
# Test if any of the baseline (Lev2) psych variables are linked to perceived improvements; Univariate
# B_Psych_PCS"
model_PCSimprove <- lmer(GlobalImprovement ~ B_Psych_PCS + (1|ID), data = df_new)
summary(model_PCSimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Psych_PCS + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16794.9
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4284 -0.4347 -0.0002  0.4339  4.9977
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.027    1.013
##  Residual             2.084    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)   6.522346   0.128253 219.069010  50.855  < 2e-16 ***
## B_Psych_PCS  -0.025840   0.005504 220.087864  -4.695 4.69e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Psych_PCS -0.829
```

```
confint(model_PCSimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %      97.5 %
## .sig01       0.91090586  1.12099293
## .sigma       1.41387693  1.47471229
## (Intercept)  6.27105135  6.77370231
## B_Psych_PCS -0.03662589 -0.01505529
```

```
# B_Psych_HADS"
model_HADSimprove <- lmer(GlobalImprovement ~ B_Psych_HADS + (1|ID), data = df_new)
summary(model_HADSimprove)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: GlobalImprovement ~ B_Psych_HADS + (1 | ID)
##    Data: df_new
##
## REML criterion at convergence: 16799
##
## Scaled residuals:
```

```
##     Min      1Q  Median      3Q     Max
## -4.4170 -0.4304 -0.0055  0.4386  4.9812
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept) 1.055    1.027
##  Residual             2.084    1.444
## Number of obs: 4552, groups:  ID, 222
##
## Fixed effects:
##                Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)    6.587636   0.156523 219.009061   42.09  < 2e-16 ***
## B_Psych_HADS  -0.035892   0.008818 219.764834   -4.07 6.55e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr)
## B_Psyc_HADS -0.886
```

```
confint(model_HADSimprove)
```

```
## Computing profile confidence intervals ...
```

```
##                    2.5 %      97.5 %
## .sig01        0.92341224  1.13559144
## .sigma        1.41384078  1.47467227
## (Intercept)   6.28098471  6.89443548
## B_Psych_HADS -0.05317654 -0.01861603
```