Surprise study pilot 16

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Study description

This study is the same as pilot 15, but we have moved the prediction before participant's performance to see whether it would make a difference in the relationship between subjective PE and emotion ratings. Although participants won't take their performance into account, this would be closer to what happens during therapy.

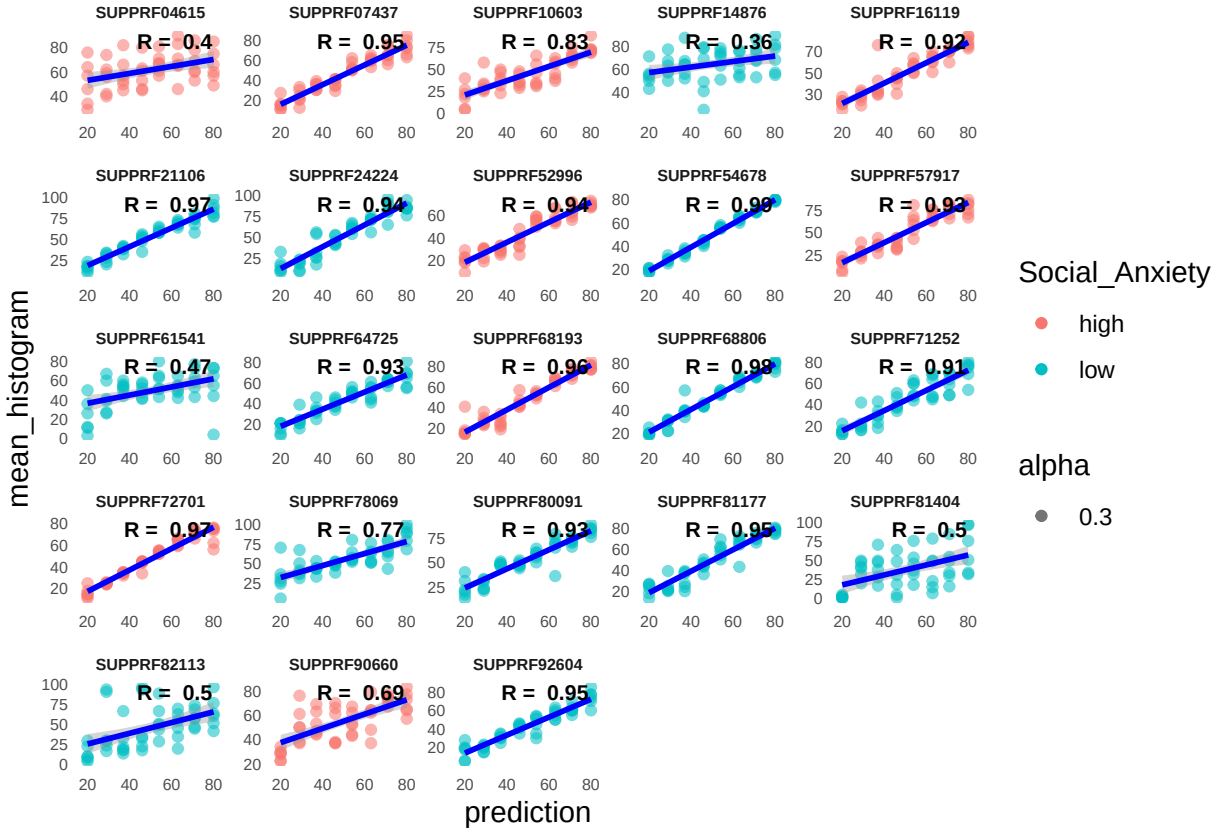
The Gorilla experiment is the following: https://app.gorilla.sc/admin/project/125827 The task is the following: https://app.gorilla.sc/admin/task/772053/editor

```
## [1] "It seems everyone has done all the 48 trials, Elena managed to fix the issue some people were e
```

```
## # A tibble: 23 x 2
##    Random_ID   Trial.Number
##    <chr>              <int>
##  1 SUPPRF04615           48
##  2 SUPPRF07437           48
##  3 SUPPRF10603           48
##  4 SUPPRF14876           48
##  5 SUPPRF16119           48
##  6 SUPPRF21106           48
##  7 SUPPRF24224           48
##  8 SUPPRF52996           48
##  9 SUPPRF54678           48
## 10 SUPPRF57917           48
## # i 13 more rows
```

Relationship between prediction and mean histogram

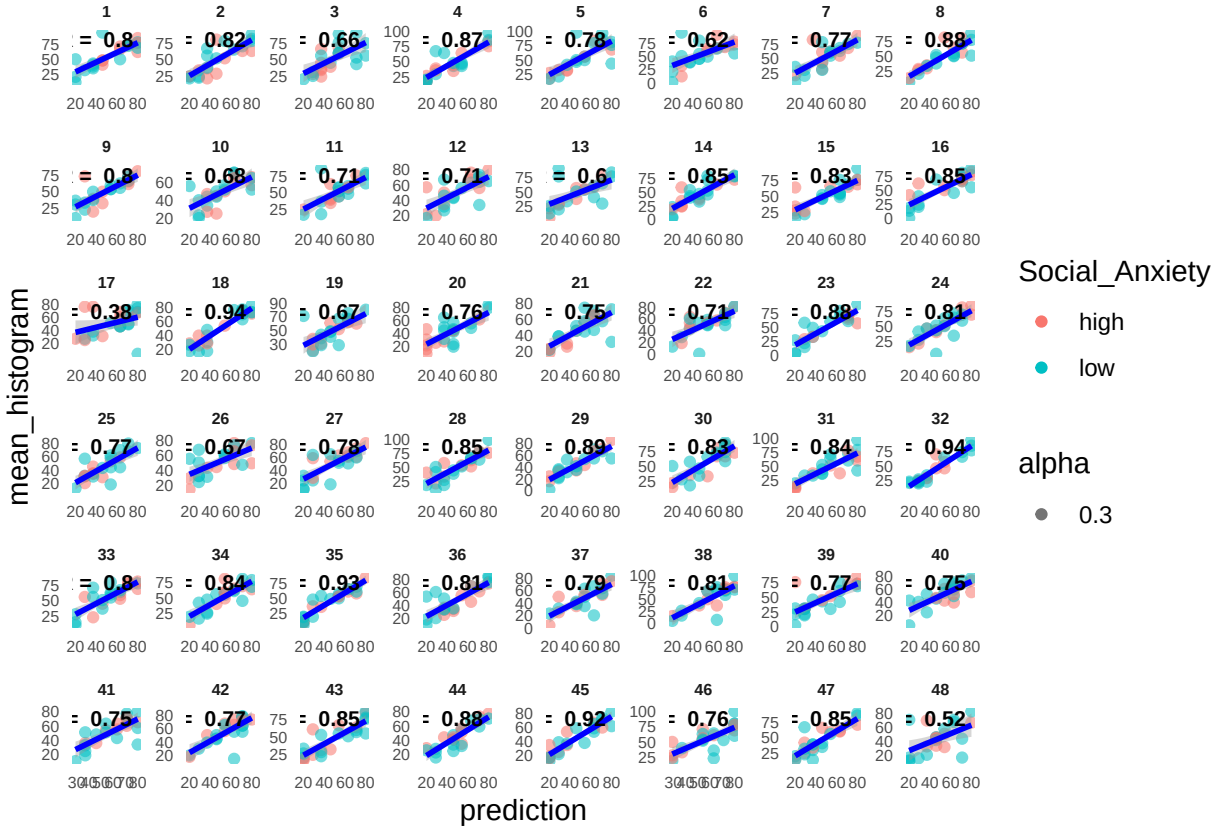
```
## [1] "average correlation between mean_hist and prediction: 0.815515029233526"
```



Relationship between prediction and mean histogram across trials

I suspect to see a weaker correlation between prediction and mean of the histogram from first to last trial.

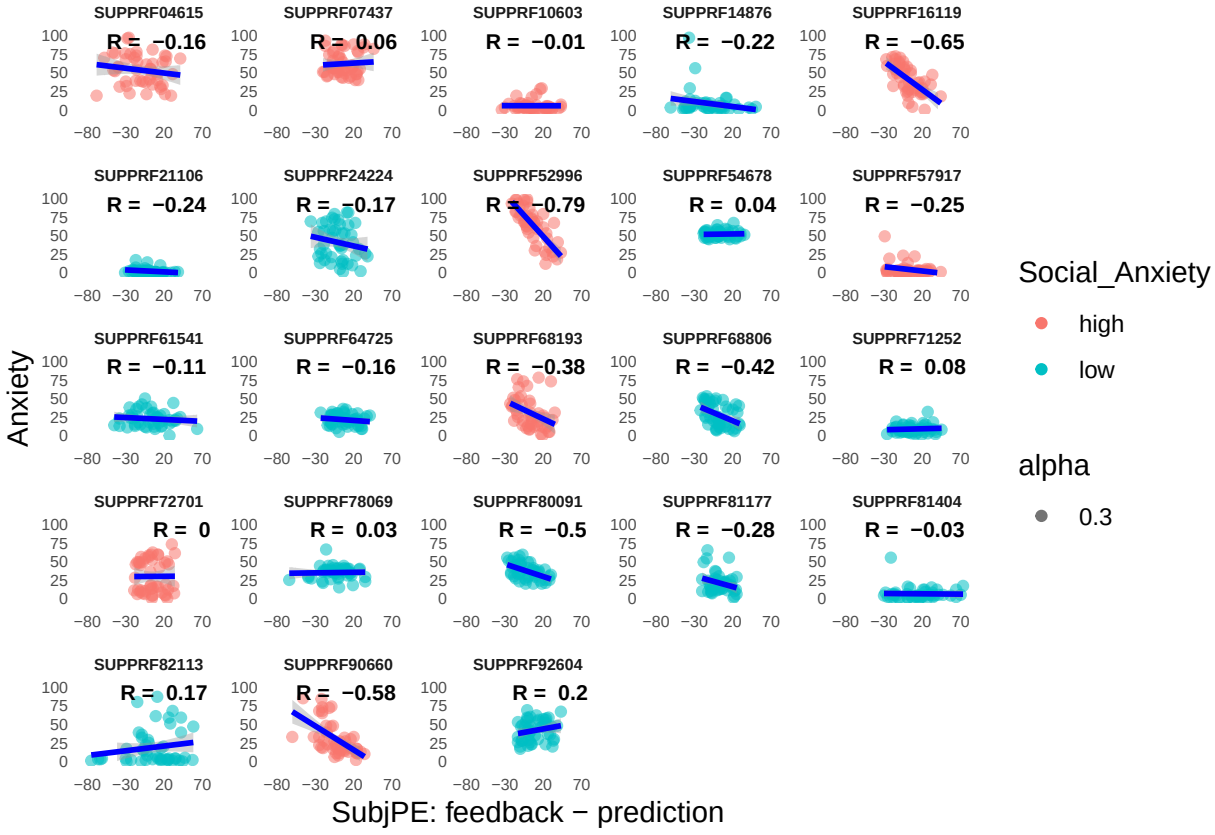
```
## [1] "average correlation between mean_hist and prediction per trial: 0.78161968099499"
```




```
## # A tibble: 2 x 2
##   Trial_Group average_correlation
##   <chr>                     <dbl>
## 1 1-24                      0.760
## 2 25-48                     0.810
```

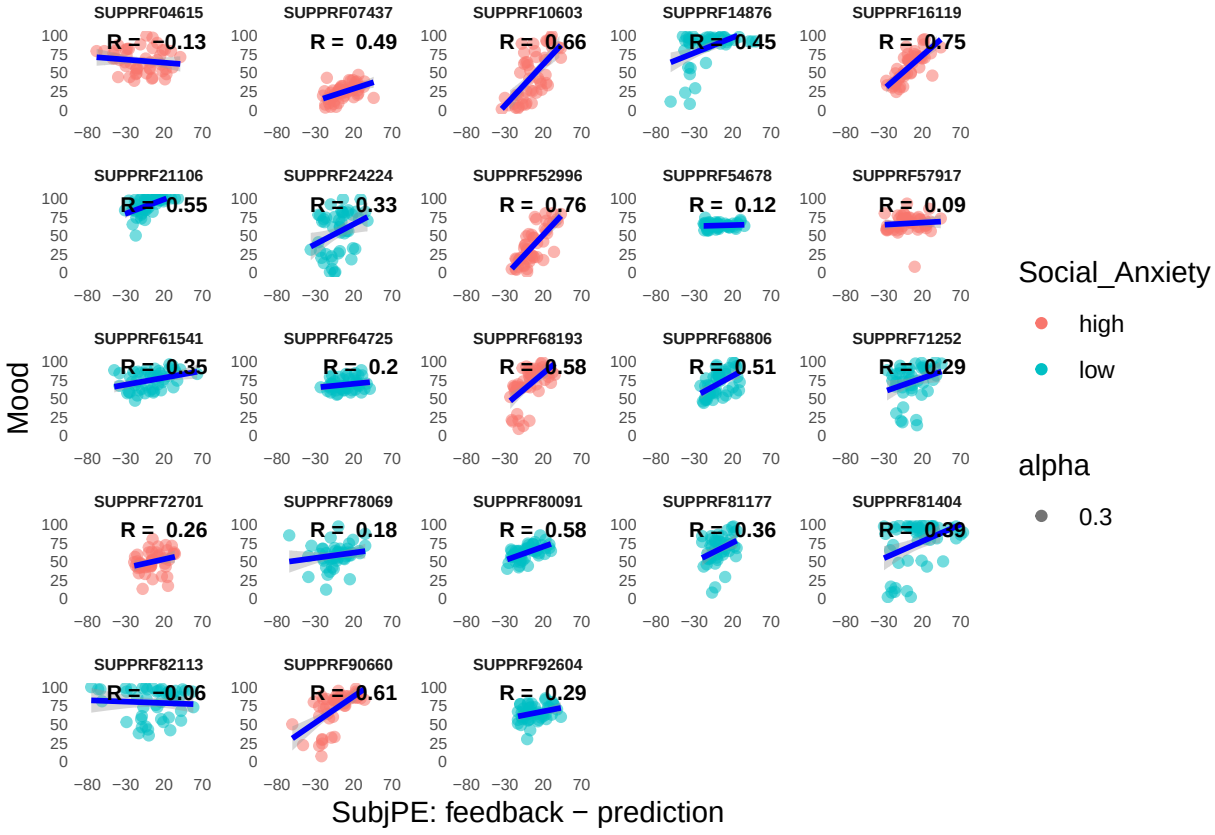
Relationship between Anxiety and SubjPE

```
## [1] "average correlation between anxiety and SubjPE: -0.188598549499634"
```



Relationship between Mood and SubjPE

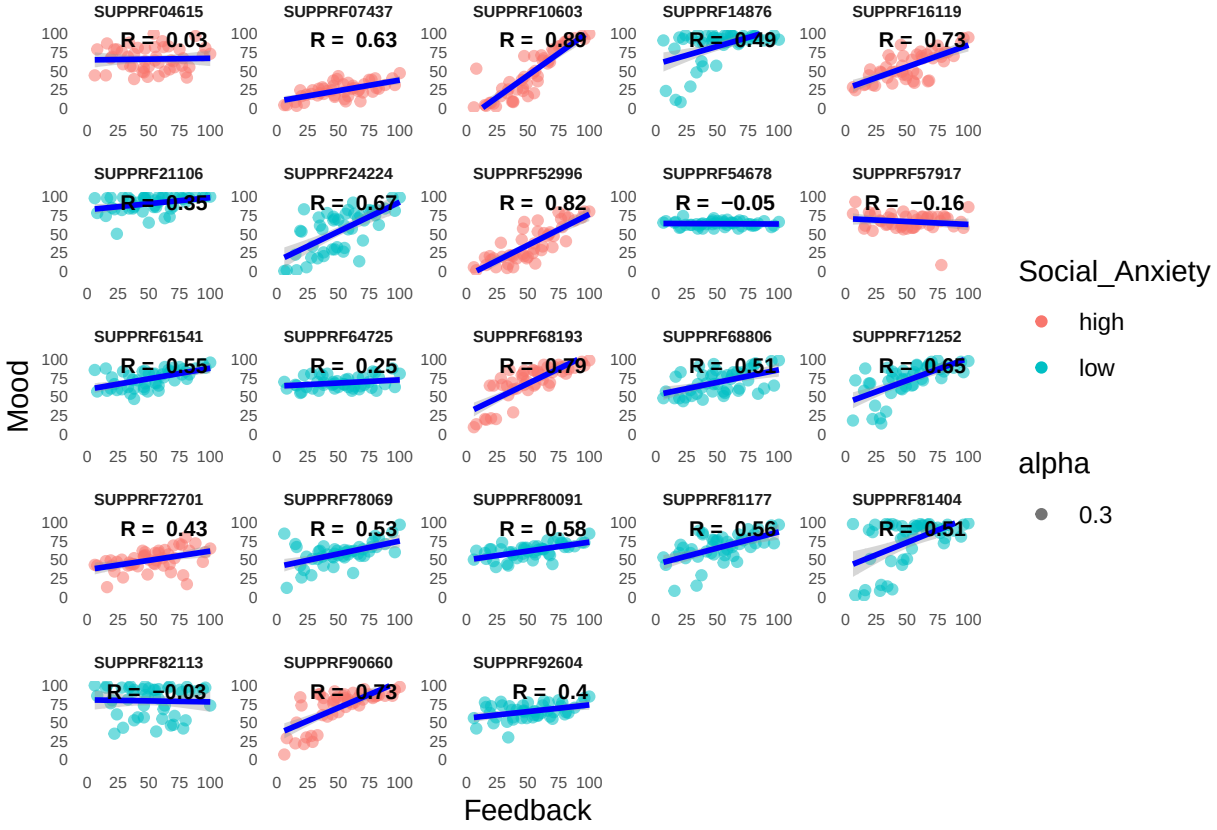
```
## [1] "average correlation between mood and SubjPE: 0.374402588235143"
```



Relationship between Mood and feedback

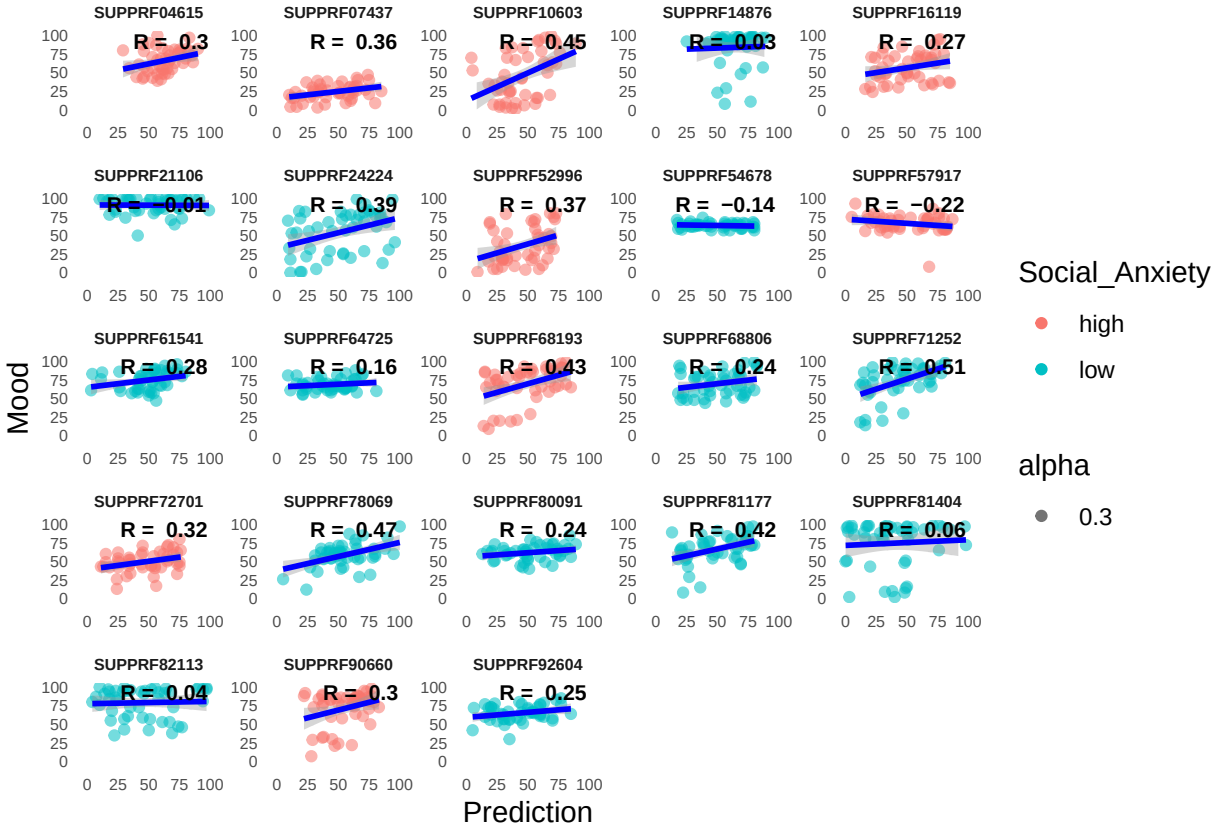
The relationship between mood and feedback still seems to be stronger than mood and subjective PE. Is this a problem? How do we even differentiate social reward, from social PE?

```
## [1] "average correlation between mood and feedback: 0.473387453802557"
```



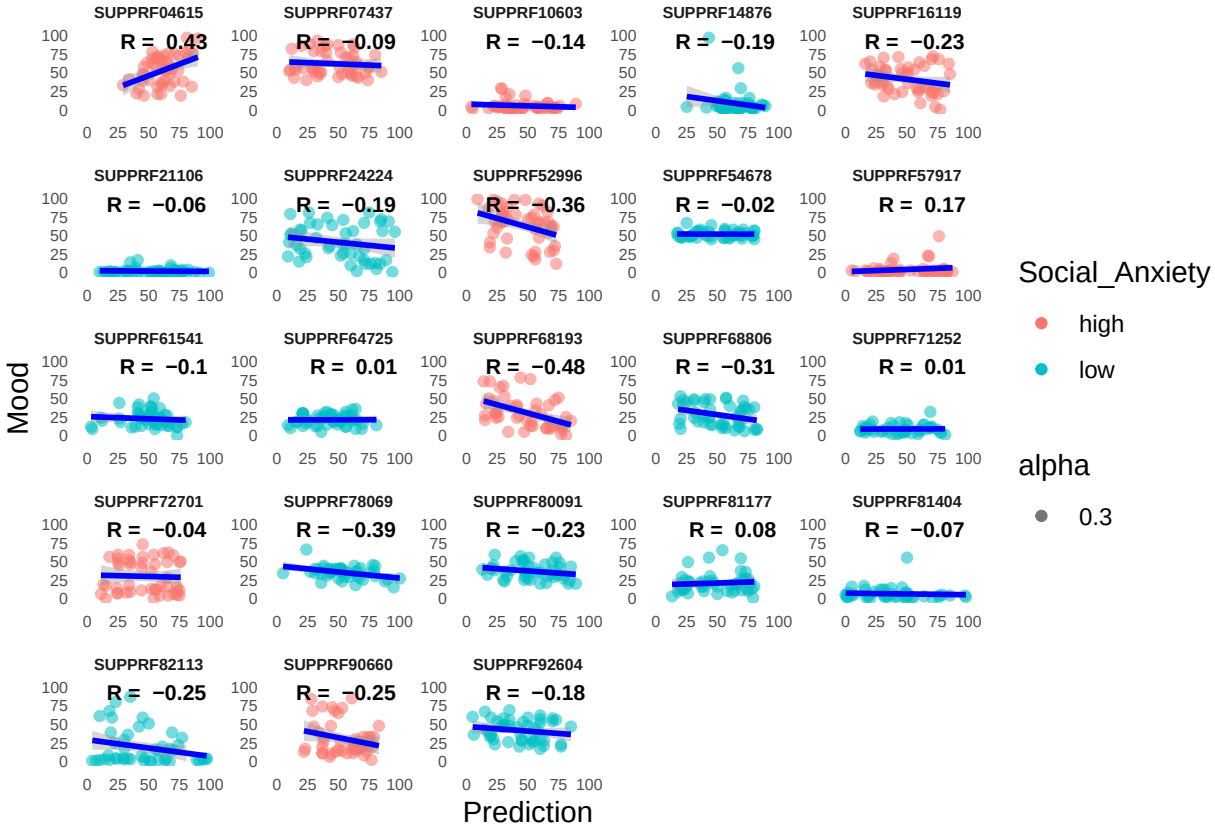
Relationship between Mood and prediction

```
## [1] "average correlation between mood and prediction: 0.240187813450925"
```



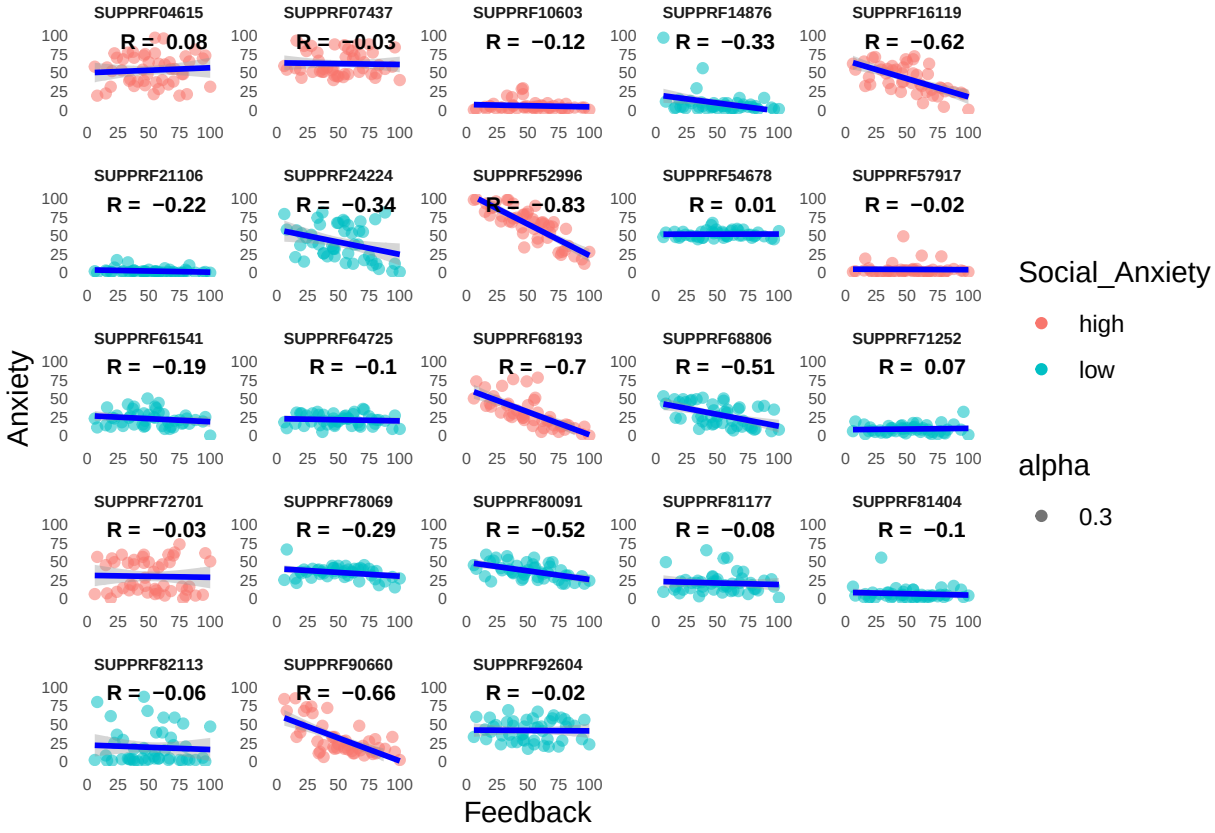
Relationship between Anxiety and prediction

```
## [1] "average correlation between anxiety and prediction: -0.124333242732399"
```

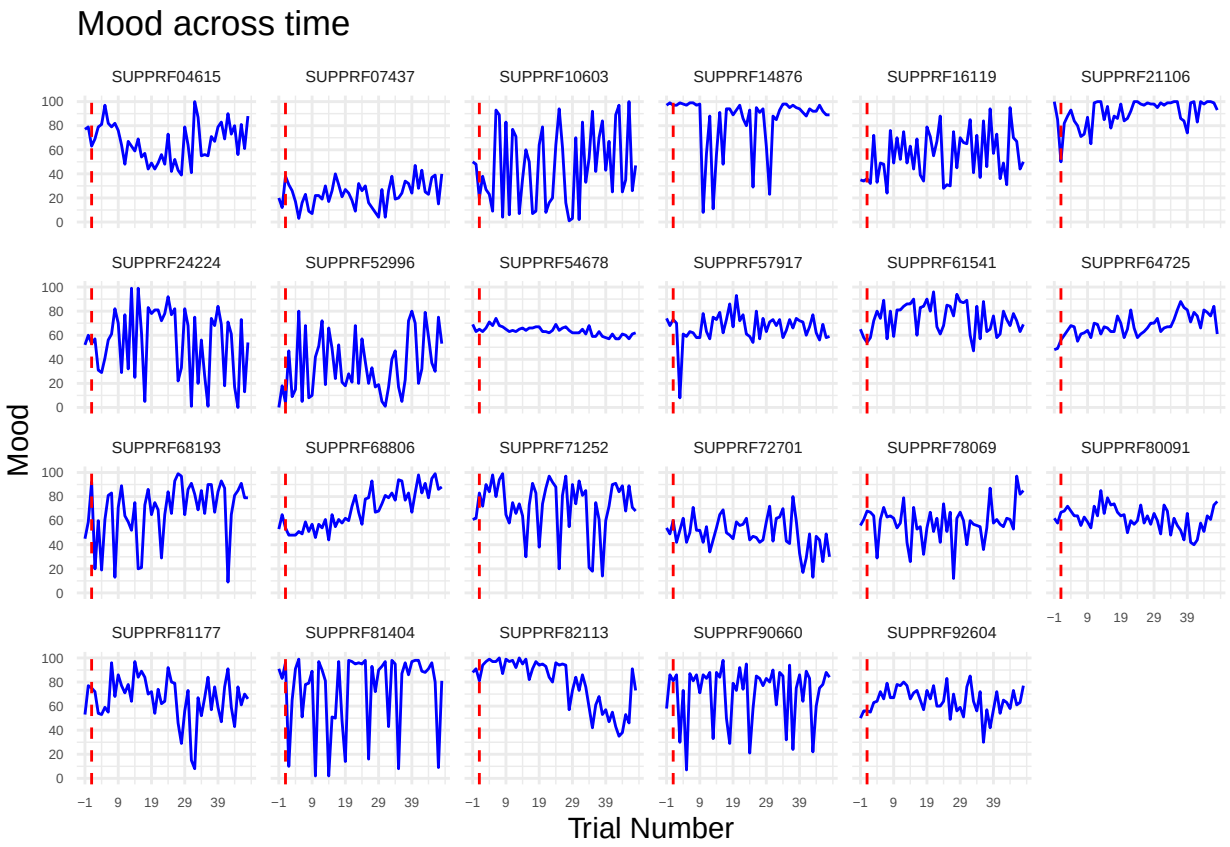


Relationship between Anxiety and feedback

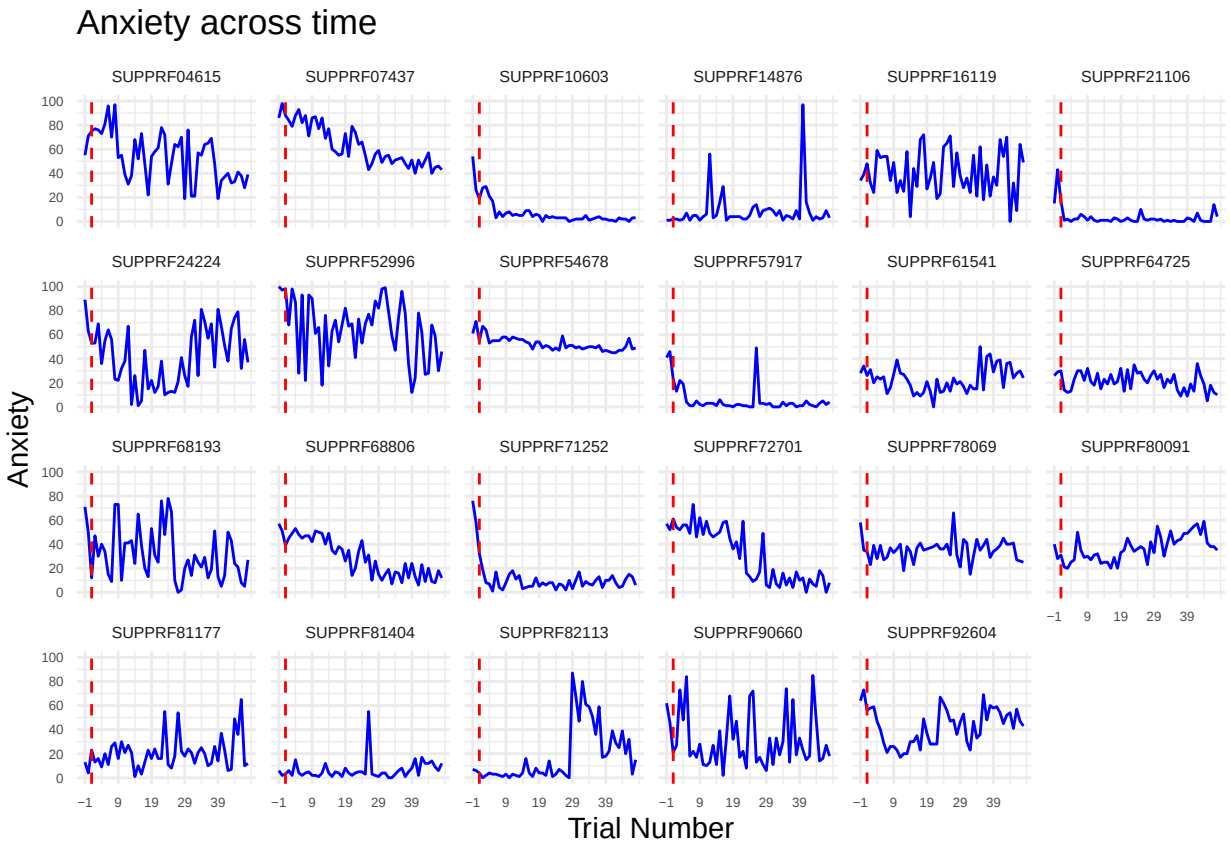
```
## [1] "average correlation between anxiety and feedback: -0.243743880842419"
```



Mood over time



Anxiety over time



LME models for Mood and SubjPE

When looking at subjective PE, the best model is Mood ~ SubjPE * mini_SPIN_total + (SubjPE | Random_ID) with an AIC of 9123.999 When including feedback the best model is Mood ~ feedback + (feedback | Random_ID) with an AIC of 8879.897

```
## [1] "Model 1 summary: Response_H ~ Response_SubjPE + (1 | Random_ID)"

## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9582.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.8571 -0.4865  0.0736  0.6056  2.7825
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 235.7    15.35
##  Residual              319.8    17.88
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     63.05071    3.24679   19.42
## Response_SubjPE  0.35209    0.02825   12.46
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.021

## [1] "Model 2 summary: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)"

## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9489.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.0492 -0.4435  0.0753  0.6192  3.4029
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     261.76342 16.1791
##            Response_SubjPE   0.09972  0.3158  -0.42
##  Residual                  282.87527 16.8189
## Number of obs: 1104, groups:  Random_ID, 23
```

```
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     62.63301    3.41470  18.342
## Response_SubjPE  0.40608    0.07195   5.644
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.388
```

```
## [1] "Model 3 summary: Response_H ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE | Random_ID)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE |
##     Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9484.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.0686 -0.4412  0.0700  0.6283  3.4133
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     197.15071 14.0410
##            Response_SubjPE   0.08201  0.2864  -0.22
##  Residual                  282.80792 16.8169
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                                 Estimate Std. Error t value
## (Intercept)                     76.84514    5.83266  13.175
## Response_SubjPE                  0.15323    0.12986   1.180
## mini_SPIN_total                 -2.84078    1.00336  -2.831
## Response_SubjPE:mini_SPIN_total  0.05045    0.02244   2.249
##
## Correlation of Fixed Effects:
##             (Intr) Rs_SPE m_SPIN
## Rspns_SbjPE -0.203
## mn_SPIN_ttl -0.860  0.175
## R_SPE:_SPIN  0.174 -0.860 -0.204
```

```
## [1] "Model 4 summary: Response_H ~ Response_fdbk + (1 | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk + (1 | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9419.4
##
```

```
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.1403 -0.5199  0.0914  0.6425  2.6923
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 216.0    14.7
##  Residual              275.4    16.6
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)   43.28064    3.29137   13.15
## Response_fdbk  0.39777    0.02106   18.89
##
## Correlation of Fixed Effects:
##             (Intr)
## Respns_fdbk -0.332
```

```
## [1] "Model 5 summary: Response_H ~ Response_fdbk + (Response_fdbk | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk + (Response_fdbk | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9236.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.0859 -0.4783  0.0422  0.6054  3.7595
##
## Random effects:
##  Groups    Name          Variance  Std.Dev. Corr
##  Random_ID (Intercept)   628.20014 25.0639
##            Response_fdbk   0.09889  0.3145  -0.83
##  Residual                221.02153 14.8668
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)   43.28064    5.33574   8.111
## Response_fdbk  0.39777    0.06823   5.830
##
## Correlation of Fixed Effects:
##             (Intr)
## Respns_fdbk -0.830
```

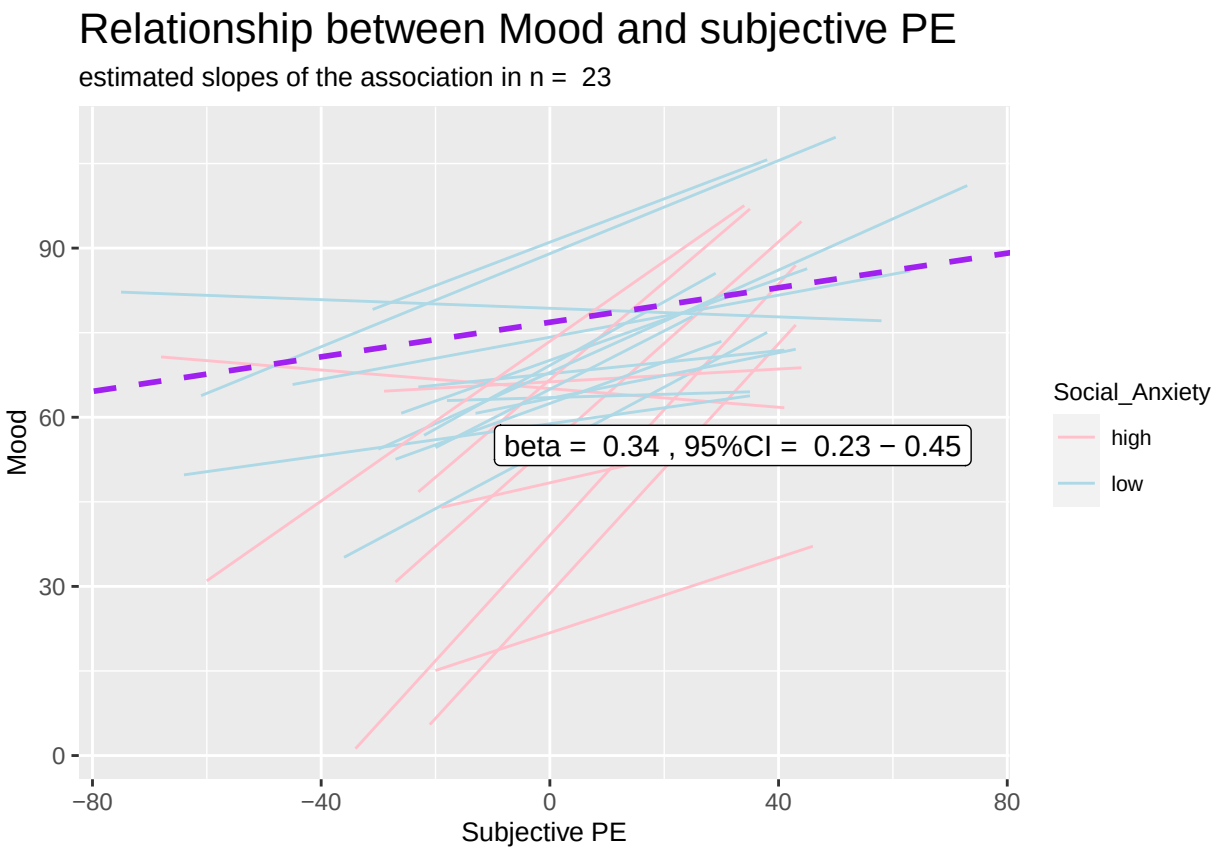
```
## [1] "Model 6 summary: Response_H ~ Response_fdbk * mini_SPIN_total + (Response_fdbk | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk * mini_SPIN_total + (Response_fdbk |
##     Random_ID)
```

```
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9232.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.0783 -0.4738  0.0389  0.5968  3.7782
##
## Random effects:
##  Groups    Name          Variance  Std.Dev. Corr
##  Random_ID (Intercept)   478.60537 21.8771
##            Response_fdbk   0.09347  0.3057  -0.82
##  Residual                221.02155 14.8668
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                               Estimate Std. Error t value
## (Intercept)                   64.95617    9.19200   7.067
## Response_fdbk                  0.23249    0.13039   1.783
## mini_SPIN_total               -4.33511    1.58148  -2.741
## Response_fdbk:mini_SPIN_total  0.03306    0.02243   1.474
##
## Correlation of Fixed Effects:
##             (Intr) Rspns_ m_SPIN
## Respns_fdbk -0.824
## mn_SPIN_ttl -0.860  0.709
## Rsp_:_SPIN_  0.709 -0.860 -0.824

## [1] "AIC model1:"

## [1] 9590.47

## [1] "AIC model2:"

## [1] 9501.69

## [1] "AIC model3:"

## [1] 9500.419

## [1] "AIC model4:"

## [1] 9427.436

## [1] "AIC model5:"

## [1] 9248.478

## [1] "AIC model6:"

## [1] 9248.502
```

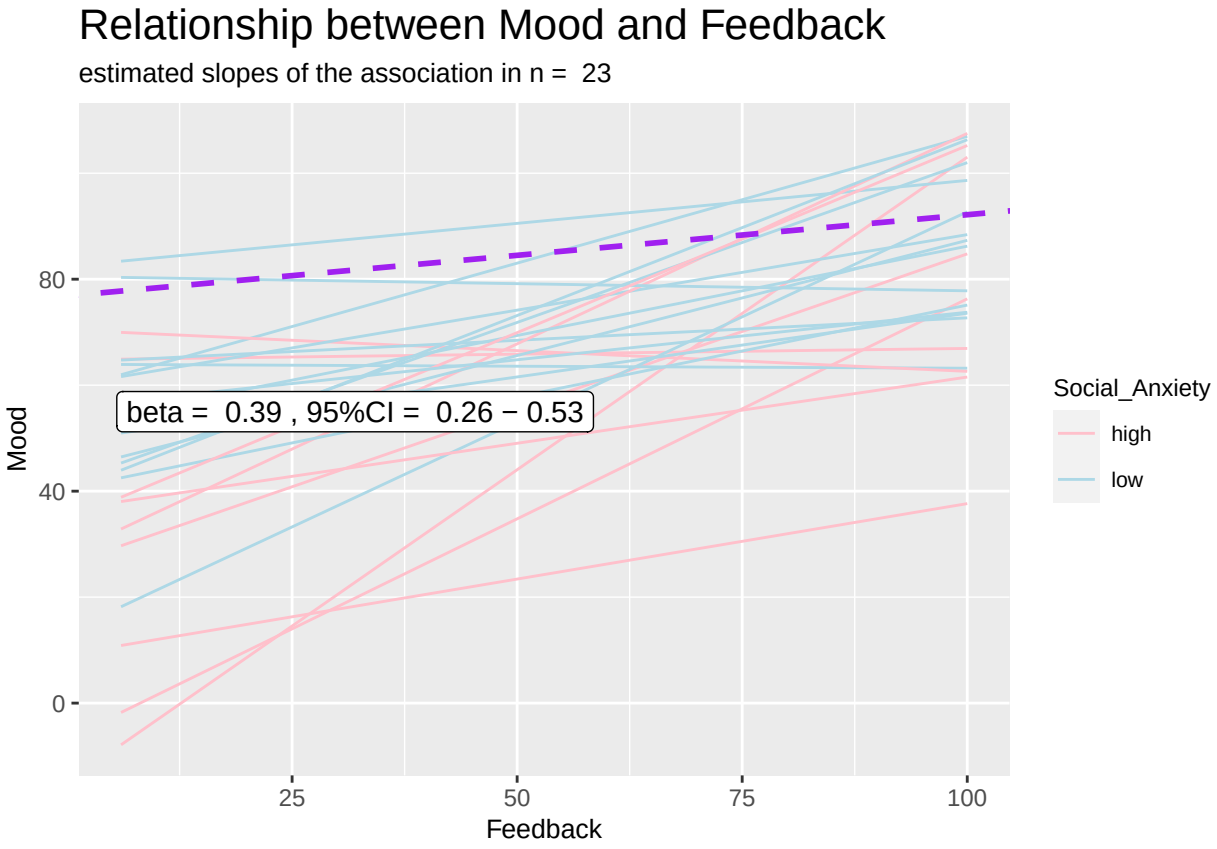
Individual plots with LME for Mood with SubjPE

When looking at subjective PE, the best model is Mood ~ SubjPE * mini_SPIN_total + (SubjPE | Random_ID) with an AIC of 9123.999



Individual plots with LME for Mood with feedback instead of SubjPE

When including feedback the best model is Mood ~ feedback + (feedback | Random_ID) with an AIC of 8879.897.



LME models for Anxiety and SubjPE

When looking at subjective PE, the best model is Anxiety ~ SubjPE + (SubjPE | Random_ID) with an AIC of 8823.219 When including feedback the best model is Anxiety ~ feedback + (Random_ID) with an AIC of 8761.136

```
## [1] "Model 1 summary: Response_Ax ~ Response_SubjPE + (1 | Random_ID)"

## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9262.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.1732 -0.5714 -0.1081  0.4668  5.4821
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 330.7    18.18
##  Residual              236.2    15.37
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     29.26896    3.82018   7.662
## Response_SubjPE -0.14938    0.02429  -6.149
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.015

## [1] "Model 2 summary: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)"

## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9175.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.9556 -0.5323 -0.1146  0.4332  5.8679
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     356.48018 18.8807
##            Response_SubjPE   0.08413  0.2901  -0.44
##  Residual                  209.80490 14.4846
## Number of obs: 1104, groups:  Random_ID, 23
```

```
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     29.14706    3.96313   7.355
## Response_SubjPE -0.19108    0.06545  -2.920
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.411
```

```
## [1] "Model 3 summary: Response_Ax ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE | Random_ID)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE |
##     Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9175.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.9690 -0.5340 -0.1151  0.4314  5.8721
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     359.58861 18.9628
##            Response_SubjPE   0.07154  0.2675  -0.40
##  Residual                  209.80148 14.4845
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                                 Estimate Std. Error t value
## (Intercept)                     23.13958    7.80487   2.965
## Response_SubjPE                  0.02083    0.11959   0.174
## mini_SPIN_total                  1.20509    1.34274   0.897
## Response_SubjPE:mini_SPIN_total -0.04244    0.02065  -2.055
##
## Correlation of Fixed Effects:
##             (Intr) Rs_SPE m_SPIN
## Rspns_SbjPE -0.369
## mn_SPIN_ttl -0.860  0.317
## R_SPE:_SPIN  0.316 -0.860 -0.369
```

```
## [1] "Model 4 summary: Response_Ax ~ Response_fdbk + (1 | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk + (1 | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9217.9
##
```

```
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.8853 -0.6179 -0.1088  0.4822  5.3079
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 332.6    18.24
##  Residual              226.6    15.05
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)    38.0562     3.9557   9.620
## Response_fdbk  -0.1765     0.0191  -9.239
##
## Correlation of Fixed Effects:
##             (Intr)
## Respns_fdbk -0.250
```

```
## [1] "Model 5 summary: Response_Ax ~ Response_fdbk + (Response_fdbk | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk + (Response_fdbk | Random_ID)
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9112
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4974 -0.5302 -0.1255  0.4295  5.6057
##
## Random effects:
##  Groups    Name          Variance Std.Dev. Corr
##  Random_ID (Intercept)   637.2512 25.2438
##            Response_fdbk   0.0533  0.2309  -0.74
##  Residual                197.2632 14.0450
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)   38.05618    5.36090   7.099
## Response_fdbk -0.17646    0.05133  -3.438
##
## Correlation of Fixed Effects:
##             (Intr)
## Respns_fdbk -0.741
```

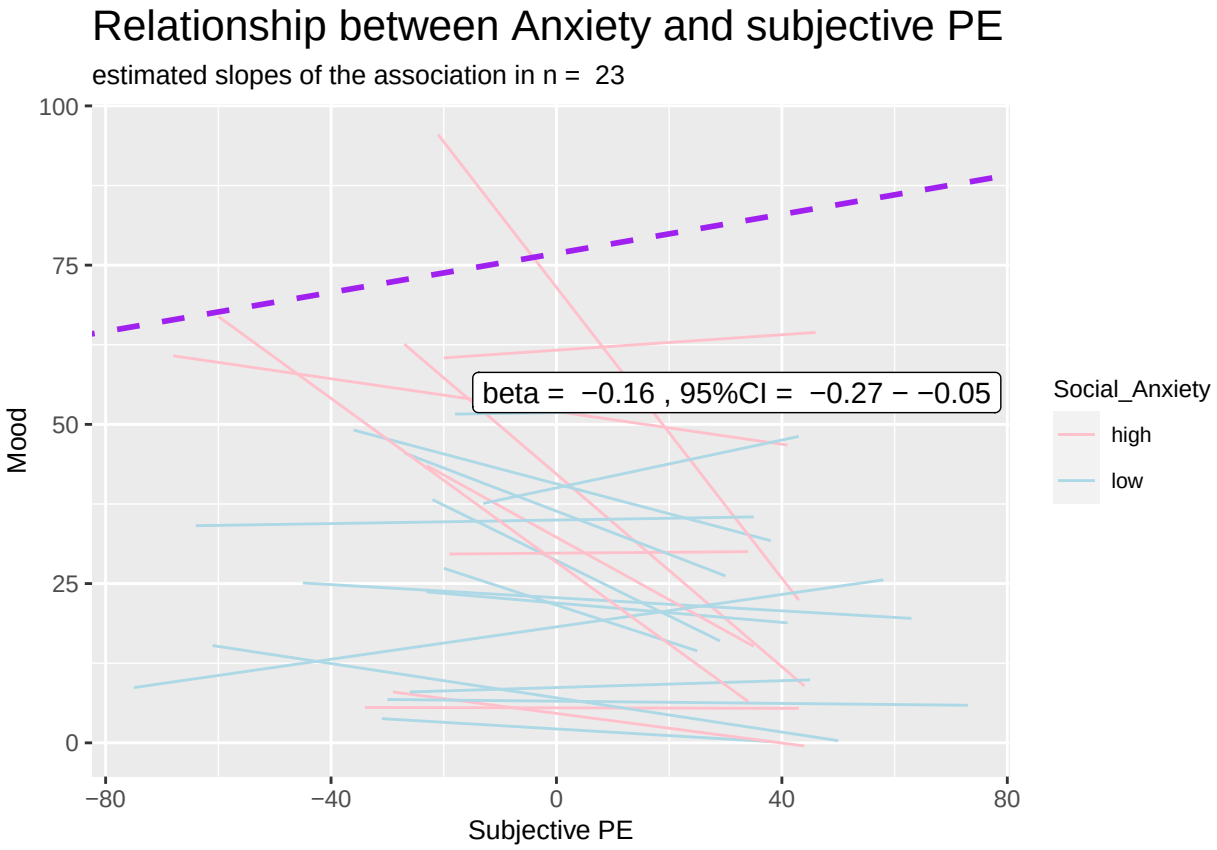
```
## [1] "Model 6 summary: Response_Ax ~ Response_fdbk * mini_SPIN_total + (Response_fdbk | Random_ID)"
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk * mini_SPIN_total + (Response_fdbk |
##     Random_ID)
```

```
##    Data: final_df16
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9113.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4936 -0.5495 -0.1286  0.4179  5.6143
##
## Random effects:
##  Groups    Name          Variance  Std.Dev. Corr
##  Random_ID (Intercept)   608.51772 24.6682
##            Response_fdbk   0.04897  0.2213  -0.71
##  Residual                197.26321 14.0450
## Number of obs: 1104, groups:  Random_ID, 23
##
## Fixed effects:
##                               Estimate Std. Error t value
## (Intercept)                   25.54711   10.28305   2.484
## Response_fdbk                 -0.03952    0.09701  -0.407
## mini_SPIN_total                2.50181    1.76919   1.414
## Response_fdbk:mini_SPIN_total -0.02739    0.01669  -1.641
##
## Correlation of Fixed Effects:
##             (Intr) Rspns_ m_SPIN
## Respns_fdbk -0.714
## mn_SPIN_ttl -0.860  0.614
## Rsp_:_SPIN_  0.614 -0.860 -0.714

## [1] "AIC model1:"

## [1] 9270.406

## [1] "AIC model2:"

## [1] 9187.423

## [1] "AIC model3:"

## [1] 9191.059

## [1] "AIC model4:"

## [1] 9225.863

## [1] "AIC model5:"

## [1] 9124.016

## [1] "AIC model6:"

## [1] 9129.378
```

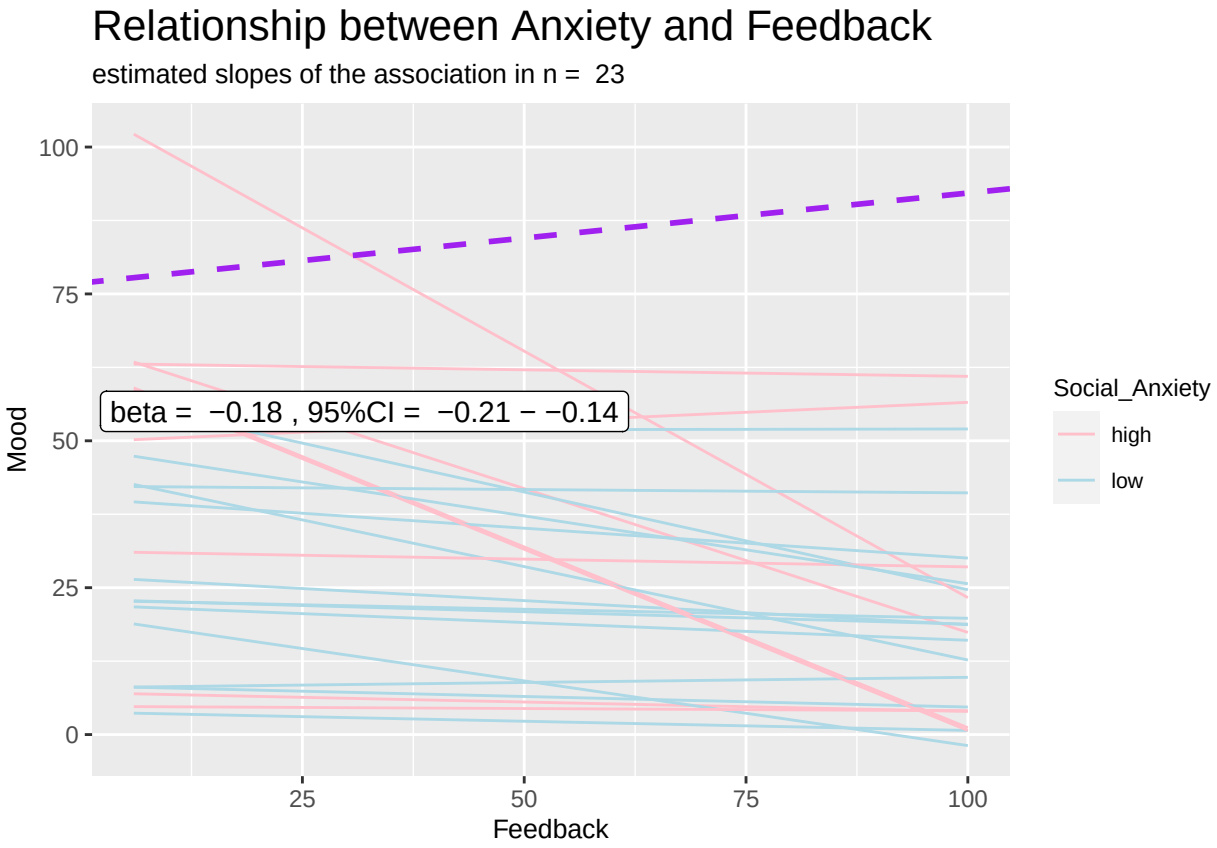
Individual plots with LME for Anxiety with SubjPE

When looking at subjective PE, the best model is Anxiety ~ SubjPE + (SubjPE | Random_ID) with an AIC of 8823.219



Individual plots with LME for Anxiety with feedback instead of SubjPE

When including feedback the best model is Anxiety ~ feedback + (Random_ID) with an AIC of 8761.136



Bayesian LME