

Negative Affect and SM Use - SMASH Study

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Descriptive Statistics

```
## Age
```

```
wide <- data[which(data$day_in_study==1 & data$hour_in_study==1),] # create dataset with 1 row/particip
```

```
mean(wide$Age, na.rm=TRUE)
```

```
## [1] 15.84211
```

```
sd(wide$Age, na.rm=TRUE)
```

```
## [1] 1.014515
```

```
## Race
```

```
table(wide$Race_012)
```

```
##
```

```
## 0 1 2
```

```
## 15 2 2
```

```
table(wide$Gender)
```

```
##
```

```
## 0 1 2
```

```
## 7 11 1
```

```
## Days in Study
```

```
# summarize max days in study
```

```
Max_days <- data %>%
```

```
  group_by(pid) %>%
```

```
  summarise(Max_day = max(day_in_study, na.rm=TRUE))
```

```
# get mean/sd day in study
```

```
mean(Max_days$Max_day, na.rm=TRUE)
```

```
## [1] 30.57895
```

```
sd(Max_days$Max_day, na.rm=TRUE)
```

```
## [1] 5.620555
```

```
## Get Means/SDs of SM time spent
```

```
sm_summary <- day %>%  
  group_by %>%  
  summarise(sm_time = (mean(sum_sm, na.rm=TRUE) * 60), sm_checks = mean(count_sm, na.rm=TRUE))
```

Negative Mood - Bayesian Framework

```
###check utility of random slopes
```

```
model1 <- lmer(Naf_pm_p ~ sum_sm_p + Naf_am_p + sum_sm_p_c + day_in_study + (1 | pid), data = day)  
model2 <- lmer(Naf_pm_p ~ sum_sm_p + Naf_am_p + sum_sm_p_c + day_in_study + (sum_sm_p | pid), data = day)  
  
anova(model1, model2)
```

```
## Data: day
```

```
## Models:
```

```
## model1: Naf_pm_p ~ sum_sm_p + Naf_am_p + sum_sm_p_c + day_in_study + (1 | pid)  
## model2: Naf_pm_p ~ sum_sm_p + Naf_am_p + sum_sm_p_c + day_in_study + (sum_sm_p | pid)  
##      npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)  
## model1     7 5483.2 5510.4 -2734.6   5469.2  
## model2     9 5487.2 5522.2 -2734.6   5469.2      0 2          1
```

```
model3 <- lmer(Naf_pm_p ~ count_sm_p + Naf_am_p + count_sm_p_c + day_in_study + (1 | pid), data = day)  
model4 <- lmer(Naf_pm_p ~ count_sm_p + Naf_am_p + count_sm_p_c + day_in_study + (count_sm_p | pid), data = day)  
  
anova(model3, model4)
```

```
## Data: day
```

```
## Models:
```

```
## model3: Naf_pm_p ~ count_sm_p + Naf_am_p + count_sm_p_c + day_in_study + (1 | pid)  
## model4: Naf_pm_p ~ count_sm_p + Naf_am_p + count_sm_p_c + day_in_study + (count_sm_p | pid)  
##      npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)  
## model3     7 5477.1 5504.3 -2731.6   5463.1  
## model4     9 5481.1 5516.1 -2731.6   5463.1      0 2          1
```

```
## Negative mood - sumduration
```

```
NA_sm_sum_bayes <- brm(Naf_pm_p ~ sum_sm_p + Naf_am_p + sum_sm_p_c + day_in_study + (1 | pid), prior =  
  family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,  
  chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedepth = 5))  
  
model_parameters(NA_sm_sum_bayes, centrality = "mean")
```

```
## # Fixed effects
##
## Parameter      | Mean |          95% CI |      pd | % in ROPE | Rhat |      ESS
## -----
## (Intercept)    | 3.16 | [-119.74, 127.59] | 52.05% | 61.13% | 1.000 | 70526.00
## sum_sm_p       | 0.19 | [-0.40, 0.77] | 73.76% | 100% | 1.000 | 79259.00
## NAf_am_p       | 2.15 | [-0.49, 4.78] | 94.42% | 100% | 1.000 | 70054.00
## sum_sm_p_c     | -0.19 | [-1.04, 0.66] | 66.96% | 100% | 1.000 | 62673.00
## day_in_study   | 1.19 | [-4.47, 6.92] | 65.79% | 100% | 1.000 | 70156.00
##
## # Fixed effects sigma
##
## Parameter      | Mean |          95% CI |      pd | % in ROPE | Rhat |      ESS
## -----
## sigma          | 506.33 | [470.27, 545.79] | 100% | 0% | 1.000 | 76395.00
```

```
standard_error(NA_sm_sum_bayes)
```

```
##      Parameter      SE
## 1      b_Intercept 62.8516695
## 2      b_sum_sm_p  0.2950649
## 3      b_NAf_am_p  1.3409750
## 4      b_sum_sm_p_c 0.4319137
## 5 b_day_in_study  2.9119264
## 6          sigma 19.2549247
```

```
## Negative mood - counts
```

```
NA_sm_count_bayes <- brm(NAf_pm_p ~ count_sm_p + NAf_am_p + count_sm_p_c + day_in_study + (1 | pid), p
family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,
chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedep
model_parameters(NA_sm_count_bayes, centrality = "mean")
```

```
## # Fixed effects
##
## Parameter      | Mean |          95% CI |      pd | % in ROPE | Rhat |      ESS
## -----
## (Intercept)    | 20.62 | [-98.18, 142.02] | 63.00% | 59.64% | 1.000 | 67682.00
## count_sm_p     | 0.90 | [0.11, 1.68] | 98.75% | 100% | 1.000 | 67157.00
## NAf_am_p       | 2.17 | [-0.43, 4.77] | 94.99% | 100% | 1.000 | 65563.00
## count_sm_p_c   | -0.35 | [-0.90, 0.20] | 89.08% | 100% | 1.000 | 65397.00
## day_in_study   | 1.73 | [-3.90, 7.33] | 72.69% | 100% | 1.000 | 68991.00
##
## # Fixed effects sigma
##
## Parameter      | Mean |          95% CI |      pd | % in ROPE | Rhat |      ESS
## -----
## sigma          | 502.10 | [466.45, 541.03] | 100% | 0% | 1.000 | 72613.00
```

```
standard_error(NA_sm_count_bayes)
```

```
##      Parameter      SE
```

```
## 1    b_Intercept 61.0762471
## 2    b_count_sm_p 0.4000597
## 3      b_NAf_am_p 1.3194582
## 4 b_count_sm_p_c 0.2816419
## 5 b_day_in_study 2.8707431
## 6          sigma 19.0431873
```

Positive Affect on SM - Within-Day Models Bayesian

```
###check utility of random slopes
model11 <- lmer(sum_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid), data = day)
model12 <- lmer(sum_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (SM_Pos_p | pid), data = day)

anova(model11, model12)

## Data: day
## Models:
## model1: sum_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid)
## model2: sum_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (SM_Pos_p | pid)
##      npar    AIC    BIC  logLik deviance Chisq Df Pr(>Chisq)
## model1     6 4854.2 4878.2 -2421.1   4842.2      0  2      1
## model2     8 4858.2 4890.2 -2421.1   4842.2      0  2      1

model3 <- lmer(count_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid), data = day)
model4 <- lmer(count_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (SM_Pos_p | pid), data = day)

anova(model3, model4)

## Data: day
## Models:
## model3: count_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid)
## model4: count_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (SM_Pos_p | pid)
##      npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## model3     6 4538.1 4562.1 -2263.1   4526.1      0  2      1
## model4     8 4542.1 4574.1 -2263.1   4526.1 0.0356  2    0.9824
```

```
#-----Pos affect & same day SM-----

## Positive affect & minutes of SM

PA_on_SM_day_bayes <- brm(sum_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid), prior = prior1,
  family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,
  chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedepth = 5),
  model_parameters(PA_on_SM_day_bayes, centrality = "mean")

## # Fixed effects
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
```

```
## (Intercept) | 2.28 | [-25.85, 30.56] | 56.22% | 53.18% | 1.000 | 80331.00
## SM_Pos_p | 0.24 | [-0.31, 0.77] | 80.21% | 100% | 1.000 | 83385.00
## SM_Pos_p_c | 0.07 | [-0.32, 0.46] | 64.20% | 100% | 1.000 | 79000.00
## day_in_study | -0.18 | [-1.25, 0.90] | 62.34% | 100% | 1.000 | 82131.00
##
## # Fixed effects sigma
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
## sigma | 98.95 | [92.40, 106.11] | 100% | 0% | 1.000 | 80474.00
```

```
standard_error(PA_on_SM_day_bayes)
```

```
##      Parameter      SE
## 1    b_Intercept 14.4081824
## 2    b_SM_Pos_p  0.2767788
## 3    b_SM_Pos_p_c 0.1993240
## 4 b_day_in_study 0.5510825
## 5          sigma  3.4919061
```

```
## Positive affect & SM checks
```

```
PA_on_SM_count_day_bayes <- brm(count_sm_p ~ SM_Pos_p + SM_Pos_p_c + day_in_study + (1 | pid), prior =
  family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,
  chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedepth = 5))
```

```
model_parameters(PA_on_SM_count_day_bayes, centrality = "mean")
```

```
## # Fixed effects
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
## (Intercept) | 2.69 | [-16.54, 21.97] | 60.86% | 52.20% | 1.000 | 77444.00
## SM_Pos_p | 0.75 | [ 0.39, 1.12] | 100.00% | 100% | 1.000 | 79619.00
## SM_Pos_p_c | -0.04 | [-0.30, 0.23] | 60.84% | 100% | 1.000 | 75156.00
## day_in_study | 0.10 | [-0.62, 0.83] | 60.95% | 100% | 1.000 | 77993.00
##
## # Fixed effects sigma
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
## sigma | 66.91 | [62.53, 71.71] | 100% | 0% | 1.000 | 88627.00
```

```
standard_error(PA_on_SM_count_day_bayes)
```

```
##      Parameter      SE
## 1    b_Intercept 9.8469461
## 2    b_SM_Pos_p 0.1876314
## 3    b_SM_Pos_p_c 0.1348922
## 4 b_day_in_study 0.3715356
## 5          sigma 2.3562323
```

Negative Affect on SM

```
###check utility of random slopes
model11 <- lmer(sum_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid), data = day)
model12 <- lmer(sum_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (SM_Neg_p | pid), data = day)

anova(model11, model12)

## Data: day
## Models:
## model11: sum_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid)
## model12: sum_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (SM_Neg_p | pid)
##      npar   AIC     BIC logLik deviance Chisq Df Pr(>Chisq)
## model11    6 3337 3359.1 -1662.5    3325
## model12    8 3341 3370.5 -1662.5    3325      0 2      1

model13 <- lmer(count_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid), data = day)
model14 <- lmer(count_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (SM_Neg_p | pid), data = day)

anova(model13, model14)

## Data: day
## Models:
## model13: count_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid)
## model14: count_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (SM_Neg_p | pid)
##      npar   AIC     BIC logLik deviance Chisq Df Pr(>Chisq)
## model13    6 3318.9 3341.0 -1653.5    3306.9
## model14    8 3322.9 3352.4 -1653.5    3306.9      0 2      1

#-----Neg affect & same day SM-----

## Negative affect & minutes of SM

NA_on_SM_day_bayes <- brm(sum_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid), prior = prior1,
  family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,
  chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedepth = 5),
  model_check = FALSE)

model_parameters(NA_on_SM_day_bayes, centrality = "mean")

## # Fixed effects
##
## Parameter      | Mean |          95% CI |    pd | % in ROPE | Rhat |      ESS
## -----
## (Intercept)    | 14.74 | [-4.46, 34.73] | 93.38% |    20.11% | 1.000 | 41717.00
## SM_Neg_p        |  0.24 | [-0.28,  0.77] | 81.37% |    100% | 1.000 | 67586.00
## SM_Neg_p_c      | -0.29 | [-1.13,  0.48] | 77.07% |    100% | 1.000 | 29861.00
## day_in_study    | -0.66 | [-1.57,  0.26] | 91.97% |    100% | 1.000 | 53227.00
##
## # Fixed effects sigma
##
## Parameter      | Mean |          95% CI |    pd | % in ROPE | Rhat |      ESS
## -----
## sigma          | 69.38 | [63.97, 75.42] | 100% |      0% | 1.000 | 60783.00
```

```
standard_error(NA_on_SM_day_bayes)
```

```
##           Parameter           SE
## 1      b_Intercept 9.9603126
## 2      b_SM_Neg_p 0.2687266
## 3      b_SM_Neg_p_c 0.4081199
## 4 b_day_in_study 0.4675308
## 5              sigma 2.9305403
```

```
## Negative affect & SM checks
```

```
NA_on_SM_count_day_bayes <- brm(count_sm_p ~ SM_Neg_p + SM_Neg_p_c + day_in_study + (1 | pid), prior =
                                family = "gaussian", data = day, warmup = 2.5e3, iter = 1.5e4, thin = 1,
                                chains = 4, cores = 4, seed = "123", control = list(adapt_delta = 0.999, max_treedepth = 5),
                                model_parameters(NA_on_SM_count_day_bayes, centrality = "mean"))
```

```
## # Fixed effects
```

```
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
## (Intercept) | 12.67 | [-4.60, 30.09] | 92.61% | 23.63% | 1.000 | 69702.00
## SM_Neg_p | 0.49 | [-0.03, 1.00] | 96.73% | 100% | 1.000 | 64540.00
## SM_Neg_p_c | 0.09 | [-0.56, 0.73] | 61.42% | 100% | 1.000 | 55622.00
## day_in_study | -0.62 | [-1.48, 0.24] | 91.90% | 100% | 1.000 | 63927.00
##
```

```
## # Fixed effects sigma
```

```
##
## Parameter | Mean | 95% CI | pd | % in ROPE | Rhat | ESS
## -----
## sigma | 67.64 | [62.40, 73.37] | 100% | 0% | 1.000 | 71599.00
```

```
standard_error(NA_on_SM_count_day_bayes)
```

```
##           Parameter           SE
## 1      b_Intercept 8.8099235
## 2      b_SM_Neg_p 0.2613456
## 3      b_SM_Neg_p_c 0.3279461
## 4 b_day_in_study 0.4425889
## 5              sigma 2.8079436
```