

Analysis of Stress-Heart Rate Coherence & Well-Being

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Non-linear Age

RStudio version 1.1.453

R version 3.5

Directories

Raw data files downloaded from <http://www.icpsr.unich.edu/icpsrweb/ICPSR/studies/29282> (biomarker/project 4) and /04652 (survey/project 1)

And from <http://midus.colectica.org/> for MIDUS 2 Milwaukee subsample

Then processed through Prep_Coherence_MIDUSIL.R script. Find at:

github.com/sashasomms/coherence_behavioral/

```
dir = '~/Desktop/UWMadison/MIDUS'
# Data directory
ddir = paste(dir, '/data', sep='')
# Analysis directory (to output plots)
adir = paste(dir, '/analysis', sep='')

setwd(ddir)
```

Packages

```
library(data.table)
library(plyr)
library(stats)
library(car)
library(ggplot2)
library(multilevel)
library(lme4)
library(lmSupport)
library(AICcmodavg)
library(pbkrtest)
library(boot)
library(rmarkdown)
library(broom)
```

```
library(pander)
library(broom.mixed)
```

```
## Warning in checkMatrixPackageVersion(): Package version inconsistency detected.
## TMB was built with Matrix version 1.2.15
## Current Matrix version is 1.2.14
## Please re-install 'TMB' from source using install.packages('TMB', type = 'source') or ask CRAN for a binary version of 'TMB' matching C
```

Read in processed data files

Files generated in Prep_Coherence_MIDUSII.R script

```
today='20181124'

# Wide format
fnameW = paste("coh_",today,".csv",sep='')
fpathW = paste(ddir,"/",fnameW, sep='')

# Long format
fnameL = paste("cohLong_",today,".csv",sep='')
fpathL = paste(ddir,"/",fnameL, sep='')

# Read in processed data
df = read.csv(fpathW)
dfL = read.csv(fpathL)
```

PREP

Subset dataframe

A condensed/subsetted dataframe for analysis - excluding the many survey/P1 people without biomarker/P4/coherence data

```
dfLs = dfL[!is.na(dfL$coherence_slope),]
length(unique(dfLs$M2ID)) # 1065
```

```
# [1] 1065
```

```
# Transform that subsetted version to wide format
```

```
dfLsW = reshape(dfLs, idvar = "M2ID", v.names=c('hr', 'stress', 'stress_CMC', 'ecgQ'), drop=c('X', 'stressMC'), timevar = "timepoint", direction="w", names(dfLsW))
```

```
# [1] "M2ID"           "birth_year"      "P1_sex"
# [4] "P1_race"        "P1_ethnicity"    "pwb2"
# [7] "autonomy2"      "envMast2"        "persGrow2"
# [10] "posRela2"       "purpLife2"       "selfAcce2"
# [13] "COPEem"         "COPEprob"        "COPE_denial"
# [16] "COPE_vent"      "COPE_disengage"  "COPE_posReGrow"
# [19] "COPE_active"    "COPE_plan"       "ZYGCAT"
# [22] "TOT_SIBS"       "M2FAMNUM"        "SAMPLMAJ"
# [25] "B4VTASK1str"    "gender"          "P1_P1age"
# [28] "P4_age"         "months_P1PI_to_P4" "months_P1SAQ_to_P4"
# [31] "months_P1cog_to_P4" "P4_STAIttrait"   "P4_CESD"
# [34] "P4_diabetes"    "P4_BMI"          "IL6"
# [37] "CRP"           "coherence_as_r"  "coherence_as_r5"
# [40] "stressNotNA"   "hrNotNA"         "complete"
# [43] "coherence_slope" "hr.3"            "stress.3"
# [46] "stress_CMC.3"   "ecgQ.3"          "hr.4"
# [49] "stress.4"       "stress_CMC.4"    "ecgQ.4"
# [52] "hr.1"          "stress.1"        "stress_CMC.1"
# [55] "ecgQ.1"        "hr.2"            "stress.2"
# [58] "stress_CMC.2"   "ecgQ.2"          "hr.5"
# [61] "stress.5"       "stress_CMC.5"    "ecgQ.5"
```

```
length(dfLsW$M2ID)
```

```
# [1] 1065
```

Summary statistics and demographics

```
summary(dfLsW$gender)
```

```
# (1) MALE (2) FEMALE
#      455      610
```

```
varDescribe(dfLsW$months_P1SAQ_to_P4)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1065 25.89 14.19 24 0 62 0.39 -0.71
```

```
varDescribe(dfLsW$P4_age)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1065 56.4 11.21 56 35 86 0.41 -0.47
```

```
varDescribe(dfLsW$P1_P1age)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1065 53.55 11.4 53 34 83 0.42 -0.5
```

```
varDescribe(dfLsW$months_P1SAQ_to_P4)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1065 25.89 14.19 24 0 62 0.39 -0.71
```

```
varDescribe(dfLsW$months_P1PI_to_P4)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1065 28.4 13.93 27 5 63 0.37 -0.82
```

```
varDescribe(dfLsW$months_P1cog_to_P4)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 973 23.62 13.64 21 1 61 0.53 -0.65
```

```
varDescribe(dfLsW$pwb2)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1061 232.81 35.25 238 97 294 -0.7 0.14
```

```
varDescribe(dfLsW$P4_CESD)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1057 8.61 8.1 6 0 54 1.6 3.16
```

```
varDescribe(dfLsW$P4_STAItrait)
```

```
# vars n mean sd median min max skew kurtosis
# X1 1 1057 34.2 8.98 33 20 71 0.84 0.39
```

```
varDescribe(dfLsW$IL6)
```

```
# vars n mean sd median min max skew kurtosis  
# X1 1 1058 2.96 2.89 2.1 0.26 21.82 3.36 14.45
```

```
varDescribe(dfLsW$CRP)
```

```
# vars n mean sd median min max skew kurtosis  
# X1 1 1052 2.85 4.26 1.38 0.14 59.3 5.09 42.36
```

```
varDescribe(dfLsW$COPE_denial)
```

```
# vars n mean sd median min max skew kurtosis  
# X1 1 1060 6.09 2.22 5 4 16 1.16 1.09
```

```
summary(dfLsW$P1_race) # Asian = 3, black = 193, Native american or alaska native aleutian islander/eskimo = 14, other = 27, white = 825,
```

```
# 1  
# 819  
# 2  
# 23  
# 3  
# 11  
# 4  
# 3  
# 5  
# 0  
# 6  
# 25  
# 7  
# 1  
# 8  
# 1  
# BLACK AND/OR AFRICAN AMERICAN  
# 170  
# NATIVE AMERICAN OR ALASKA NATIVE ALEUTIAN ISLANDER/ESKIMO  
# 3  
# OTHER (SPECIFY)  
# 2  
# WHITE  
# 6
```

```
# NA's
# 1
```

```
summary(dfLsW$SAMPLMAJ)
```

```
# (01) MAIN RDD (02) SIBLING (03) TWIN
# 521 6 337
# (04) CITY OVERSAMPLE (13) MILWAUKEE
# 19 182
```

Siblings

Prep variables in long format df

- Have age for everyone (so don't need to recenter well-being variable based on who has age)
- Stress is centered within cluster (centered around each subject's mean)
- Thus: for each analysis, just need to re-center age based on who has that well-being variable (this is probably overkill, the mean changes very little, but it's done)

Cluster mean center

```
dfLs$stress_CMC = dfLs$stress - ave(dfLs$stress, dfLs$M2ID, na.rm=T)
dfLs$hr_CMC = dfLs$hr - ave(dfLs$hr, dfLs$M2ID, na.rm=T)
```

Mean Center

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age, na.rm=T)
# Self reports
dfLs$pwb2_C = dfLs$pwb2 - mean(dfLs$pwb2, na.rm=T)
dfLs$P4_CESD_C = dfLs$P4_CESD - mean(dfLs$P4_CESD, na.rm=T)
dfLs$P4_STAItrait_C = dfLs$P4_STAItrait - mean(dfLs$P4_STAItrait, na.rm=T)
dfLs$COPE_denial_C = dfLs$COPE_denial - mean(dfLs$COPE_denial, na.rm=T)
# Divide pwb, cesd, stai by 10 so SEs larger, interpretable
dfLs$pwb2_C_d10 = dfLs$pwb2_C/10.000000
dfLs$P4_CESD_C_d10 = dfLs$P4_CESD_C/10.000000
dfLs$P4_STAItrait_C_d10 = dfLs$P4_STAItrait_C/10.000000
```

```

# PWB subscales
dfLs$autonomy2_C = dfLs$autonomy2 - mean(dfLs$autonomy2, na.rm=T)
dfLs$envMast2_C = dfLs$envMast2 - mean(dfLs$envMast2, na.rm=T)
dfLs$persGrow2_C = dfLs$persGrow2 - mean(dfLs$persGrow2, na.rm=T)
dfLs$posRela2_C = dfLs$posRela2 - mean(dfLs$posRela2, na.rm=T)
dfLs$purpLife2_C = dfLs$purpLife2 - mean(dfLs$purpLife2, na.rm=T)
dfLs$selfAcce2_C = dfLs$selfAcce2 - mean(dfLs$selfAcce2, na.rm=T)

# Inflammatory
dfLs$IL6_C = dfLs$IL6 - mean(dfLs$IL6, na.rm=T)
dfLs$CRP_C = dfLs$CRP - mean(dfLs$CRP, na.rm=T)

# Wide data frame
dfLsW$P4_age_C = dfLsW$P4_age - mean(dfLsW$P4_age, na.rm=T)
# Self reports
dfLsW$pwb2_C = dfLsW$pwb2 - mean(dfLsW$pwb2, na.rm=T)
dfLsW$P4_CESD_C = dfLsW$P4_CESD - mean(dfLsW$P4_CESD, na.rm=T)
dfLsW$P4_STAItrait_C = dfLsW$P4_STAItrait - mean(dfLsW$P4_STAItrait, na.rm=T)
dfLsW$COPE_denial_C = dfLsW$COPE_denial - mean(dfLsW$COPE_denial, na.rm=T)
# Inflammatory
dfLsW$IL6_C = dfLsW$IL6 - mean(dfLsW$IL6, na.rm=T)
dfLsW$CRP_C = dfLsW$CRP - mean(dfLsW$CRP, na.rm=T)
# PWB subscales
dfLsW$autonomy2_C = dfLsW$autonomy2 - mean(dfLsW$autonomy2, na.rm=T)
dfLsW$envMast2_C = dfLsW$envMast2 - mean(dfLsW$envMast2, na.rm=T)
dfLsW$persGrow2_C = dfLsW$persGrow2 - mean(dfLsW$persGrow2, na.rm=T)
dfLsW$posRela2_C = dfLsW$posRela2 - mean(dfLsW$posRela2, na.rm=T)
dfLsW$purpLife2_C = dfLsW$purpLife2 - mean(dfLsW$purpLife2, na.rm=T)
dfLsW$selfAcce2_C = dfLsW$selfAcce2 - mean(dfLsW$selfAcce2, na.rm=T)

```

Recode dichotomous

```

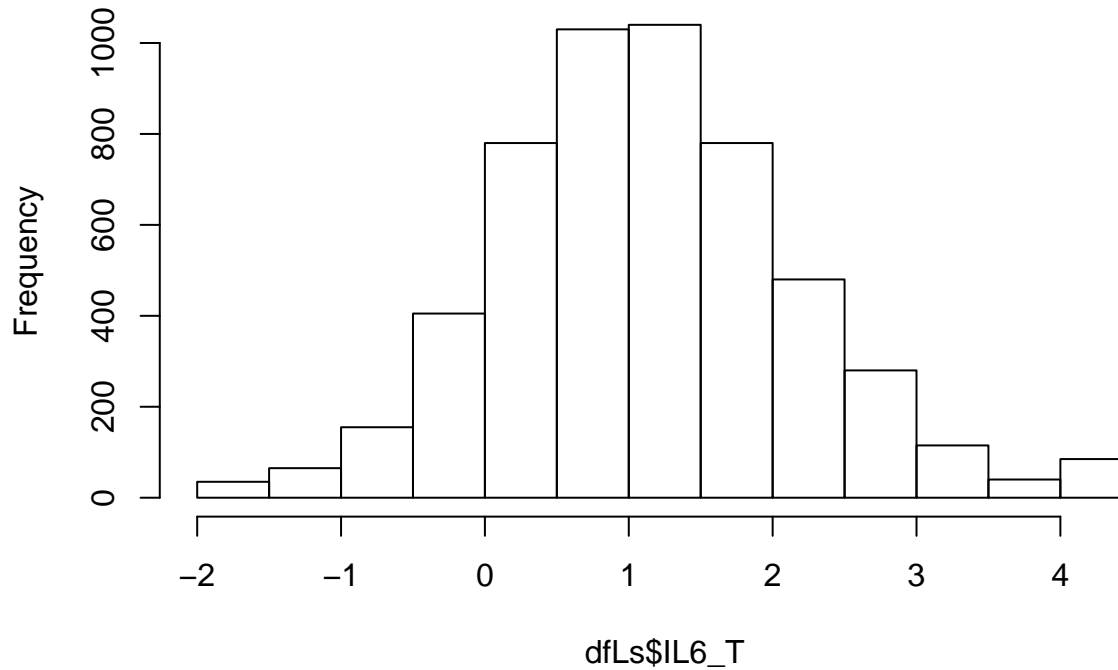
dfLs$gender_C = varRecode(dfLs$gender, c('(1) MALE', '(2) FEMALE'), c(-.5,.5))

```


Log transform inflammatory markers for normal distribution

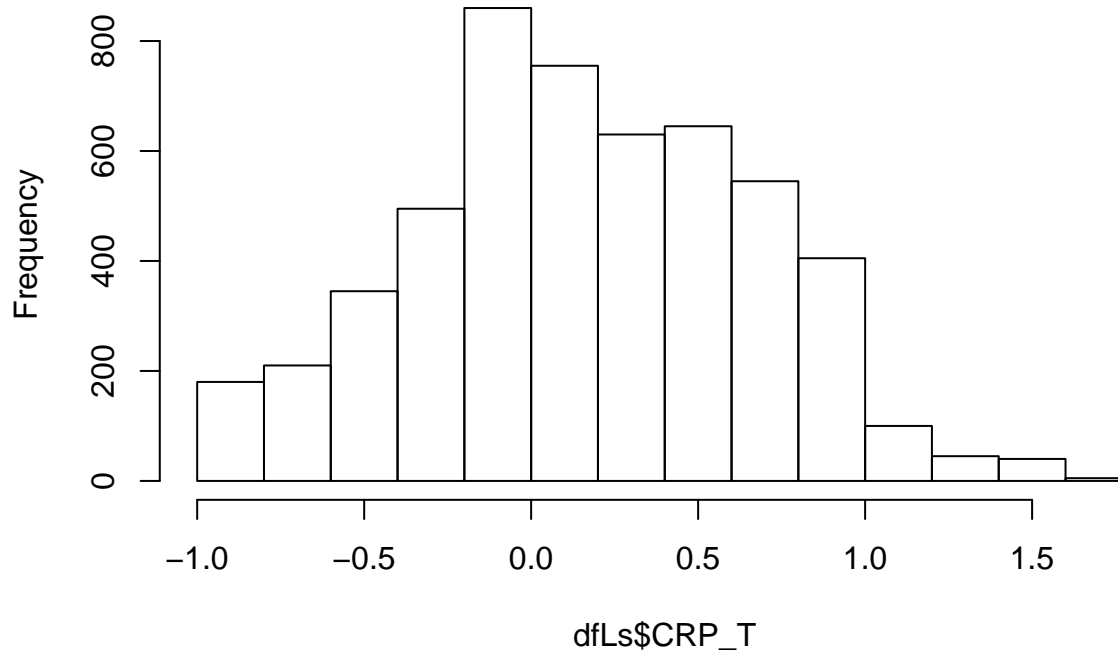
```
dfLs$IL6_T = log2(dfLs$IL6)
dfLsW$IL6_T = log2(dfLsW$IL6)
hist(dfLs$IL6_T)
```

Histogram of dfLs\$IL6_T



```
dfLs$CRP_T = log(dfLs$CRP, base=10)
dfLsW$CRP_T = log(dfLsW$CRP, base=10)
hist(dfLs$CRP_T)
```

Histogram of dfLs\$CRP_T



```
dfLs$IL6_T_C = dfLs$IL6_T - mean(dfLs$IL6_T, na.rm=T)  
dfLs$CRP_T_C = dfLs$CRP_T - mean(dfLs$CRP_T, na.rm=T)
```

TESTS

Stress-heart rate coherence associations

Age

```
lmerM = lmer(hr ~ stress_CMC * P4_age_C + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)  
a = Anova(lmerM, type=3, test="F")  
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df Df.res   Pr(>F)
## (Intercept) 49053.1688  1 910.30 < 2.2e-16 ***
## stress_CMC   677.6757  1 834.03 < 2.2e-16 ***
## P4_age_C     24.3479  1 951.47  9.49e-07 ***
## stress_CMC:P4_age_C  7.7536  1 842.97  0.005481 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * P4_age_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 29188.2
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0979 -0.4728 -0.0427  0.4042  9.4677
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 83.2926  9.1265
##          stress_CMC  0.5321  0.7294  0.18
## M2FAMNUM (Intercept) 30.1982  5.4953
## Residual                    5.5894  2.3642
## Number of obs: 5174, groups: M2ID, 1065; M2FAMNUM, 940
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept) 74.606886  0.336632 221.627
## stress_CMC  0.879697  0.033773  26.047
## P4_age_C   -0.147480  0.029872  -4.937
## stress_CMC:P4_age_C -0.008380  0.003008  -2.786
##
## Correlation of Fixed Effects:
```

```
##          (Intr) st_CMC P4_g_C
## stress_CMC  0.105
## P4_age_C   -0.009  0.001
## s_CMC:P4__C 0.001 -0.031  0.106
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49053	1	910	0
stress_CMC	678	1	834	8.05e-110
P4_age_C	24.3	1	951	9.49e-07
stress_CMC:P4_age_C	7.75	1	843	0.00548

Gender

```
lmerM = lmer(hr ~ stress_CMC * gender_C + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: hr
##          F Df  Df.res  Pr(>F)
## (Intercept) 20311.9902  1  997.91 < 2.2e-16 ***
## stress_CMC   258.9752  1  890.34 < 2.2e-16 ***
## gender_C     27.0488  1 1034.08 2.391e-07 ***
## stress_CMC:gender_C  0.5594  1  850.02  0.4547
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```

## Formula:
## hr ~ stress_CMC * gender_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 29178.1
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0543 -0.4760 -0.0405  0.4079  9.4955
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.5457  9.1403
##           stress_CMC  0.5396  0.7346  0.20
##   M2FAMNUM (Intercept) 29.6326  5.4436
##   Residual                5.5901  2.3643
## Number of obs: 5174, groups:  M2ID, 1065; M2FAMNUM, 940
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)      72.60364    0.50890 142.669
## stress_CMC         0.84851    0.05270  16.102
## gender_C0.5        3.48633    0.66938   5.208
## stress_CMC:gender_C0.5 0.05149    0.06881   0.748
##
## Correlation of Fixed Effects:
##           (Intr) st_CMC g_C0.5
## stress_CMC    0.111
## gender_C0.5 -0.751 -0.085
## s_CMC:_C0.5 -0.086 -0.766  0.115
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	20312	1	998	0
stress_CMC	259	1	890	2.44e-51
gender_C	27	1	1034	2.39e-07
stress_CMC:gender_C	0.559	1	850	0.455

PWB

```

# Center age for subjects in this analysis
varDescribe(dfLs$pwb2_C)

##      vars      n mean      sd median      min      max skew kurtosis
## X1      1 5305      0 35.23   5.19 -135.81 61.19 -0.7      0.14

length(dfLs$P4_age[!is.na(dfLs$pwb2_C)])

## [1] 5305

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$pwb2_C)], na.rm=T)

# Run the test
lmerM = lmer(hr ~ stress_CMC * pwb2_C_d10 + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##              F Df  Df.res    Pr(>F)
## (Intercept) 49048.2054  1  904.94 < 2.2e-16 ***
## stress_CMC   692.2135  1  827.82 < 2.2e-16 ***
## pwb2_C_d10    0.0059  1 1058.31 0.9385844
## P4_age_C      23.9414  1  951.02 1.166e-06 ***
## stress_CMC:pwb2_C_d10 26.6977  1  822.77 2.987e-07 ***
## stress_CMC:P4_age_C  14.9033  1  846.04 0.0001218 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + (1 + stress_CMC |
##   M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 29066.1
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0804 -0.4734 -0.0403  0.4042  9.4774
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept)         82.9873   9.1097
##           stress_CMC          0.5161   0.7184   0.18
##   M2FAMNUM (Intercept)         29.9774   5.4752
##   Residual                    5.5892   2.3642
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)      74.576312   0.336510 221.617
## stress_CMC         0.883415   0.033557  26.326
## pwb2_C_d10         0.007326   0.094901   0.077
## P4_age_C          -0.149293   0.030494  -4.896
## stress_CMC:pwb2_C_d10 0.050252   0.009720   5.170
## stress_CMC:P4_age_C -0.011877   0.003075  -3.863
##
## Correlation of Fixed Effects:
##           (Intr) st_CMC p2_C_1 P4_g_C s_CMC:2
## stress_CMC   0.103
## pwb2_C_d10   0.004 -0.001
## P4_age_C    -0.010  0.001 -0.187
## s_CMC:2_C_1 -0.001  0.028  0.107 -0.020
## s_CMC:P4_C   0.001 -0.038 -0.020  0.103 -0.219
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49048	1	905	0
stress_CMC	692	1	828	2.37e-111
pwb2_C_d10	0.00594	1	1058	0.939
P4_age_C	23.9	1	951	1.17e-06
stress_CMC:pwb2_C_d10	26.7	1	823	2.99e-07
stress_CMC:P4_age_C	14.9	1	846	0.000122

Depression

```
# Center age for subjects in this analysis
```

```
varDescribe(dfLs$P4_CESD_C)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 5285 0 8.1 -2.61 -8.61 45.39 1.61 3.17
```

```
length(dfLs$P4_age[!is.na(dfLs$P4_CESD_C)])
```

```
## [1] 5285
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$P4_CESD_C)], na.rm=T)
```

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C*stress_CMC + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
--	---	----	--------	--------


```

## (Intercept)          48675.0923  1  903.93 < 2.2e-16 ***
## stress_CMC           708.6105  1  821.66 < 2.2e-16 ***
## P4_CESD_C_d10        0.8915  1 1053.83  0.3453
## P4_age_C             21.6462  1  943.62 3.746e-06 ***
## stress_CMC:P4_CESD_C_d10 36.7742  1  783.73 2.061e-09 ***
## stress_CMC:P4_age_C   15.6921  1  833.89 8.091e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + (1 +
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 28941.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1330 -0.4775 -0.0407  0.4082  9.4424
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 81.7186  9.0398
##           stress_CMC  0.4949  0.7035  0.20
##   M2FAMNUM (Intercept) 31.5649  5.6183
##   Residual                5.5949  2.3654
## Number of obs: 5136, groups:  M2ID, 1057; M2FAMNUM, 933
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)    74.604070  0.337934 220.765
## stress_CMC      0.885757  0.033254  26.636
## P4_CESD_C_d10  0.390758  0.413199   0.946
## P4_age_C       -0.141844  0.030469  -4.655
## stress_CMC:P4_CESD_C_d10 -0.249253  0.041077  -6.068
## stress_CMC:P4_age_C   -0.011962  0.003018  -3.964
##
## Correlation of Fixed Effects:

```

```
##          (Intr) st_CMC P4_CES P4_g_C s_CMC:P4_C
## stress_CMC  0.113
## P4_CESD_C_1 -0.011  0.000
## P4_age_C    -0.012  0.001  0.179
## s_CMC:P4_CE 0.000 -0.037  0.117  0.020
## s_CMC:P4__C 0.001 -0.040  0.020  0.114  0.199
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48675	1	904	0
stress_CMC	709	1	822	4.53e-113
P4_CESD_C_d10	0.891	1	1054	0.345
P4_age_C	21.6	1	944	3.75e-06
stress_CMC:P4_CESD_C_d10	36.8	1	784	2.06e-09
stress_CMC:P4_age_C	15.7	1	834	8.09e-05

Anxiety

```
# Center age for subjects in this analysis
varDescribe(dfLs$P4_STAItrait_C)
```

```
## vars  n mean  sd median  min max skew kurtosis
## X1    1 5285   0 8.98  -1.2 -14.2 36.8 0.84    0.4
```

```
length(dfLs$P4_age[!is.na(dfLs$P4_STAItrait_C)])
```

```
## [1] 5285
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$P4_STAItrait_C)], na.rm=T)
```

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C*stress_CMC + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 48804.0381  1  901.75 < 2.2e-16 ***
## stress_CMC   698.7427  1  824.85 < 2.2e-16 ***
## P4_STAItrait_C_d10  0.6496  1 1050.97 0.4204417
## P4_age_C     22.5998  1  946.23 2.305e-06 ***
## stress_CMC:P4_STAItrait_C_d10 32.4933  1  769.39 1.704e-08 ***
## stress_CMC:P4_age_C   14.4580  1  834.40 0.0001538 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC +
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 28933.7
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0941 -0.4783 -0.0381  0.4069  9.4807
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 82.7810  9.0984
##           stress_CMC  0.5074  0.7123  0.20
##   M2FAMNUM (Intercept) 30.3042  5.5049
## Residual                    5.5802  2.3622
## Number of obs: 5134, groups: M2ID, 1057; M2FAMNUM, 932
##
## Fixed effects:
##
##           Estimate Std. Error t value
```

```
## (Intercept)          74.59287    0.33743 221.063
## stress_CMC           0.88498    0.03346  26.450
## P4_STAItrait_C_d10  0.30179    0.37381   0.807
## P4_age_C            -0.14510    0.03050  -4.757
## stress_CMC:P4_STAItrait_C_d10 -0.21105    0.03700  -5.704
## stress_CMC:P4_age_C -0.01157    0.00304  -3.805
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_STA P4_g_C s_CMC:P4_S
## stress_CMC  0.113
## P4_STAI_C_1 -0.009  0.001
## P4_age_C    -0.011  0.001  0.180
## s_CMC:P4_ST 0.001 -0.042  0.118  0.021
## s_CMC:P4__C 0.001 -0.042  0.021  0.114  0.198
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48804	1	902	0
stress_CMC	699	1	825	5.05e-112
P4_STAItrait_C_d10	0.65	1	1051	0.42
P4_age_C	22.6	1	946	2.31e-06
stress_CMC:P4_STAItrait_C_d10	32.5	1	769	1.7e-08
stress_CMC:P4_age_C	14.5	1	834	0.000154

IL6

```
# Center age for subjects in this analysis
varDescribe(dfLs$IL6_T_C)
```

```
## vars    n mean  sd median  min max skew kurtosis
## X1     1 5290   0 1.06  -0.07 -3.09 3.3 0.31    0.46
```

```

length(dfLs$P4_age[!is.na(dfLs$IL6_T_C)])

## [1] 5290

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$IL6_T_C)], na.rm=T)

# Run the test
lmerM = lmer(hr ~ stress_CMC * IL6_T_C + P4_age_C*stress_CMC + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df Df.res   Pr(>F)
## (Intercept) 49387.3244  1  902.50 < 2.2e-16 ***
## stress_CMC   701.9324  1  820.80 < 2.2e-16 ***
## IL6_T_C      14.5493  1 1055.38 0.0001445 ***
## P4_age_C     29.1957  1  949.54 8.275e-08 ***
## stress_CMC:IL6_T_C 22.2044  1  762.26 2.913e-06 ***
## stress_CMC:P4_age_C  5.1371  1  818.63 0.0236806 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + (1 + stress_CMC |
## M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 28974.2
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1655 -0.4782 -0.0442  0.4062  9.4401
##
## Random effects:
##  Groups   Name                Variance Std.Dev. Corr

```

```

## M2ID      (Intercept) 84.1103  9.1712
##          stress_CMC  0.4884  0.6989  0.23
## M2FAMNUM (Intercept) 27.9945  5.2910
## Residual                5.5835  2.3629
## Number of obs: 5147, groups: M2ID, 1058; M2FAMNUM, 933
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   74.566859   0.335299 222.389
## stress_CMC     0.876484   0.033062  26.510
## IL6_T_C       1.202373   0.314616   3.822
## P4_age_C     -0.163316   0.030207  -5.407
## stress_CMC:IL6_T_C -0.145483   0.030856  -4.715
## stress_CMC:P4_age_C -0.006733   0.002969  -2.268
##
## Correlation of Fixed Effects:
##          (Intr) st_CMC IL6_T_ P4_g_C s_CMC:I
## stress_CMC  0.129
## IL6_T_C    -0.004 -0.001
## P4_age_C   -0.008  0.001 -0.160
## s_CMC:IL6_T -0.001 -0.007  0.136 -0.022
## s_CMC:P4__C  0.001 -0.035 -0.022  0.132 -0.134

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49387	1	902	0
stress_CMC	702	1	821	2.93e-112
IL6_T_C	14.5	1	1055	0.000144
P4_age_C	29.2	1	950	8.27e-08
stress_CMC:IL6_T_C	22.2	1	762	2.91e-06
stress_CMC:P4_age_C	5.14	1	819	0.0237

CRP

```
# Center age for subjects in this analysis
varDescribe(dfLs$CRP_T_C)

##      vars      n mean  sd median  min max skew kurtosis
## X1      1 5260    0 0.51  -0.03 -1.02 1.61 0.05   -0.44

length(dfLs$P4_age[!is.na(dfLs$CRP_T_C)])

## [1] 5260

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$CRP_T_C)], na.rm=T)

# Run the test
lmerM = lmer(hr ~ stress_CMC * CRP_T_C + P4_age_C*stress_CMC + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##              F Df  Df.res    Pr(>F)
## (Intercept)  49078.668  1  902.33 < 2.2e-16 ***
## stress_CMC    680.613  1  819.13 < 2.2e-16 ***
## CRP_T_C       24.137  1 1046.92 1.041e-06 ***
## P4_age_C      23.060  1  939.56 1.826e-06 ***
## stress_CMC:CRP_T_C  7.155  1  827.20 0.007623 **
## stress_CMC:P4_age_C  8.802  1  829.94 0.003095 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + (1 + stress_CMC |
##      M2ID) + (1 | M2FAMNUM)
##      Data: dfLs
##
## REML criterion at convergence: 28817.8
```

```

##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1728 -0.4754 -0.0394  0.4055  9.4259
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 78.7779  8.8757
##           stress_CMC    0.5023  0.7087  0.22
##   M2FAMNUM (Intercept) 32.6217  5.7115
##   Residual                5.5965  2.3657
## Number of obs: 5117, groups: M2ID, 1052; M2FAMNUM, 928
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.547465   0.336296 221.672
## stress_CMC      0.872203   0.033412  26.104
## CRP_T_C         3.199604   0.650060   4.922
## P4_age_C       -0.143695   0.029908  -4.805
## stress_CMC:CRP_T_C -0.175099   0.065423  -2.676
## stress_CMC:P4_age_C -0.008831   0.002975  -2.969
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC CRP_T_ P4_g_C s_CMC:C
## stress_CMC    0.122
## CRP_T_C      -0.002 -0.001
## P4_age_C     -0.010  0.001  0.016
## s_CMC:CRP_T -0.001 -0.012  0.126  0.002
## s_CMC:P4__C  0.001 -0.038  0.002  0.124  0.044
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	49079	1	902	0

term	statistic	df	Df.res	p.value
stress_CMC	681	1	819	1.09e-109
CRP_T_C	24.1	1	1047	1.04e-06
P4_age_C	23.1	1	940	1.83e-06
stress_CMC:CRP_T_C	7.15	1	827	0.00762
stress_CMC:P4_age_C	8.8	1	830	0.0031

Denial

```

# Center age for subjects in this analysis
length(dfLs$P4_age[!is.na(dfLs$COPE_denial_C)])

## [1] 5300
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$COPE_denial_C)], na.rm=T)

# Run the test
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res  Pr(>F)
## (Intercept) 48794.9153  1  903.47 < 2.2e-16 ***
## stress_CMC   697.4192  1  821.28 < 2.2e-16 ***
## COPE_denial_C    0.0640  1 1057.62  0.800396
## P4_age_C       24.0417  1  945.63 1.109e-06 ***
## stress_CMC:COPE_denial_C  20.6906  1  853.31 6.179e-06 ***
## stress_CMC:P4_age_C    6.8998  1  830.01  0.008779 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + (1 +
##           stress_CMC | M2ID) + (1 | M2FAMNUM)

```

```

## Data: dfLs
##
## REML criterion at convergence: 28988.6
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1781 -0.4782 -0.0401  0.4055  9.4747
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 84.4781  9.191
##           stress_CMC   0.4859  0.697  0.18
##   M2FAMNUM (Intercept) 29.2390  5.407
##   Residual                5.5473  2.355
## Number of obs: 5149, groups: M2ID, 1060; M2FAMNUM, 936
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)      74.603472  0.337499 221.048
## stress_CMC         0.871002  0.032961  26.425
## COPE_denial_C     -0.037553  0.148277  -0.253
## P4_age_C          -0.147097  0.029983  -4.906
## stress_CMC:COPE_denial_C -0.068955  0.015150  -4.552
## stress_CMC:P4_age_C  -0.007733  0.002942  -2.628
##
## Correlation of Fixed Effects:
##           (Intr) st_CMC COPE__ P4_g_C s_CMC:C
## stress_CMC   0.103
## COPE_denl_C -0.010  0.000
## P4_age_C     -0.009  0.001 -0.017
## s_CMC:COPE_  0.000  0.013  0.104 -0.004
## s_CMC:P4__C  0.001 -0.033 -0.004  0.104 -0.034
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs
```

term	statistic	df	Df.res	p.value
(Intercept)	48795	1	903	0
stress_CMC	697	1	821	9.55e-112
COPE_denial_C	0.064	1	1058	0.8
P4_age_C	24	1	946	1.11e-06
stress_CMC:COPE_denial_C	20.7	1	853	6.18e-06
stress_CMC:P4_age_C	6.9	1	830	0.00878

Multiple Comparisons Correction

Holm-Bonferonni

```
## p value for each test of a well-being marker
p = c(2.99E-07, 2.06E-09, 1.70E-08, 2.91E-06, 0.00762, 6.18E-06)
## Holm-bonferonni
p.adjust(p, method= 'holm')

## [1] 1.196e-06 1.236e-08 8.500e-08 8.730e-06 7.620e-03 1.236e-05
#
```

Reactivity and Recovery

Compute reactivity measures

```
# Stress reactivity
dfLsW$stressChange2to1 = dfLsW$stress.2 - dfLsW$stress.1
varDescribe(dfLsW$stressChange2to1)

## vars n mean sd median min max skew kurtosis
## X1 1 1065 2.35 1.76 2 -7 9 0.14 1.39

dfLsW$stressChange4to1 = dfLsW$stress.4 - dfLsW$stress.1
varDescribe(dfLsW$stressChange4to1)
```

```

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1065 2.85 2.06      3 -8  9 0.11      0.77

dfLsW$stressChangeStresstoBase = rowMeans(dfLsW[c('stressChange2to1', 'stressChange4to1')], na.rm=TRUE)
varDescribe(dfLsW$stressChangeStresstoBase) # mean = 2.6, sd = 1.75, min = -7.5, max = 8

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1065 2.6 1.75      2.5 -7.5  8  0      1.14

# Heart rate reactivity
dfLsW$hrChange2to1 = dfLsW$hr.2 - dfLsW$hr.1
varDescribe(dfLsW$hrChange2to1)

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1008 3.97 4.25      3.3 -7.3 38 1.71      7.35

dfLsW$hrChange4to1 = dfLsW$hr.4 - dfLsW$hr.1
varDescribe(dfLsW$hrChange4to1)

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1001 2.88 3.88      2.4 -9.4 26.8 1.21      4.11

dfLsW$hrChangeStresstoBase = rowMeans(dfLsW[c('hrChange2to1', 'hrChange4to1')], na.rm=TRUE)
varDescribe(dfLsW$hrChangeStresstoBase) # mean = 3.42, sd = 3.81, min = -7.1, max = 30.95

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1035 3.42 3.81      2.9 -7.1 30.95 1.43      5.41

# Center reactivity
dfLsW$stressChangeStresstoBase_C = dfLsW$stressChangeStresstoBase - mean(dfLsW$stressChangeStresstoBase, na.rm=T)
dfLsW$hrChangeStresstoBase_C = dfLsW$hrChangeStresstoBase - mean(dfLsW$hrChangeStresstoBase, na.rm=T)

# Self-reported stress
dfLsW$stressChange3to2 = dfLsW$stress.3 - dfLsW$stress.2
varDescribe(dfLsW$stressChange3to2)

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1065 -2.17 1.76      -2 -8  6 -0.29      0.86

dfLsW$stressChange5to4 = dfLsW$stress.5 - dfLsW$stress.4
varDescribe(dfLsW$stressChange5to4)

##      vars      n mean   sd median min max skew kurtosis
## X1      1 1065 -2.74 2.04      -3 -9  8 -0.06      0.91

```

```
dfLsW$stressChangeRecovtoStress = rowMeans(dfLsW[c('stressChange3to2', 'stressChange5to4')], na.rm=TRUE)
varDescribe(dfLsW$stressChangeRecovtoStress)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 1065 -2.46 1.66 -2.5 -7.5 5 -0.14 0.39
```

```
# center
```

```
dfLsW$stressChangeRecovtoStress_C = dfLsW$stressChangeRecovtoStress - mean(dfLsW$stressChangeRecovtoStress, na.rm=T)
```

```
# Heart rate
```

```
dfLsW$hrChange3to2 = dfLsW$hr.3 - dfLsW$hr.2
varDescribe(dfLsW$hrChange3to2)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 1003 -3.35 3.93 -2.9 -33 7.1 -1.77 8.26
```

```
dfLsW$hrChange5to4 = dfLsW$hr.5 - dfLsW$hr.4
varDescribe(dfLsW$hrChange5to4)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 994 -2.8 3.38 -2.3 -24.8 8.3 -1.08 3.84
```

```
dfLsW$hrChangeRecovtoStress = rowMeans(dfLsW[c('hrChange3to2', 'hrChange5to4')], na.rm=TRUE)
varDescribe(dfLsW$hrChangeRecovtoStress)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 1030 -3.06 3.33 -2.75 -26.45 6.45 -1.44 5.94
```

```
# center
```

```
dfLsW$hrChangeRecovtoStress_C = dfLsW$hrChangeRecovtoStress - mean(dfLsW$hrChangeRecovtoStress, na.rm=T)
```

```
## Merge reactivity and recovery measures into dfLs
```

```
varsToMerge = c('M2ID', 'hrChangeStresstoBase', 'hrChangeStresstoBase_C', 'stressChangeStresstoBase', 'stressChangeStresstoBase_C', 'hrCha
```

```
#dfLsW[varsToMerge]
```

```
# dfLs with Reactivity and Recovery data = dfLsRR
```

```
dfLsRR = merge.data.frame(dfLs, dfLsW[varsToMerge], by='M2ID', all=TRUE)
```

```
#varDescribe(dfLsRR)
```

```
# Center age
```

```
dfLsRR$P4_age_C = dfLsRR$P4_age - mean(dfLsRR$P4_age, na.rm=T)
```

Is reactivity or recovery associated with coherence?

Heart rate reactivity

```
# hr reactivity
lmerM = lmer(hr ~ stress_CMC * hrChangeStresstoBase_C + P4_age_C * stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLsRR)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 48347.497  1  884.70 < 2.2e-16 ***
## stress_CMC  1477.918  1  553.80 < 2.2e-16 ***
## hrChangeStresstoBase_C  18.144  1 1017.96 2.238e-05 ***
## P4_age_C    19.873  1  916.88 9.299e-06 ***
## stress_CMC:hrChangeStresstoBase_C 1318.695  1  752.53 < 2.2e-16 ***
## stress_CMC:P4_age_C    1.973  1  508.76  0.1607
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * hrChangeStresstoBase_C + P4_age_C * stress_CMC +
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 27851.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -12.0186  -0.4942  -0.0253   0.4459   7.0565
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 8.305e+01 9.11338
```

```

##          stress_CMC 9.804e-04 0.03131 1.00
## M2FAMNUM (Intercept) 2.925e+01 5.40850
## Residual          5.357e+00 2.31460
## Number of obs: 5098, groups: M2ID, 1035; M2FAMNUM, 918
##
## Fixed effects:
##
##              Estimate Std. Error t value
## (Intercept)      74.611591   0.339084 220.039
## stress_CMC        0.775073   0.020112  38.537
## hrChangeStresstoBase_C
##                0.376262   0.088110   4.270
## P4_age_C         -0.135265   0.030323  -4.461
## stress_CMC:hrChangeStresstoBase_C
##                0.195908   0.005386  36.376
## stress_CMC:P4_age_C
##               -0.002527   0.001794  -1.409
##
## Correlation of Fixed Effects:
##          (Intr) st_CMC hCSB_C P4_g_C s_CMC:C
## stress_CMC  0.042
## hrChngStB_C 0.006  0.000
## P4_age_C    0.001  0.001  0.070
## s_CMC:CSB_C 0.000  0.017  0.042  0.003
## s_CMC:P4__C 0.001 -0.058  0.003  0.043  0.058
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	48347	1	885	0
stress_CMC	1478	1	554	1.93e-158
hrChangeStresstoBase_C	18.1	1	1018	2.24e-05
P4_age_C	19.9	1	917	9.3e-06
stress_CMC:hrChangeStresstoBase_C	1319	1	753	1.31e-167
stress_CMC:P4_age_C	1.97	1	509	0.161

Stress reactivity

```
# stress reactivity
lmerM = lmer(hr ~ stress_CMC * stressChangeStresstoBase_C + P4_age_C * stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLsRR)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49060.5947	1	908.36	< 2.2e-16 ***
## stress_CMC	652.6562	1	1108.84	< 2.2e-16 ***
## stressChangeStresstoBase_C	0.6268	1	1060.01	0.428720
## P4_age_C	23.7626	1	951.90	1.276e-06 ***
## stress_CMC:stressChangeStresstoBase_C	10.3484	1	714.50	0.001354 **
## stress_CMC:P4_age_C	6.5206	1	840.94	0.010839 *

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * stressChangeStresstoBase_C + P4_age_C * stress_CMC +
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 29185.3
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.2472 -0.4730 -0.0443  0.4016  9.3916
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept)          83.5713   9.1417
##          stress_CMC           0.5241   0.7239   0.17
## M2FAMNUM (Intercept)         29.9308   5.4709
## Residual                    5.5843   2.3631
```



```

## Number of obs: 5174, groups: M2ID, 1065; M2FAMNUM, 940
##
## Fixed effects:
##
##              Estimate Std. Error t value
## (Intercept)      74.603915   0.336590 221.646
## stress_CMC        0.919418   0.035971  25.560
## stressChangeStresstoBase_C -0.149642   0.188708  -0.793
## P4_age_C         -0.146056   0.029945  -4.877
## stress_CMC:stressChangeStresstoBase_C -0.061563   0.019123  -3.219
## stress_CMC:P4_age_C -0.007672   0.003003  -2.555
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC sCSB_C P4_g_C s_CMC:C
## stress_CMC    0.092
## strssChSB_C  0.004  0.002
## P4_age_C     -0.009  0.000 -0.071
## s_CMC:CSB_C  0.002 -0.353  0.101 -0.005
## s_CMC:P4__C  0.001 -0.004 -0.004  0.099 -0.072
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	49061	1	908	0
stress_CMC	653	1	1109	1.41e-113
stressChangeStresstoBase_C	0.627	1	1060	0.429
P4_age_C	23.8	1	952	1.28e-06
stress_CMC:stressChangeStresstoBase_C	10.3	1	714	0.00135
stress_CMC:P4_age_C	6.52	1	841	0.0108

Heart rate recovery

```
# hr recovery
lmerM = lmer(hr ~ stress_CMC * hrChangeRecovtoStress_C + P4_age_C * stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLsRR)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	48082.160	1	879.41	< 2.2e-16 ***
## stress_CMC	1324.508	1	548.48	< 2.2e-16 ***
## hrChangeRecovtoStress_C	19.528	1	1002.86	1.099e-05 ***
## P4_age_C	22.602	1	911.21	2.315e-06 ***
## stress_CMC:hrChangeRecovtoStress_C	1306.213	1	672.09	< 2.2e-16 ***
## stress_CMC:P4_age_C	17.280	1	512.28	3.780e-05 ***

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * hrChangeRecovtoStress_C + P4_age_C * stress_CMC +
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 27788
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -11.6864 -0.4747 -0.0338  0.4379  7.2108
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 8.318e+01 9.12006
##          stress_CMC 5.754e-04 0.02399  1.00
## M2FAMNUM (Intercept) 2.923e+01 5.40604
## Residual                    5.377e+00 2.31887
```

```

## Number of obs: 5085, groups: M2ID, 1030; M2FAMNUM, 913
##
## Fixed effects:
##
##              Estimate Std. Error t value
## (Intercept)      74.624414   0.340075 219.435
## stress_CMC         0.735922   0.020171  36.484
## hrChangeRecovtoStress_C
##                -0.447674   0.101052  -4.430
## P4_age_C          -0.144192   0.030311  -4.757
## stress_CMC:hrChangeRecovtoStress_C
##                -0.215940   0.005963 -36.211
## stress_CMC:P4_age_C
##                -0.007483   0.001795  -4.169
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC hCRS_C P4_g_C s_CMC:C
## stress_CMC    0.032
## hrChngRcS_C -0.005  0.001
## P4_age_C      0.000  0.001  0.009
## s_CMC:CRS_C  0.000  0.037  0.034  0.001
## s_CMC:P4__C  0.001 -0.057  0.001  0.034  0.019
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	48082	1	879	0
stress_CMC	1325	1	548	2.16e-148
hrChangeRecovtoStress_C	19.5	1	1003	1.1e-05
P4_age_C	22.6	1	911	2.32e-06
stress_CMC:hrChangeRecovtoStress_C	1306	1	672	1.04e-159
stress_CMC:P4_age_C	17.3	1	512	3.78e-05

Stress recovery

```
# stress recovery
lmerM = lmer(hr ~ stress_CMC * stressChangeRecovtoStress_C + P4_age_C * stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLsRR)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49002.4502	1	909.07	< 2.2e-16 ***
## stress_CMC	632.8103	1	1129.40	< 2.2e-16 ***
## stressChangeRecovtoStress_C	0.0162	1	1057.93	0.898838
## P4_age_C	24.2816	1	950.78	9.815e-07 ***
## stress_CMC:stressChangeRecovtoStress_C	5.2489	1	711.29	0.022252 *
## stress_CMC:P4_age_C	7.4174	1	842.03	0.006593 **

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * stressChangeRecovtoStress_C + P4_age_C * stress_CMC +
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 29190.3
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1327 -0.4739 -0.0447  0.4039  9.4526
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept)          83.3065  9.1272
##          stress_CMC           0.5292  0.7274  0.18
## M2FAMNUM (Intercept)          30.2880  5.5035
## Residual                    5.5863  2.3635
```

```

## Number of obs: 5174, groups: M2ID, 1065; M2FAMNUM, 940
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      74.605982   0.336802 221.513
## stress_CMC        0.909223   0.036127  25.168
## stressChangeRecovtoStress_C
##                0.025278   0.198451   0.127
## P4_age_C         -0.147419   0.029900  -4.930
## stress_CMC:stressChangeRecovtoStress_C
##                0.045771   0.019964   2.293
## stress_CMC:P4_age_C
##               -0.008186   0.003004  -2.725
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC sCRS_C P4_g_C s_CMC:C
## stress_CMC    0.096
## strssChRS_C -0.005 -0.001
## P4_age_C     -0.009  0.000  0.031
## s_CMC:CRS_C -0.001  0.357  0.108  0.002
## s_CMC:P4__C  0.001 -0.020  0.002  0.105  0.028
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	49002	1	909	0
stress_CMC	633	1	1129	3.1e-111
stressChangeRecovtoStress_C	0.0162	1	1058	0.899
P4_age_C	24.3	1	951	9.81e-07
stress_CMC:stressChangeRecovtoStress_C	5.25	1	711	0.0223
stress_CMC:P4_age_C	7.42	1	842	0.00659

Is stress reactivity associated with heart rate reactivity?

```
lmerM = lmer(hrChangeStresstoBase_C ~ stressChangeStresstoBase_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hrChangeStresstoBase_C
##              F Df  Df.res  Pr(>F)
## (Intercept)  0.0681  1  896.19 0.79413
## stressChangeStresstoBase_C 0.1077  1 1031.57 0.74285
## P4_age_C      5.0072  1  921.99 0.02548 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hrChangeStresstoBase_C ~ stressChangeStresstoBase_C + P4_age_C +
##          (1 | M2FAMNUM)
##    Data: dfLsW
##
## REML criterion at convergence: 5677.6
##
## Scaled residuals:
##    Min      1Q  Median      3Q      Max
## -2.2963 -0.5023 -0.0954  0.3750  5.5446
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 5.403    2.324
## Residual              8.833    2.972
## Number of obs: 1035, groups: M2FAMNUM, 918
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   -0.03164   0.12115  -0.261
## stressChangeStresstoBase_C  0.02217   0.06744   0.329
```

```
## P4_age_C          -0.02422    0.01082   -2.239
##
## Correlation of Fixed Effects:
##          (Intr) sCSB_C
## strssChSB_C  0.008
## P4_age_C    -0.003 -0.073
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	0.0681	1	896	0.794
stressChangeStresstoBase_C	0.108	1	1032	0.743
P4_age_C	5.01	1	922	0.0255

Does coherence predict well-being outcomes when adjusting for reactivity?

PWB + reactivity

```
# PWB
lmerM = lmer(hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1+ stress_CMC | M
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: hr
##
##          F Df  Df.res  Pr(>F)
## (Intercept) 48451.0786  1  876.85 < 2.2e-16 ***
## stress_CMC   696.3578  1  820.74 < 2.2e-16 ***
## pwb2_C_d10    0.0137  1 1024.71 0.9068054
## P4_age_C     18.5708  1  917.85 1.814e-05 ***
## stressChangeStresstoBase_C  1.4874  1 1024.46 0.2229064
```

```

## hrChangeStresstoBase_C      16.8527  1 1008.69 4.366e-05 ***
## stress_CMC:pwb2_C_d10      26.7139  1  816.69 2.968e-07 ***
## stress_CMC:P4_age_C       12.9924  1  832.53 0.0003313 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLsRR
##
## REML criterion at convergence: 28627
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1162 -0.4768 -0.0415  0.4007  9.3894
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.4966  9.138
##           stress_CMC  0.5127  0.716  0.01
##   M2FAMNUM (Intercept) 28.0835  5.299
##   Residual                5.6293  2.373
## Number of obs: 5078, groups: M2ID, 1031; M2FAMNUM, 914
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.578126  0.338560 220.280
## stress_CMC      0.888089  0.033640  26.400
## pwb2_C_d10    -0.011324  0.096535  -0.117
## P4_age_C      -0.133923  0.031055  -4.312
## stressChangeStresstoBase_C -0.233787  0.191172  -1.223
## hrChangeStresstoBase_C    0.364889  0.088572   4.120
## stress_CMC:pwb2_C_d10    0.050377  0.009741   5.171
## stress_CMC:P4_age_C    -0.011161  0.003095  -3.607
##
## Correlation of Fixed Effects:

```



```
## (Intr) st_CMC p2_C_1 P4_g_C sCSB_C hCSB_C s_CMC:2
## stress_CMC 0.005
## pwb2_C_d10 0.004 0.000
## P4_age_C 0.001 0.001 -0.194
## strssChSB_C 0.005 0.002 0.020 -0.080
## hrChngStB_C 0.004 0.000 -0.118 0.089 -0.017
## s_CMC:2_C_1 0.000 0.028 0.004 -0.001 0.000 0.000
## s_CMC:P4__C 0.001 -0.032 -0.001 0.005 0.001 0.000 -0.219
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48451	1	877	0
stress_CMC	696	1	821	1.33e-111
pwb2_C_d10	0.0137	1	1025	0.907
P4_age_C	18.6	1	918	1.81e-05
stressChangeStresstoBase_C	1.49	1	1024	0.223
hrChangeStresstoBase_C	16.9	1	1009	4.37e-05
stress_CMC:pwb2_C_d10	26.7	1	817	2.97e-07
stress_CMC:P4_age_C	13	1	833	0.000331

Depression + reactivity

```
# CESD
```

```
lmerM = lmer(hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1+ stress_CMC
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
--	---	----	--------	--------

```

## (Intercept)          48198.8180  1  874.70 < 2.2e-16 ***
## stress_CMC           711.9971  1  814.50 < 2.2e-16 ***
## P4_CESD_C_d10        2.1285  1 1018.78 0.1448862
## P4_age_C             16.0595  1  908.08 6.641e-05 ***
## stressChangeStresstoBase_C  1.4078  1 1020.13 0.2357016
## hrChangeStresstoBase_C  16.6307  1 1010.18 4.898e-05 ***
## stress_CMC:P4_CESD_C_d10  36.5551  1  777.64 2.303e-09 ***
## stress_CMC:P4_age_C    13.7432  1  819.84 0.0002237 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28502.2
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1618 -0.4822 -0.0399  0.4075  9.3588
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## M2ID (Intercept) 82.2990  9.0719
## stress_CMC 0.4917  0.7012  0.03
## M2FAMNUM (Intercept) 29.3471  5.4173
## Residual 5.6345  2.3737
## Number of obs: 5060, groups: M2ID, 1027; M2FAMNUM, 911
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 74.605761  0.339581 219.699
## stress_CMC 0.890243  0.033349  26.695
## P4_CESD_C_d10 0.615523  0.421293  1.461
## P4_age_C -0.124569  0.031062 -4.010
## stressChangeStresstoBase_C -0.227692  0.191378 -1.190

```

```
## hrChangeStresstoBase_C      0.364627  0.089095  4.093
## stress_CMC:P4_CESD_C_d10    -0.249095  0.041175 -6.050
## stress_CMC:P4_age_C         -0.011272  0.003039 -3.709
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_CES P4_g_C sCSB_C hCSB_C s_CMC:P4_C
## stress_CMC  0.017
## P4_CESD_C_1 -0.010  0.000
## P4_age_C    -0.001  0.000  0.199
## strssChSB_C 0.007  0.007 -0.043 -0.082
## hrChngStB_C 0.003  0.000  0.145  0.096 -0.026
## s_CMC:P4_CE 0.000 -0.036  0.017  0.003  0.000  0.000
## s_CMC:P4__C 0.001 -0.034  0.003  0.018  0.001  0.000  0.200
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48199	1	875	0
stress_CMC	712	1	814	3.25e-113
P4_CESD_C_d10	2.13	1	1019	0.145
P4_age_C	16.1	1	908	6.64e-05
stressChangeStresstoBase_C	1.41	1	1020	0.236
hrChangeStresstoBase_C	16.6	1	1010	4.9e-05
stress_CMC:P4_CESD_C_d10	36.6	1	778	2.3e-09
stress_CMC:P4_age_C	13.7	1	820	0.000224

Anxiety + reactivity

```
# P4_STAItrait
lmerM = lmer(hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1+ stre
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 48247.7375  1  873.01 < 2.2e-16 ***
## stress_CMC   702.1587  1  817.53 < 2.2e-16 ***
## P4_STAItrait_C_d10  1.0661  1 1014.58 0.3020789
## P4_age_C     17.5177  1  912.50 3.122e-05 ***
## stressChangeStresstoBase_C  1.1415  1 1020.46 0.2855890
## hrChangeStresstoBase_C    15.1972  1 1008.27 0.0001033 ***
## stress_CMC:P4_STAItrait_C_d10 32.3399  1  762.97 1.844e-08 ***
## stress_CMC:P4_age_C      12.5194  1  821.03 0.0004254 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC +
##          stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1 +
##          stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28495.6
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1192 -0.4771 -0.0426  0.4046  9.4008
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.3342  9.1288
##           stress_CMC  0.5042  0.7101  0.03
##   M2FAMNUM (Intercept) 28.2878  5.3186
##   Residual                5.6193  2.3705
## Number of obs: 5058, groups: M2ID, 1027; M2FAMNUM, 910
##
## Fixed effects:
##
##           Estimate Std. Error t value
## (Intercept) 74.59753    0.33936 219.816
```

```

## stress_CMC                0.88940    0.03355   26.510
## P4_STAItrait_C_d10        0.39387    0.38083    1.034
## P4_age_C                  -0.13014    0.03107   -4.188
## stressChangeStresstoBase_C -0.20481    0.19117   -1.071
## hrChangeStresstoBase_C     0.34682    0.08865    3.912
## stress_CMC:P4_STAItrait_C_d10 -0.21103    0.03709   -5.690
## stress_CMC:P4_age_C       -0.01083    0.00306   -3.540
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_STA P4_g_C sCSB_C hCSB_C s_CMC:P4_S
## stress_CMC  0.020
## P4_STAI_C_1 -0.005  0.000
## P4_age_C    0.003  0.000  0.189
## strssChSB_C 0.005  0.008 -0.024 -0.081
## hrChngStB_C 0.007  0.000  0.125  0.091 -0.020
## s_CMC:P4_ST 0.000 -0.041  0.021  0.004  0.000  0.000
## s_CMC:P4__C 0.001 -0.034  0.004  0.021  0.001  0.000  0.197
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	48248	1	873	0
stress_CMC	702	1	818	3.57e-112
P4_STAItrait_C_d10	1.07	1	1015	0.302
P4_age_C	17.5	1	912	3.12e-05
stressChangeStresstoBase_C	1.14	1	1020	0.286
hrChangeStresstoBase_C	15.2	1	1008	0.000103
stress_CMC:P4_STAItrait_C_d10	32.3	1	763	1.84e-08
stress_CMC:P4_age_C	12.5	1	821	0.000425

IL6 + reactivity

```
# IL6
```

```
lmerM = lmer(hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1 + stress_CMC|M2ID) | M2FAMNUM, data=dfLsRR, type=3, test="F")
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49112.6562	1	874.02	< 2.2e-16 ***
## stress_CMC	705.0468	1	813.81	< 2.2e-16 ***
## IL6_T_C	18.7398	1	1025.27	1.645e-05 ***
## P4_age_C	25.2120	1	915.77	6.172e-07 ***
## stressChangeStresstoBase_C	0.7484	1	1022.79	0.38719
## hrChangeStresstoBase_C	15.7779	1	1007.58	7.630e-05 ***
## stress_CMC:IL6_T_C	22.5271	1	754.82	2.479e-06 ***
## stress_CMC:P4_age_C	3.9751	1	805.25	0.04651 *

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28549.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1803 -0.4791 -0.0437  0.4051  9.3687
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept)          84.0928   9.1702
##          stress_CMC           0.4863   0.6973   0.06
```

```

## M2FAMNUM (Intercept) 26.0281 5.1018
## Residual 5.6202 2.3707
## Number of obs: 5073, groups: M2ID, 1030; M2FAMNUM, 913
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 74.557851 0.336166 221.789
## stress_CMC 0.881594 0.033187 26.565
## IL6_T_C 1.379825 0.318100 4.338
## P4_age_C -0.153349 0.030518 -5.025
## stressChangeStresstoBase_C -0.164777 0.189952 -0.867
## hrChangeStresstoBase_C 0.351570 0.088203 3.986
## stress_CMC:IL6_T_C -0.147131 0.030982 -4.749
## stress_CMC:P4_age_C -0.005968 0.002991 -1.995
##
## Correlation of Fixed Effects:
## (Intr) st_CMC IL6_T_ P4_g_C sCSB_C hCSB_C s_CMC:I
## stress_CMC 0.036
## IL6_T_C -0.013 0.000
## P4_age_C 0.002 0.000 -0.157
## strssChSB_C 0.005 0.015 0.047 -0.084
## hrChngStB_C 0.006 0.000 0.127 0.051 -0.015
## s_CMC:IL6_T -0.001 -0.008 0.038 -0.006 0.000 -0.001
## s_CMC:P4__C 0.001 -0.029 -0.006 0.037 0.001 0.000 -0.136
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	49113	1	874	0
stress_CMC	705	1	814	2.21e-112
IL6_T_C	18.7	1	1025	1.65e-05
P4_age_C	25.2	1	916	6.17e-07
stressChangeStresstoBase_C	0.748	1	1023	0.387
hrChangeStresstoBase_C	15.8	1	1008	7.63e-05

term	statistic	df	Df.res	p.value
stress_CMC:IL6_T_C	22.5	1	755	2.48e-06
stress_CMC:P4_age_C	3.98	1	805	0.0465

CRP + reactivity

```
# CRP
lmerM = lmer(hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1 + stress_CMC|M2ID)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##              F Df  Df.res  Pr(>F)
## (Intercept) 48861.7504 1  874.20 < 2.2e-16 ***
## stress_CMC   684.2299 1  812.37 < 2.2e-16 ***
## CRP_T_C      29.6922 1 1017.01 6.353e-08 ***
## P4_age_C     18.6059 1  907.56 1.783e-05 ***
## stressChangeStresstoBase_C 0.9048 1 1018.28 0.341732
## hrChangeStresstoBase_C    18.4657 1 1007.88 1.897e-05 ***
## stress_CMC:CRP_T_C        7.8016 1  818.40 0.005342 **
## stress_CMC:P4_age_C       7.2423 1  817.43 0.007266 **
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```
## Data: dfLsRR
```

```
##
```

```
## REML criterion at convergence: 28390.6
```

```
##
```

```
## Scaled residuals:
```

```
##   Min       1Q   Median       3Q      Max
```



```

## -7.1897 -0.4745 -0.0387 0.4034 9.3526
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## M2ID (Intercept) 78.7101 8.8719
## stress_CMC 0.5005 0.7075 0.04
## M2FAMNUM (Intercept) 30.5743 5.5294
## Residual 5.6324 2.3733
## Number of obs: 5043, groups: M2ID, 1024; M2FAMNUM, 908
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 74.535174 0.336962 221.198
## stress_CMC 0.877712 0.033540 26.169
## CRP_T_C 3.583501 0.656354 5.460
## P4_age_C -0.130430 0.030219 -4.316
## stressChangeStresstoBase_C -0.180621 0.189359 -0.954
## hrChangeStresstoBase_C 0.378851 0.087855 4.312
## stress_CMC:CRP_T_C -0.183689 0.065729 -2.795
## stress_CMC:P4_age_C -0.008068 0.002996 -2.693
##
## Correlation of Fixed Effects:
## (Intr) st_CMC CRP_T_ P4_g_C sCSB_C hCSB_C s_CMC:C
## stress_CMC 0.021
## CRP_T_C -0.013 0.000
## P4_age_C -0.004 0.000 0.016
## strssChSB_C 0.005 0.009 0.025 -0.079
## hrChngStB_C 0.007 0.000 0.102 0.073 -0.015
## s_CMC:CRP_T 0.000 -0.014 0.022 0.001 0.000 -0.001
## s_CMC:P4__C 0.001 -0.035 0.001 0.022 0.001 0.000 0.039
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	48862	1	874	0
stress_CMC	684	1	812	6.83e-110
CRP_T_C	29.7	1	1017	6.35e-08
P4_age_C	18.6	1	908	1.78e-05
stressChangeStresstoBase_C	0.905	1	1018	0.342
hrChangeStresstoBase_C	18.5	1	1008	1.9e-05
stress_CMC:CRP_T_C	7.8	1	818	0.00534
stress_CMC:P4_age_C	7.24	1	817	0.00727

Denial + reactivity

```
# denial
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 + stress_CMC | M2FAMNUM))
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##              F Df  Df.res    Pr(>F)
## (Intercept) 48109.4888  1  875.91 < 2.2e-16 ***
## stress_CMC   701.5992  1  814.45 < 2.2e-16 ***
## COPE_denial_C    0.0001  1 1024.71 0.9934647
## P4_age_C       19.0976  1  912.29 1.385e-05 ***
## stressChangeStresstoBase_C    1.2045  1 1023.33 0.2726830
## hrChangeStresstoBase_C    13.7280  1 1020.10 0.0002226 ***
## stress_CMC:COPE_denial_C    21.2404  1  847.12 4.675e-06 ***
## stress_CMC:P4_age_C     5.5655  1  816.65 0.0185521 *
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```

## Data: dfLsRR
##
## REML criterion at convergence: 28549.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.2063 -0.4843 -0.0381  0.4045  9.3967
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 85.0358  9.2215
##           stress_CMC   0.4831  0.6951  0.02
##   M2FAMNUM (Intercept) 27.4894  5.2430
##   Residual                5.5837  2.3630
## Number of obs: 5073, groups: M2ID, 1030; M2FAMNUM, 914
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      74.611286   0.339904 219.507
## stress_CMC         0.875742   0.033048  26.499
## COPE_denial_C     -0.001239   0.150958  -0.008
## P4_age_C          -0.133549   0.030539  -4.373
## stressChangeStresstoBase_C -0.212189   0.192810  -1.101
## hrChangeStresstoBase_C    0.333195   0.089631   3.717
## stress_CMC:COPE_denial_C -0.070040   0.015188  -4.612
## stress_CMC:P4_age_C     -0.006992   0.002962  -2.361
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC COPE__ P4_g_C sCSB_C hCSB_C s_CMC:C
## stress_CMC    0.014
## COPE_denl_C -0.011  0.000
## P4_age_C      0.005  0.001 -0.023
## strssChSB_C  0.003  0.006  0.067 -0.082
## hrChngStB_C  0.008  0.000  0.119  0.068 -0.010
## s_CMC:COPE_  0.000  0.012  0.013 -0.001  0.000  0.000
## s_CMC:P4__C  0.001 -0.025 -0.001  0.015  0.001  0.000 -0.036
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =

```

```
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48109	1	876	0
stress_CMC	702	1	814	5.3e-112
COPE_denial_C	6.71e-05	1	1025	0.993
P4_age_C	19.1	1	912	1.38e-05
stressChangeStresstoBase_C	1.2	1	1023	0.273
hrChangeStresstoBase_C	13.7	1	1020	0.000223
stress_CMC:COPE_denial_C	21.2	1	847	4.67e-06
stress_CMC:P4_age_C	5.57	1	817	0.0186

Does coherence predict well-being outcomes when adjusting for recovery?

PWB + recovery

```
# PWB
lmerM = lmer(hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1+ stress_CMC
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: hr
##
##           F Df  Df.res  Pr(>F)
## (Intercept) 48154.2993  1  871.94 < 2.2e-16 ***
## stress_CMC  693.4114  1  818.08 < 2.2e-16 ***
## pwb2_C_d10   0.0699  1 1019.70 0.7915532
## P4_age_C    21.3914  1  910.04 4.286e-06 ***
## stressChangeRecovtoStress_C  0.7717  1 1018.61 0.3798914
## hrChangeRecovtoStress_C  22.9971  1  996.22 1.870e-06 ***
## stress_CMC:pwb2_C_d10  26.6775  1  813.91 3.025e-07 ***
## stress_CMC:P4_age_C  12.7347  1  830.59 0.0003795 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeRecovtoStress_C +
##   hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 |
##   M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28553.8
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1260 -0.4790 -0.0428  0.4036  9.3728
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.4912   9.1374
##           stress_CMC   0.5145   0.7173  -0.02
##   M2FAMNUM (Intercept) 28.2379   5.3139
##   Residual                5.6379   2.3744
## Number of obs: 5065, groups: M2ID, 1026; M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.593814   0.339673 219.605
## stress_CMC      0.888587   0.033730  26.344
## pwb2_C_d10     -0.025748   0.097221  -0.265
## P4_age_C       -0.143135   0.030927  -4.628
## stressChangeRecovtoStress_C 0.177241   0.201195   0.881
## hrChangeRecovtoStress_C   -0.492615   0.102359  -4.813
## stress_CMC:pwb2_C_d10     0.050460   0.009764   5.168
## stress_CMC:P4_age_C      -0.011079   0.003103  -3.571
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC p2_C_1 P4_g_C sCRS_C hCRS_C s_CMC:2
## stress_CMC   -0.012
## pwb2_C_d10   0.002  0.000
```

```
## P4_age_C      0.001  0.001 -0.184
## strssChRS_C -0.009  0.005  0.003  0.033
## hrChngRcS_C -0.002  0.000  0.142 -0.019 -0.097
## s_CMC:2_C_1  0.000  0.026 -0.013  0.002  0.001  0.000
## s_CMC:P4__C  0.001 -0.031  0.002 -0.011 -0.001  0.000 -0.220

table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48154	1	872	0
stress_CMC	693	1	818	3.63e-111
pwb2_C_d10	0.0699	1	1020	0.792
P4_age_C	21.4	1	910	4.29e-06
stressChangeRecovtoStress_C	0.772	1	1019	0.38
hrChangeRecovtoStress_C	23	1	996	1.87e-06
stress_CMC:pwb2_C_d10	26.7	1	814	3.03e-07
stress_CMC:P4_age_C	12.7	1	831	0.00038

Depression + recovery

```
# CESD
lmerM = lmer(hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1+ stress_
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

```
## (Intercept)          47871.9751  1  869.72 < 2.2e-16 ***
## stress_CMC           709.8430  1  811.90 < 2.2e-16 ***
## P4_CESD_C_d10        2.0320  1 1013.45 0.1543288
```

```

## P4_age_C                18.8640  1  900.24 1.563e-05 ***
## stressChangeRecovtoStress_C    0.5418  1 1013.76 0.4618572
## hrChangeRecovtoStress_C       20.3574  1  997.10 7.189e-06 ***
## stress_CMC:P4_CESD_C_d10      36.4240  1  775.17 2.459e-09 ***
## stress_CMC:P4_age_C          13.4368  1  817.70 0.0002627 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeRecovtoStress_C +
##   hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 |
##   M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28430.2
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1650 -0.4824 -0.0391  0.4101  9.3471
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 82.4206  9.0786
##          stress_CMC  0.4935  0.7025  0.01
## M2FAMNUM (Intercept) 29.4537  5.4271
## Residual                    5.6429  2.3755
## Number of obs: 5047, groups: M2ID, 1022; M2FAMNUM, 906
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.619523   0.340800 218.954
## stress_CMC      0.891440   0.033444  26.654
## P4_CESD_C_d10  0.602676   0.422189   1.428
## P4_age_C       -0.134388   0.030921  -4.346
## stressChangeRecovtoStress_C 0.149214   0.202155   0.738
## hrChangeRecovtoStress_C   -0.465876   0.102887  -4.528
## stress_CMC:P4_CESD_C_d10  -0.249206   0.041267  -6.039

```

```
## stress_CMC:P4_age_C      -0.011174  0.003047  -3.668
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_CES P4_g_C sCRS_C hCRS_C s_CMC:P4_C
## stress_CMC    0.006
## P4_CESD_C_1 -0.011  0.000
## P4_age_C      -0.001  0.001  0.185
## strssChRS_C -0.007 -0.002  0.014  0.034
## hrChngRcS_C  0.001  0.000 -0.148 -0.024 -0.101
## s_CMC:P4_CE  0.000 -0.037  0.005  0.001  0.000  0.000
## s_CMC:P4__C  0.001 -0.034  0.001  0.006 -0.001  0.000  0.199
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	47872	1	870	0
stress_CMC	710	1	812	7.13e-113
P4_CESD_C_d10	2.03	1	1013	0.154
P4_age_C	18.9	1	900	1.56e-05
stressChangeRecovtoStress_C	0.542	1	1014	0.462
hrChangeRecovtoStress_C	20.4	1	997	7.19e-06
stress_CMC:P4_CESD_C_d10	36.4	1	775	2.46e-09
stress_CMC:P4_age_C	13.4	1	818	0.000263

Anxiety + recovery

```
# P4_STAItrait
lmerM = lmer(hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1+ st
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```



```
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 47932.3025  1  868.26 < 2.2e-16 ***
## stress_CMC  699.4756  1  814.85 < 2.2e-16 ***
## P4_STAItrait_C_d10  1.2523  1 1007.96 0.2633873
## P4_age_C  20.0665  1  904.04 8.437e-06 ***
## stressChangeRecovtoStress_C  0.3825  1 1014.85 0.5364128
## hrChangeRecovtoStress_C  19.1951  1  993.78 1.305e-05 ***
## stress_CMC:P4_STAItrait_C_d10  31.8875  1  760.93 2.307e-08 ***
## stress_CMC:P4_age_C  12.2718  1  818.99 0.0004848 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC +
##   stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 +
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28423.3
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1234 -0.4784 -0.0420  0.4054  9.3883
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.1481  9.1186
##           stress_CMC  0.5065  0.7117  0.01
##   M2FAMNUM (Intercept) 28.6447  5.3521
##   Residual                    5.6276  2.3723
## Number of obs: 5045, groups: M2ID, 1022; M2FAMNUM, 905
##
## Fixed effects:
##
##           Estimate Std. Error t value
## (Intercept) 74.61361  0.34055 219.096
## stress_CMC  0.89041  0.03365  26.459
```

```

## P4_STAItrait_C_d10          0.42860    0.38237    1.121
## P4_age_C                    -0.13877    0.03096   -4.483
## stressChangeRecovtoStress_C  0.12520    0.20186    0.620
## hrChangeRecovtoStress_C     -0.45084    0.10254   -4.397
## stress_CMC:P4_STAItrait_C_d10 -0.21021    0.03720   -5.650
## stress_CMC:P4_age_C         -0.01076    0.00307   -3.505
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_STA P4_g_C sCRS_C hCRS_C s_CMC:P4_S
## stress_CMC    0.009
## P4_STAI_C_1 -0.007  0.000
## P4_age_C      0.002  0.001  0.181
## strssChRS_C -0.004 -0.004  0.010  0.038
## hrChngRcS_C -0.004  0.000 -0.138 -0.020 -0.101
## s_CMC:P4_ST  0.000 -0.042  0.009  0.002  0.000  0.000
## s_CMC:P4__C  0.001 -0.034  0.002  0.010 -0.001  0.000  0.200
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	47932	1	868	0
stress_CMC	699	1	815	9.09e-112
P4_STAItrait_C_d10	1.25	1	1008	0.263
P4_age_C	20.1	1	904	8.44e-06
stressChangeRecovtoStress_C	0.382	1	1015	0.536
hrChangeRecovtoStress_C	19.2	1	994	1.31e-05
stress_CMC:P4_STAItrait_C_d10	31.9	1	761	2.31e-08
stress_CMC:P4_age_C	12.3	1	819	0.000485

IL6 + recovery

```
# IL6
```

```
lmerM = lmer(hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 + stress_CMC | M2FAMNUM))
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)	
## (Intercept)	48821.9934	1	868.56	< 2.2e-16	***
## stress_CMC	704.6114	1	811.04	< 2.2e-16	***
## IL6_T_C	19.0056	1	1020.12	1.435e-05	***
## P4_age_C	28.5993	1	909.04	1.127e-07	***
## stressChangeRecovtoStress_C	0.2623	1	1016.89	0.60865	
## hrChangeRecovtoStress_C	21.2448	1	995.59	4.567e-06	***
## stress_CMC:IL6_T_C	23.1730	1	753.84	1.789e-06	***
## stress_CMC:P4_age_C	3.7054	1	803.00	0.05459	.

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C +
```

```
##   hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 |
```

```
##   M2FAMNUM)
```

```
## Data: dfLsRR
```

```
##
```

```
## REML criterion at convergence: 28476.3
```

```
##
```

```
## Scaled residuals:
```

```
##   Min      1Q  Median      3Q      Max
```

```
## -7.1900 -0.4797 -0.0460  0.4051  9.3523
```

```
##
```

```
## Random effects:
```

```
## Groups   Name              Variance Std.Dev. Corr
```

```
## M2ID     (Intercept) 84.1098  9.1711
```

```

##          stress_CMC  0.4875  0.6982  0.03
## M2FAMNUM (Intercept) 26.1089  5.1097
## Residual           5.6283  2.3724
## Number of obs: 5060, groups: M2ID, 1025; M2FAMNUM, 908
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.568839   0.337214 221.132
## stress_CMC      0.883553   0.033271  26.556
## IL6_T_C        1.397468   0.319880   4.369
## P4_age_C       -0.163139   0.030483  -5.352
## stressChangeRecovtoStress_C 0.103183   0.200904   0.514
## hrChangeRecovtoStress_C  -0.472659   0.102183  -4.626
## stress_CMC:IL6_T_C  -0.150195   0.031183  -4.817
## stress_CMC:P4_age_C  -0.005778   0.003000  -1.926
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC IL6_T_ P4_g_C sCRS_C hCRS_C s_CMC:I
## stress_CMC  0.020
## IL6_T_C    -0.019  0.000
## P4_age_C    0.002  0.001 -0.168
## strssChRS_C -0.006 -0.009 -0.031  0.041
## hrChngRcS_C -0.005  0.000 -0.131  0.025 -0.100
## s_CMC:IL6_T -0.001 -0.013  0.022 -0.003 -0.001  0.000
## s_CMC:P4__C  0.001 -0.028 -0.003  0.021 -0.001  0.000 -0.140
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	48822	1	869	0
stress_CMC	705	1	811	3.1e-112
IL6_T_C	19	1	1020	1.44e-05
P4_age_C	28.6	1	909	1.13e-07
stressChangeRecovtoStress_C	0.262	1	1017	0.609

term	statistic	df	Df.res	p.value
hrChangeRecovtoStress_C	21.2	1	996	4.57e-06
stress_CMC:IL6_T_C	23.2	1	754	1.79e-06
stress_CMC:P4_age_C	3.71	1	803	0.0546

CRP + recovery

```
# CRP
lmerM = lmer(hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 + stress_CMC:CRP_T_C | M2ID) + (1 + stress_CMC:P4_age_C | M2ID))
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##          F Df Df.res Pr(>F)
## (Intercept) 48464.5847 1 868.90 < 2.2e-16 ***
## stress_CMC 682.0911 1 809.71 < 2.2e-16 ***
## CRP_T_C 27.8573 1 1012.23 1.598e-07 ***
## P4_age_C 21.7846 1 900.11 3.514e-06 ***
## stressChangeRecovtoStress_C 0.2836 1 1012.69 0.594466
## hrChangeRecovtoStress_C 19.7030 1 998.21 1.005e-05 ***
## stress_CMC:CRP_T_C 7.7853 1 815.08 0.005390 **
## stress_CMC:P4_age_C 7.0466 1 815.21 0.008096 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C +
##   hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 +
##   stress_CMC:CRP_T_C | M2ID) + (1 + stress_CMC:P4_age_C | M2ID)
## Data: dfLsRR
##
## REML criterion at convergence: 28319.6
##
```

```

## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1855 -0.4763 -0.0397  0.4039  9.3457
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 78.9119  8.8832
##           stress_CMC   0.5023  0.7088  0.03
##   M2FAMNUM (Intercept) 30.7158  5.5422
##   Residual                5.6408  2.3750
## Number of obs: 5030, groups: M2ID, 1019; M2FAMNUM, 903
##
## Fixed effects:
##                Estimate Std. Error t value
## (Intercept)      74.550368   0.338407  220.298
## stress_CMC         0.878823   0.033635   26.128
## CRP_T_C           3.478391   0.657730    5.288
## P4_age_C          -0.140863   0.030162   -4.670
## stressChangeRecovtoStress_C  0.106584   0.199570    0.534
## hrChangeRecovtoStress_C    -0.452388   0.101554   -4.455
## stress_CMC:CRP_T_C    -0.183965   0.065897   -2.792
## stress_CMC:P4_age_C    -0.007978   0.003004   -2.656
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC CRP_T_ P4_g_C sCRS_C hCRS_C s_CMC:C
## stress_CMC   0.017
## CRP_T_C     -0.019  0.000
## P4_age_C     -0.005  0.001  0.010
## strssChRS_C -0.008 -0.007 -0.023  0.036
## hrChngRcS_C -0.010  0.000 -0.067  0.006 -0.099
## s_CMC:CRP_T  0.000 -0.016  0.018  0.001  0.000  0.001
## s_CMC:P4__C  0.001 -0.034  0.001  0.018 -0.001  0.001  0.039
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48465	1	869	0
stress_CMC	682	1	810	1.5e-109
CRP_T_C	27.9	1	1012	1.6e-07
P4_age_C	21.8	1	900	3.51e-06
stressChangeRecovtoStress_C	0.284	1	1013	0.594
hrChangeRecovtoStress_C	19.7	1	998	1.01e-05
stress_CMC:CRP_T_C	7.79	1	815	0.00539
stress_CMC:P4_age_C	7.05	1	815	0.0081

denial + recovery

```
# Denial
```

```
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1+ stress_CMC | subject))
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	47817.4673	1	870.91	< 2.2e-16 ***
## stress_CMC	699.2313	1	811.90	< 2.2e-16 ***
## COPE_denial_C	0.0212	1	1019.72	0.8843
## P4_age_C	22.0675	1	904.67	3.041e-06 ***
## stressChangeRecovtoStress_C	0.4804	1	1017.82	0.4884
## hrChangeRecovtoStress_C	19.2600	1	1008.99	1.261e-05 ***
## stress_CMC:COPE_denial_C	20.9901	1	844.56	5.312e-06 ***
## stress_CMC:P4_age_C	5.4155	1	814.63	0.0202 *

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```

## Formula:
## hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeRecovtoStress_C +
##   hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 |
##   M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28476.5
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.2149 -0.4851 -0.0393  0.4060  9.3811
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 84.9254  9.2155
##           stress_CMC  0.4852  0.6966  -0.01
##   M2FAMNUM (Intercept) 27.7282  5.2658
##   Residual                5.5919  2.3647
## Number of obs: 5060, groups: M2ID, 1025; M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      74.625852   0.341007 218.840
## stress_CMC         0.876828   0.033145  26.454
## COPE_denial_C     0.022099   0.151639   0.146
## P4_age_C          -0.143177   0.030459 -4.701
## stressChangeRecovtoStress_C 0.140866   0.202670   0.695
## hrChangeRecovtoStress_C   -0.453425   0.102980 -4.403
## stress_CMC:COPE_denial_C  -0.069778   0.015221 -4.584
## stress_CMC:P4_age_C     -0.006915   0.002970 -2.329
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC COPE__ P4_g_C sCRS_C hCRS_C s_CMC:C
## stress_CMC  -0.002
## COPE_denl_C -0.012  0.000
## P4_age_C     0.004  0.001 -0.029
## strssChRS_C -0.006  0.001 -0.078  0.037
## hrChngRcS_C -0.004  0.000 -0.128  0.011 -0.089
## s_CMC:COPE_  0.000  0.011 -0.003  0.000  0.000 -0.001

```



```
## s_CMC:P4_C 0.001 -0.024 0.000 -0.001 -0.001 0.001 -0.035
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	47817	1	871	0
stress_CMC	699	1	812	1.23e-111
COPE_denial_C	0.0212	1	1020	0.884
P4_age_C	22.1	1	905	3.04e-06
stressChangeRecovtoStress_C	0.48	1	1018	0.488
hrChangeRecovtoStress_C	19.3	1	1009	1.26e-05
stress_CMC:COPE_denial_C	21	1	845	5.31e-06
stress_CMC:P4_age_C	5.42	1	815	0.0202

Does coherence predict well-being outcomes when adjusting for reactivity and recovery?

PWB + reactivity + recovery

```
# PWB
lmerM = lmer(hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C, data=dfLsRR)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##          F Df  Df.res  Pr(>F)
## (Intercept) 48150.6948 1 870.61 < 2.2e-16 ***
## stress_CMC 694.0895 1 818.80 < 2.2e-16 ***
## pwb2_C_d10 0.2240 1 1018.00 0.6360748
## P4_age_C 18.0891 1 915.15 2.325e-05 ***
## stressChangeStresstoBase_C 1.6652 1 1014.99 0.1971997
```

```
## hrChangeStresstoBase_C      3.0462  1 1011.20 0.0812276 .
## stressChangeRecovtoStress_C  0.1731  1 1016.42 0.6774429
## hrChangeRecovtoStress_C     5.9531  1 1015.92 0.0148617 *
## stress_CMC:pwb2_C_d10       26.9403  1  814.30 2.652e-07 ***
## stress_CMC:P4_age_C        12.7211  1  830.96 0.0003822 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * pwb2_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C +
##   (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28552.7
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1912 -0.4825 -0.0412  0.4046  9.3278
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 83.9083  9.1601
##          stress_CMC  0.5149  0.7176 -0.09
## M2FAMNUM (Intercept) 27.8855  5.2807
## Residual                    5.6372  2.3743
## Number of obs: 5065, groups: M2ID, 1026; M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  74.593679  0.339682 219.598
## stress_CMC    0.889094  0.033734  26.356
## pwb2_C_d10   -0.046161  0.097345  -0.474
## P4_age_C     -0.133034  0.031256  -4.256
## stressChangeStresstoBase_C -0.397955  0.307519  -1.294
## hrChangeStresstoBase_C    0.235610  0.134554   1.751
## stressChangeRecovtoStress_C -0.135131  0.323852  -0.417
```

```

## hrChangeRecovtoStress_C      -0.380672   0.155512  -2.448
## stress_CMC:pwb2_C_d10         0.050703   0.009763   5.193
## stress_CMC:P4_age_C           -0.011072   0.003102  -3.569
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC p2_C_1 P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
## stress_CMC  -0.050
## pwb2_C_d10   0.002  0.000
## P4_age_C     0.001  0.002 -0.188
## strssChSB_C -0.003 -0.006  0.041 -0.093
## hrChngStB_C  0.001  0.001 -0.018  0.117 -0.066
## strssChRS_C -0.008  0.008  0.035 -0.058  0.783 -0.101
## hrChngRcS_C -0.001  0.001  0.078  0.079 -0.088  0.753 -0.145
## s_CMC:2_C_1  0.000  0.026 -0.051  0.009  0.001  0.000  0.002  0.000
## s_CMC:P4__C  0.001 -0.031  0.009 -0.049  0.000  0.000  0.000  0.000
##      s_CMC:2
## stress_CMC
## pwb2_C_d10
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C
## s_CMC:2_C_1
## s_CMC:P4__C -0.220

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48151	1	871	0
stress_CMC	694	1	819	2.85e-111
pwb2_C_d10	0.224	1	1018	0.636
P4_age_C	18.1	1	915	2.32e-05
stressChangeStresstoBase_C	1.67	1	1015	0.197

term	statistic	df	Df.res	p.value
hrChangeStresstoBase_C	3.05	1	1011	0.0812
stressChangeRecovtoStress_C	0.173	1	1016	0.677
hrChangeRecovtoStress_C	5.95	1	1016	0.0149
stress_CMC:pwb2_C_d10	26.9	1	814	2.65e-07
stress_CMC:P4_age_C	12.7	1	831	0.000382

Depression + reactivity + recovery

```
# CESD
```

```
lmerM = lmer(hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + stress_CMC:P4_CESD_C_d10 + stress_CMC:P4_age_C, data = Anova(lmerM, type=3, test="F"))
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

```
## (Intercept) 47946.7718 1 867.80 < 2.2e-16 ***
```

```
## stress_CMC 710.1739 1 812.37 < 2.2e-16 ***
```

```
## P4_CESD_C_d10 3.0031 1 1011.61 0.0834101 .
```

```
## P4_age_C 15.5848 1 905.28 8.500e-05 ***
```

```
## stressChangeStresstoBase_C 1.8712 1 1011.97 0.1716431
```

```
## hrChangeStresstoBase_C 3.2962 1 1005.05 0.0697389 .
```

```
## stressChangeRecovtoStress_C 0.3181 1 1013.54 0.5728949
```

```
## hrChangeRecovtoStress_C 4.9913 1 1011.16 0.0256935 *
```

```
## stress_CMC:P4_CESD_C_d10 36.5236 1 775.45 2.341e-09 ***
```

```
## stress_CMC:P4_age_C 13.4003 1 817.99 0.0002677 ***
```

```
## ---
```

```
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * P4_CESD_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
```

```
## hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C +
```

```
## (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```

## Data: dfLsRR
##
## REML criterion at convergence: 28428.7
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -7.2274 -0.4816 -0.0396 0.4111 9.3036
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## M2ID (Intercept) 82.6613 9.092
## stress_CMC 0.4943 0.703 -0.06
## M2FAMNUM (Intercept) 29.0765 5.392
## Residual 5.6418 2.375
## Number of obs: 5047, groups: M2ID, 1022; M2FAMNUM, 906
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 74.616926 0.340520 219.127
## stress_CMC 0.891897 0.033454 26.660
## P4_CESD_C_d10 0.734480 0.423220 1.735
## P4_age_C -0.123428 0.031242 -3.951
## stressChangeStresstoBase_C -0.423482 0.308693 -1.372
## hrChangeStresstoBase_C 0.245795 0.134937 1.822
## stressChangeRecovtoStress_C -0.184334 0.325909 -0.566
## hrChangeRecovtoStress_C -0.348963 0.155682 -2.242
## stress_CMC:P4_CESD_C_d10 -0.249599 0.041276 -6.047
## stress_CMC:P4_age_C -0.011161 0.003047 -3.663
##
## Correlation of Fixed Effects:
## (Intr) st_CMC P4_CES P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
## stress_CMC -0.034
## P4_CESD_C_1 -0.011 0.000
## P4_age_C -0.001 0.001 0.194
## strssChSB_C 0.005 -0.004 -0.060 -0.095
## hrChngStB_C 0.003 0.001 0.053 0.120 -0.066
## strssChRS_C -0.001 0.005 -0.040 -0.059 0.784 -0.097
## hrChngRcS_C 0.003 0.001 -0.055 0.078 -0.083 0.750 -0.140
## s_CMC:P4_CE 0.000 -0.037 -0.035 -0.006 0.000 0.000 -0.001 0.000

```

```
## s_CMC:P4__C 0.001 -0.033 -0.006 -0.032 0.001 0.000 0.000 0.000
## s_CMC:P4_C
## stress_CMC
## P4_CESD_C_1
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C
## s_CMC:P4_CE
## s_CMC:P4__C 0.199
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	47947	1	868	0
stress_CMC	710	1	812	6.29e-113
P4_CESD_C_d10	3	1	1012	0.0834
P4_age_C	15.6	1	905	8.5e-05
stressChangeStresstoBase_C	1.87	1	1012	0.172
hrChangeStresstoBase_C	3.3	1	1005	0.0697
stressChangeRecovtoStress_C	0.318	1	1014	0.573
hrChangeRecovtoStress_C	4.99	1	1011	0.0257
stress_CMC:P4_CESD_C_d10	36.5	1	775	2.34e-09
stress_CMC:P4_age_C	13.4	1	818	0.000268

Anxiety + reactivity + recovery

```
# P4_STAItrait
lmerM = lmer(hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressCh
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 48008.7015  1  866.23 < 2.2e-16 ***
## stress_CMC  699.7750  1  815.19 < 2.2e-16 ***
## P4_STAItrait_C_d10  1.7951  1 1006.37 0.1806029
## P4_age_C  16.9509  1  909.57 4.185e-05 ***
## stressChangeStresstoBase_C  1.7481  1 1012.49 0.1864185
## hrChangeStresstoBase_C  2.8777  1 1005.92 0.0901246 .
## stressChangeRecovtoStress_C  0.3637  1 1013.79 0.5465772
## hrChangeRecovtoStress_C  4.7699  1 1012.41 0.0291904 *
## stress_CMC:P4_STAItrait_C_d10  31.8758  1  761.16 2.320e-08 ***
## stress_CMC:P4_age_C  12.2192  1  819.22 0.0004984 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_STAItrait_C_d10 + P4_age_C * stress_CMC +
## stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C +
## hrChangeRecovtoStress_C + (1 + stress_CMC | M2ID) + (1 |
## M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28422.2
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1802 -0.4789 -0.0434  0.4057  9.3484
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.3871  9.1317
##           stress_CMC  0.5072  0.7122  -0.05
##   M2FAMNUM (Intercept) 28.2726  5.3172
##   Residual                5.6266  2.3721
## Number of obs: 5045, groups: M2ID, 1022; M2FAMNUM, 905
##
```

```

## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)    74.612817   0.340275 219.272
## stress_CMC      0.890835   0.033662  26.464
## P4_STAItrait_C_d10 0.513393   0.382536   1.342
## P4_age_C       -0.128776   0.031255  -4.120
## stressChangeStresstoBase_C -0.408762   0.308290  -1.326
## hrChangeStresstoBase_C    0.229227   0.134685   1.702
## stressChangeRecovtoStress_C -0.196904   0.325555  -0.605
## hrChangeRecovtoStress_C   -0.341217   0.155726  -2.191
## stress_CMC:P4_STAItrait_C_d10 -0.210219   0.037213  -5.649
## stress_CMC:P4_age_C      -0.010741   0.003071  -3.498
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC P4_STA P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
## stress_CMC -0.028
## P4_STAI_C_1 -0.006  0.000
## P4_age_C    0.002  0.001  0.186
## strssChSB_C 0.003 -0.003 -0.034 -0.089
## hrChngStB_C 0.002  0.001  0.032  0.118 -0.065
## strssChRS_C 0.000  0.005 -0.022 -0.051  0.784 -0.099
## hrChngRcS_C -0.001  0.001 -0.066  0.078 -0.085  0.752 -0.144
## s_CMC:P4_ST 0.000 -0.041 -0.030 -0.005 -0.001  0.000 -0.001  0.000
## s_CMC:P4__C 0.001 -0.034 -0.005 -0.027  0.001  0.000  0.000  0.000
##      s_CMC:P4_S
## stress_CMC
## P4_STAI_C_1
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C
## s_CMC:P4_ST
## s_CMC:P4__C 0.200
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```



```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48009	1	866	0
stress_CMC	700	1	815	8.16e-112
P4_STAItrait_C_d10	1.8	1	1006	0.181
P4_age_C	17	1	910	4.18e-05
stressChangeStresstoBase_C	1.75	1	1012	0.186
hrChangeStresstoBase_C	2.88	1	1006	0.0901
stressChangeRecovtoStress_C	0.364	1	1014	0.547
hrChangeRecovtoStress_C	4.77	1	1012	0.0292
stress_CMC:P4_STAItrait_C_d10	31.9	1	761	2.32e-08
stress_CMC:P4_age_C	12.2	1	819	0.000498

IL6 + reactivity + recovery

```
# IL6
lmerM = lmer(hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 48920.3032  1  866.47 < 2.2e-16 ***
## stress_CMC  704.5798  1  811.32 < 2.2e-16 ***
## IL6_T_C    20.5949  1 1018.12 6.351e-06 ***
## P4_age_C   25.4623  1  913.26 5.443e-07 ***
## stressChangeStresstoBase_C  1.4279  1 1016.14  0.23239
## hrChangeStresstoBase_C    3.0770  1 1011.69  0.07971 .
## stressChangeRecovtoStress_C  0.3239  1 1017.35  0.56940
## hrChangeRecovtoStress_C    5.4686  1 1015.73  0.01955 *
## stress_CMC:IL6_T_C    23.1448  1  754.10 1.815e-06 ***
## stress_CMC:P4_age_C    3.6530  1  803.30  0.05632 .
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * IL6_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C +
##   (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28475.3
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.2451 -0.4775 -0.0436  0.4051  9.3142
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept)          84.1453   9.1731
##          stress_CMC           0.4888   0.6991  -0.04
## M2FAMNUM (Intercept)          25.8727   5.0865
## Residual                    5.6266   2.3720
## Number of obs: 5060, groups: M2ID, 1025; M2FAMNUM, 908
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.567090   0.336865  221.356
## stress_CMC      0.884057   0.033291   26.555
## IL6_T_C         1.455603   0.320079    4.548
## P4_age_C       -0.155226   0.030738   -5.050
## stressChangeStresstoBase_C -0.367590   0.306759   -1.198
## hrChangeStresstoBase_C     0.235175   0.133642    1.760
## stressChangeRecovtoStress_C -0.185247   0.324567   -0.571
## hrChangeRecovtoStress_C   -0.363101   0.154765   -2.346
## stress_CMC:IL6_T_C      -0.150199   0.031203   -4.814
## stress_CMC:P4_age_C     -0.005741   0.003002   -1.912
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC IL6_T_ P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
```

```

## stress_CMC -0.019
## IL6_T_C -0.019 0.000
## P4_age_C 0.002 0.001 -0.163
## strssChSB_C 0.001 -0.002 0.025 -0.088
## hrChngStB_C -0.001 0.000 0.046 0.109 -0.066
## strssChRS_C -0.003 0.003 -0.002 -0.050 0.784 -0.101
## hrChngRcS_C -0.004 0.000 -0.053 0.102 -0.091 0.750 -0.149
## s_CMC:IL6_T 0.000 -0.013 -0.019 0.004 0.000 0.001 0.000 0.000
## s_CMC:P4__C 0.001 -0.028 0.004 -0.018 0.001 0.000 0.000 0.000
## s_CMC:I
## stress_CMC
## IL6_T_C
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C
## s_CMC:IL6_T
## s_CMC:P4__C -0.140

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48920	1	866	0
stress_CMC	705	1	811	3.06e-112
IL6_T_C	20.6	1	1018	6.35e-06
P4_age_C	25.5	1	913	5.44e-07
stressChangeStresstoBase_C	1.43	1	1016	0.232
hrChangeStresstoBase_C	3.08	1	1012	0.0797
stressChangeRecovtoStress_C	0.324	1	1017	0.569
hrChangeRecovtoStress_C	5.47	1	1016	0.0196
stress_CMC:IL6_T_C	23.1	1	754	1.81e-06
stress_CMC:P4_age_C	3.65	1	803	0.0563

CRP + reactivity + recovery

```
# CRP
```

```
lmerM = lmer(hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovto
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)	
## (Intercept)	48583.5205	1	867.05	< 2.2e-16	***
## stress_CMC	682.0273	1	810.22	< 2.2e-16	***
## CRP_T_C	30.2179	1	1009.79	4.890e-08	***
## P4_age_C	18.4103	1	904.70	1.973e-05	***
## stressChangeStresstoBase_C	1.5335	1	1008.79	0.215876	
## hrChangeStresstoBase_C	4.1742	1	1001.88	0.041305	*
## stressChangeRecovtoStress_C	0.3506	1	1010.51	0.553928	
## hrChangeRecovtoStress_C	4.4212	1	1006.46	0.035743	*
## stress_CMC:CRP_T_C	7.6815	1	815.46	0.005706	**
## stress_CMC:P4_age_C	6.9289	1	815.65	0.008642	**

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * CRP_T_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
```

```
##   hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C +
```

```
##   (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```
## Data: dfLsRR
```

```
##
```

```
## REML criterion at convergence: 28317.8
```

```
##
```

```
## Scaled residuals:
```

```
##   Min      1Q  Median      3Q      Max
```

```
## -7.2447 -0.4755 -0.0417  0.4040  9.3047
```

```
##
```

```
## Random effects:
```

```

## Groups   Name          Variance Std.Dev. Corr
## M2ID     (Intercept) 78.9964  8.888
##          stress_CMC   0.5041  0.710   -0.05
## M2FAMNUM (Intercept) 30.3873  5.512
## Residual                5.6385  2.375
## Number of obs: 5030, groups: M2ID, 1019; M2FAMNUM, 903
##
## Fixed effects:
##
##          Estimate Std. Error t value
## (Intercept)      74.547630   0.337978 220.569
## stress_CMC         0.879474   0.033662  26.126
## CRP_T_C           3.631461   0.659316   5.508
## P4_age_C          -0.130733   0.030449  -4.293
## stressChangeStresstoBase_C -0.377893   0.304279  -1.242
## hrChangeStresstoBase_C     0.273761   0.133554   2.050
## stressChangeRecovtoStress_C -0.190391   0.320632  -0.594
## hrChangeRecovtoStress_C   -0.325312   0.154199  -2.110
## stress_CMC:CRP_T_C        -0.182874   0.065948  -2.773
## stress_CMC:P4_age_C       -0.007918   0.003006  -2.634
##
## Correlation of Fixed Effects:
##          (Intr) st_CMC CRP_T_ P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
## stress_CMC -0.028
## CRP_T_C    -0.019  0.001
## P4_age_C   -0.006  0.002  0.019
## strssChSB_C 0.000 -0.003  0.005 -0.088
## hrChngStB_C -0.005  0.001  0.082  0.122 -0.067
## strssChRS_C -0.005  0.004 -0.015 -0.053  0.782 -0.105
## hrChngRcS_C -0.010  0.001  0.018  0.099 -0.089  0.752 -0.149
## s_CMC:CRP_T  0.001 -0.016 -0.029  0.000  0.002  0.001  0.002  0.000
## s_CMC:P4__C  0.001 -0.034  0.000 -0.027  0.001  0.000  0.000  0.000
##          s_CMC:C
## stress_CMC
## CRP_T_C
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C

```

```
## s_CMC:CRP_T
## s_CMC:P4__C 0.039
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48584	1	867	0
stress_CMC	682	1	810	1.47e-109
CRP_T_C	30.2	1	1010	4.89e-08
P4_age_C	18.4	1	905	1.97e-05
stressChangeStresstoBase_C	1.53	1	1009	0.216
hrChangeStresstoBase_C	4.17	1	1002	0.0413
stressChangeRecovtoStress_C	0.351	1	1011	0.554
hrChangeRecovtoStress_C	4.42	1	1006	0.0357
stress_CMC:CRP_T_C	7.68	1	815	0.00571
stress_CMC:P4_age_C	6.93	1	816	0.00864

Denial + reactivity + recovery

```
# Denial
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeR
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

```
## (Intercept) 47843.6575 1 869.17 < 2.2e-16 ***
```

```
## stress_CMC 699.5981 1 812.44 < 2.2e-16 ***
```

```
## COPE_denial_C 0.0836 1 1017.77 0.77248
```

```
## P4_age_C 19.0939 1 909.65 1.388e-05 ***
```

```

## stressChangeStresstoBase_C      1.6072  1 1015.13  0.20517
## hrChangeStresstoBase_C          2.4944  1 1009.31  0.11456
## stressChangeRecovtoStress_C     0.2688  1 1016.29  0.60422
## hrChangeRecovtoStress_C         5.0153  1 1015.34  0.02534 *
## stress_CMC:COPE_denial_C        20.9227  1  844.91 5.498e-06 ***
## stress_CMC:P4_age_C             5.3923  1  814.97  0.02047 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * COPE_denial_C + P4_age_C * stress_CMC + stressChangeStresstoBase_C +
##   hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C +
##   (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLsRR
##
## REML criterion at convergence: 28475.9
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.2703 -0.4868 -0.0391  0.4032  9.3429
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 85.248   9.2330
##          stress_CMC  0.486   0.6971 -0.07
## M2FAMNUM (Intercept) 27.400   5.2345
## Residual                    5.591   2.3645
## Number of obs: 5060, groups: M2ID, 1025; M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.628681  0.340924 218.901
## stress_CMC      0.877327  0.033155  26.461
## COPE_denial_C  0.043947  0.151725   0.290
## P4_age_C       -0.134598  0.030781 -4.373
## stressChangeStresstoBase_C -0.394045  0.309939 -1.271
## hrChangeStresstoBase_C  0.215421  0.135955  1.584

```

```

## stressChangeRecovtoStress_C -0.169537  0.326045  -0.520
## hrChangeRecovtoStress_C      -0.351093  0.156274  -2.247
## stress_CMC:COPE_denial_C     -0.069679  0.015224  -4.577
## stress_CMC:P4_age_C          -0.006902  0.002970  -2.324
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC COPE__ P4_g_C sCSB_C hCSB_C sCRS_C hCRS_C
## stress_CMC  -0.037
## COPE_denl_C -0.012 -0.002
## P4_age_C     0.004  0.002 -0.026
## strssChSB_C -0.002 -0.004  0.002 -0.091
## hrChngStB_C  0.004  0.001  0.033  0.120 -0.068
## strssChRS_C -0.005  0.006 -0.048 -0.054  0.782 -0.102
## hrChngRcS_C  0.000  0.001 -0.060  0.101 -0.094  0.751 -0.146
## s_CMC:COPE_  0.000  0.011 -0.037  0.001 -0.001  0.002  0.000  0.001
## s_CMC:P4__C  0.001 -0.024  0.001 -0.036  0.001  0.000  0.000  0.000
##      s_CMC:C
## stress_CMC
## COPE_denl_C
## P4_age_C
## strssChSB_C
## hrChngStB_C
## strssChRS_C
## hrChngRcS_C
## s_CMC:COPE_
## s_CMC:P4__C -0.035

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsRR)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsRR): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	47844	1	869	0
stress_CMC	700	1	812	1.06e-111
COPE_denial_C	0.0836	1	1018	0.772
P4_age_C	19.1	1	910	1.39e-05

term	statistic	df	Df.res	p.value
stressChangeStresstoBase_C	1.61	1	1015	0.205
hrChangeStresstoBase_C	2.49	1	1009	0.115
stressChangeRecovtoStress_C	0.269	1	1016	0.604
hrChangeRecovtoStress_C	5.02	1	1015	0.0253
stress_CMC:COPE_denial_C	20.9	1	845	5.5e-06
stress_CMC:P4_age_C	5.39	1	815	0.0205

Does reactivity and/or recovery predict well-being outcomes?

PWB ~ reactivity + recovery

```
# PWB
lmerM = lmer(pwb2 ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: pwb2
##
##           F Df  Df.res  Pr(>F)
## (Intercept) 44668.6544  1  878.35 < 2.2e-16 ***
## P4_age_C    36.8092  1  912.23 1.907e-09 ***
## stressChangeStresstoBase_C  1.5743  1 1015.95  0.20988
## hrChangeStresstoBase_C    0.3877  1 1000.57  0.53367
## stressChangeRecovtoStress_C  1.1799  1 1017.82  0.27763
## hrChangeRecovtoStress_C    6.1532  1 1009.14  0.01328 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## pwb2 ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
## stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
## M2FAMNUM)
## Data: dfLsW
```

```

##
## REML criterion at convergence: 10142.8
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -3.1368 -0.5364  0.1045  0.6361  1.7732
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 371.2    19.27
## Residual          802.2    28.32
## Number of obs: 1026, groups: M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      232.71937    1.10048 211.471
## P4_age_C          0.60304    0.09934   6.070
## stressChangeStresstoBase_C -1.24258    0.98868  -1.257
## hrChangeStresstoBase_C     0.26974    0.43217   0.624
## stressChangeRecovtoStress_C -1.13350    1.04175  -1.088
## hrChangeRecovtoStress_C    -1.23929    0.49841  -2.486
##
## Correlation of Fixed Effects:
##              (Intr) P4_g_C sCSB_C hCSB_C sCRS_C
## P4_age_C      0.000
## strssChSB_C  -0.003 -0.086
## hrChngStB_C  0.001  0.114 -0.065
## strssChRS_C -0.008 -0.052  0.782 -0.102
## hrChngRcS_C -0.001  0.094 -0.092  0.754 -0.149
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	44669	1	878	0

term	statistic	df	Df.res	p.value
P4_age_C	36.8	1	912	1.91e-09
stressChangeStresstoBase_C	1.57	1	1016	0.21
hrChangeStresstoBase_C	0.388	1	1001	0.534
stressChangeRecovtoStress_C	1.18	1	1018	0.278
hrChangeRecovtoStress_C	6.15	1	1009	0.0133

Depression ~ reactivity + recovery

```
# CESD
lmerM = lmer(P4_CESD ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C, data = a)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: P4_CESD
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 1158.3974  1  884.90 < 2.2e-16 ***
## P4_age_C      39.5213  1  912.13 5.024e-10 ***
## stressChangeStresstoBase_C  3.6272  1 1002.78  0.05713 .
## hrChangeStresstoBase_C      2.7069  1  963.49  0.10024
## stressChangeRecovtoStress_C  1.5700  1 1007.31  0.21050
## hrChangeRecovtoStress_C      3.2894  1  977.67  0.07003 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## P4_CESD ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
## stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
## M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 7117.4
##
```

```

## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.9016 -0.5315 -0.1796  0.3434  4.1373
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 26.96    5.192
## Residual              35.85    5.988
## Number of obs: 1022, groups: M2FAMNUM, 906
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      8.74762   0.25692  34.047
## P4_age_C         -0.14504   0.02306  -6.289
## stressChangeStresstoBase_C  0.43391   0.22738   1.908
## hrChangeStresstoBase_C    -0.16332   0.09899  -1.650
## stressChangeRecovtoStress_C 0.30200   0.24055   1.255
## hrChangeRecovtoStress_C    0.20803   0.11439   1.819
##
## Correlation of Fixed Effects:
##              (Intr) P4_g_C sCSB_C hCSB_C sCRS_C
## P4_age_C      -0.003
## strssChSB_C   0.004 -0.083
## hrChngStB_C   0.005  0.109 -0.062
## strssChRS_C  -0.003 -0.051  0.781 -0.098
## hrChngRcS_C  0.001  0.088 -0.089  0.750 -0.146
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	1158	1	885	5.6e-163
P4_age_C	39.5	1	912	5.02e-10
stressChangeStresstoBase_C	3.63	1	1003	0.0571
hrChangeStresstoBase_C	2.71	1	963	0.1

term	statistic	df	Df.res	p.value
stressChangeRecovtoStress_C	1.57	1	1007	0.211
hrChangeRecovtoStress_C	3.29	1	978	0.07

Anxiety ~ reactivity + recovery

```
# P4_STAItrait
lmerM = lmer(P4_STAItrait ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C, data=M2FAMNUM)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: P4_STAItrait
##
##           F Df  Df.res  Pr(>F)
## (Intercept) 14533.6009  1  884.76 < 2.2e-16 ***
## P4_age_C      35.0611  1  912.03 4.522e-09 ***
## stressChangeStresstoBase_C  1.1324  1 1001.76  0.28753
## hrChangeStresstoBase_C      0.7231  1  958.99  0.39535
## stressChangeRecovtoStress_C  0.5516  1 1004.85  0.45784
## hrChangeRecovtoStress_C     5.0441  1  974.47  0.02493 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## P4_STAItrait ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
##   stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
##   M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 7320.2
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -2.1295 -0.5766 -0.1190  0.4637  2.9583
```

```

##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 33.96    5.828
## Residual          42.86    6.547
## Number of obs: 1022, groups: M2FAMNUM, 905
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    34.30337   0.28445 120.596
## P4_age_C       -0.15161   0.02560  -5.923
## stressChangeStresstoBase_C  0.26772   0.25108   1.066
## hrChangeStresstoBase_C    -0.09308   0.10915  -0.853
## stressChangeRecovtoStress_C  0.19755   0.26545   0.744
## hrChangeRecovtoStress_C    0.28432   0.12625   2.252
##
## Correlation of Fixed Effects:
##          (Intr) P4_g_C sCSB_C hCSB_C sCRS_C
## P4_age_C   -0.001
## strssChSB_C  0.004 -0.081
## hrChngStB_C  0.003  0.111 -0.063
## strssChRS_C -0.002 -0.047  0.782 -0.102
## hrChngRcS_C -0.003  0.089 -0.090  0.750 -0.149
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	14534	1	885	0
P4_age_C	35.1	1	912	4.52e-09
stressChangeStresstoBase_C	1.13	1	1002	0.288
hrChangeStresstoBase_C	0.723	1	959	0.395
stressChangeRecovtoStress_C	0.552	1	1005	0.458
hrChangeRecovtoStress_C	5.04	1	974	0.0249

IL6 ~ reactivity + recovery

```
# IL6
```

```
lmerM = lmer(IL6_T ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 | M2FAMNUM))
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: IL6_T
```

```
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	1247.1982	1	866.82	< 2.2e-16 ***
## P4_age_C	27.9526	1	908.04	1.558e-07 ***
## stressChangeStresstoBase_C	0.6373	1	1017.56	0.42487
## hrChangeStresstoBase_C	2.1842	1	1012.81	0.13975
## stressChangeRecovtoStress_C	0.0047	1	1018.61	0.94541
## hrChangeRecovtoStress_C	2.8516	1	1017.12	0.09159 .

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## IL6_T ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
```

```
## stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
```

```
## M2FAMNUM)
```

```
## Data: dfLsW
```

```
##
```

```
## REML criterion at convergence: 3000.9
```

```
##
```

```
## Scaled residuals:
```

```
##      Min       1Q   Median       3Q      Max
```

```
## -2.60015 -0.58969 -0.06949  0.51579  3.16225
```

```
##
```

```
## Random effects:
```

```
## Groups   Name      Variance Std.Dev.
```

```
## M2FAMNUM (Intercept) 0.2424   0.4924
```

```
## Residual              0.8222   0.9067
```

```
## Number of obs: 1025, groups: M2FAMNUM, 908
```

```
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)      1.164457   0.032946  35.344
## P4_age_C          0.015695   0.002967   5.291
## stressChangeStresstoBase_C -0.024005   0.030023  -0.800
## hrChangeStresstoBase_C    -0.019359   0.013069  -1.481
## stressChangeRecovtoStress_C  0.002180   0.031774   0.069
## hrChangeRecovtoStress_C    0.025605   0.015129   1.692
##
## Correlation of Fixed Effects:
##           (Intr) P4_g_C sCSB_C hCSB_C sCRS_C
## P4_age_C    -0.001
## strssChSB_C  0.001 -0.086
## hrChngStB_C  0.000  0.118 -0.067
## strssChRS_C -0.003 -0.051  0.785 -0.101
## hrChngRcS_C -0.005  0.095 -0.090  0.755 -0.149
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	1247	1	867	5.49e-170
P4_age_C	28	1	908	1.56e-07
stressChangeStresstoBase_C	0.637	1	1018	0.425
hrChangeStresstoBase_C	2.18	1	1013	0.14
stressChangeRecovtoStress_C	0.00469	1	1019	0.945
hrChangeRecovtoStress_C	2.85	1	1017	0.0916

CRP ~ reactivity + recovery

```
# CRP
lmerM = lmer(CRP_T ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_
```



```
a = Anova(lmerM, type=3, test="F")
```

```
a
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: CRP_T
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 117.1964  1  876.02 < 2.2e-16 ***
## P4_age_C      0.3592  1  908.49  0.549078
## stressChangeStresstoBase_C 0.0199  1 1006.53  0.887865
## hrChangeStresstoBase_C     7.1247  1  985.49  0.007728 **
## stressChangeRecovtoStress_C 0.2230  1 1009.27  0.636865
## hrChangeRecovtoStress_C    0.3684  1  994.15  0.544005
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## CRP_T ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
##   stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
##   M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 1515.8
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -2.58665 -0.57063 -0.04282  0.58332  2.56396
##
## Random effects:
##   Groups   Name                Variance Std.Dev.
## M2FAMNUM (Intercept) 0.09056  0.3009
## Residual              0.16191  0.4024
## Number of obs: 1019, groups: M2FAMNUM, 903
##
## Fixed effects:
##
##           Estimate Std. Error t value
```

```
## (Intercept)          0.1759434  0.0162444  10.831
## P4_age_C             -0.0008763  0.0014614  -0.600
## stressChangeStresstoBase_C -0.0020457  0.0144782  -0.141
## hrChangeStresstoBase_C   -0.0169171  0.0063217  -2.676
## stressChangeRecovtoStress_C  0.0072199  0.0152617   0.473
## hrChangeRecovtoStress_C   -0.0044591  0.0073278  -0.609
##
## Correlation of Fixed Effects:
##      (Intr) P4_age_C sCSB_C hCSB_C sCRS_C
## P4_age_C   -0.008
## strssChSB_C  0.000 -0.087
## hrChngStB_C -0.003  0.119 -0.067
## strssChRS_C -0.006 -0.052  0.781 -0.105
## hrChngRcS_C -0.010  0.097 -0.090  0.751 -0.150
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	117	1	876	1.01e-25
P4_age_C	0.359	1	908	0.549
stressChangeStresstoBase_C	0.0199	1	1007	0.888
hrChangeStresstoBase_C	7.12	1	985	0.00773
stressChangeRecovtoStress_C	0.223	1	1009	0.637
hrChangeRecovtoStress_C	0.368	1	994	0.544

Denial ~ reactivity + recovery

```
# Denial
```

```
lmerM = lmer(COPE_denial ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C + stressChangeRecovtoStress_C + hrChangeRecovtoStress_C, data=dfLsW)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: COPE_denial
##
##           F Df  Df.res  Pr(>F)
## (Intercept) 7434.4395  1  878.04 < 2e-16 ***
## P4_age_C      0.5886  1  912.05 0.44317
## stressChangeStresstoBase_C 0.0067  1 1014.82 0.93495
## hrChangeStresstoBase_C    1.1399  1  998.67 0.28592
## stressChangeRecovtoStress_C 2.3013  1 1016.75 0.12958
## hrChangeRecovtoStress_C    3.7390  1 1008.94 0.05344 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## COPE_denial ~ P4_age_C + stressChangeStresstoBase_C + hrChangeStresstoBase_C +
##   stressChangeRecovtoStress_C + hrChangeRecovtoStress_C + (1 |
##   M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 4545.1
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.6846 -0.6835 -0.2290  0.5407  3.8140
##
## Random effects:
## Groups Name          Variance Std.Dev.
## M2FAMNUM (Intercept) 1.510    1.229
## Residual              3.362    1.834
## Number of obs: 1025, groups: M2FAMNUM, 909
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    6.116677   0.070898  86.274
## P4_age_C        0.004907   0.006392   0.768
## stressChangeStresstoBase_C -0.005232   0.063977  -0.082
## hrChangeStresstoBase_C    -0.029976   0.028007  -1.070
```

```
## stressChangeRecovtoStress_C 0.102182 0.067245 1.520
## hrChangeRecovtoStress_C 0.062365 0.032178 1.938
##
## Correlation of Fixed Effects:
## (Intr) P4_g_C sCSB_C hCSB_C sCRS_C
## P4_age_C 0.002
## strssChSB_C -0.002 -0.090
## hrChngStB_C 0.005 0.120 -0.068
## strssChRS_C -0.006 -0.055 0.783 -0.101
## hrChngRcS_C -0.001 0.099 -0.095 0.753 -0.150
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	7434	1	878	0
P4_age_C	0.589	1	912	0.443
stressChangeStresstoBase_C	0.00667	1	1015	0.935
hrChangeStresstoBase_C	1.14	1	999	0.286
stressChangeRecovtoStress_C	2.3	1	1017	0.13
hrChangeRecovtoStress_C	3.74	1	1009	0.0534

PLOT

FIGURE 1: Stress and heart rate by phase histograms

Facet-wrapped histograms of stress and heart rate at each phase of stress induction

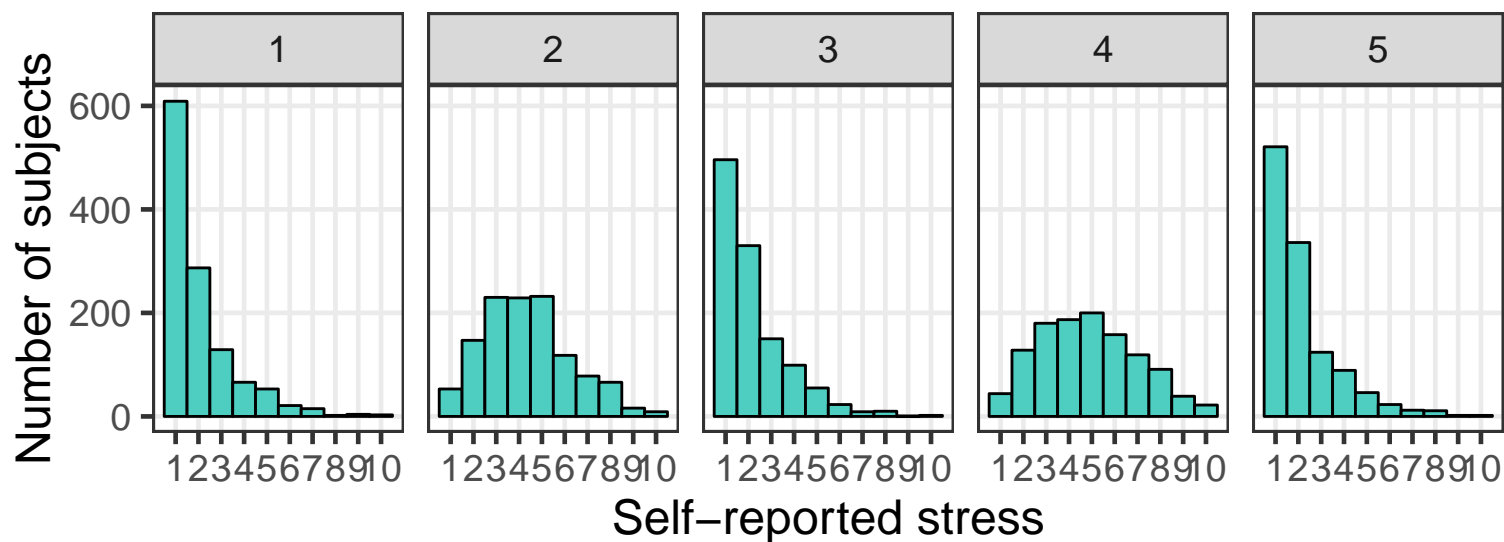
```
ylimits = c(0, 610)
colcode = "#4ECDC1"
stressHist=ggplot()+
geom_histogram(data=dfL, aes(stress), fill=colcode, binwidth=1, color="black") +
facet_wrap(~timepoint, ncol=5) +
```

```

labs(x="Self-reported stress", y="Number of subjects") +
ylim(ylimits)+
scale_x_continuous(breaks=c(1,2,3,4,5,6,7,8,9,10) )+
theme_bw(base_size=18)+
theme(axis.text.x=element_text(size=14),
axis.text.y=element_text(size=14),
panel.grid.minor=element_blank(),
panel.background=element_rect(fill="transparent"),
plot.background=element_rect(fill="transparent") )
stressHist

```

Warning: Removed 32624 rows containing non-finite values (stat_bin).



```

#ggsave(stressHist, filename=paste(adir, "/stressHist.png", sep=''), bg="transparent", height=2.8, width=10.45, units="in")

```

```

xlimits = c(30,150)
ylimits = c(0, 240)
colcode = "#900C3F"
hrHist=ggplot()+
geom_histogram(data=dfL, aes(hr), fill=colcode, binwidth=6, color="black") +
facet_wrap(~timepoint, ncol=5) +
labs(x="Heart rate", y="Number of subjects") +

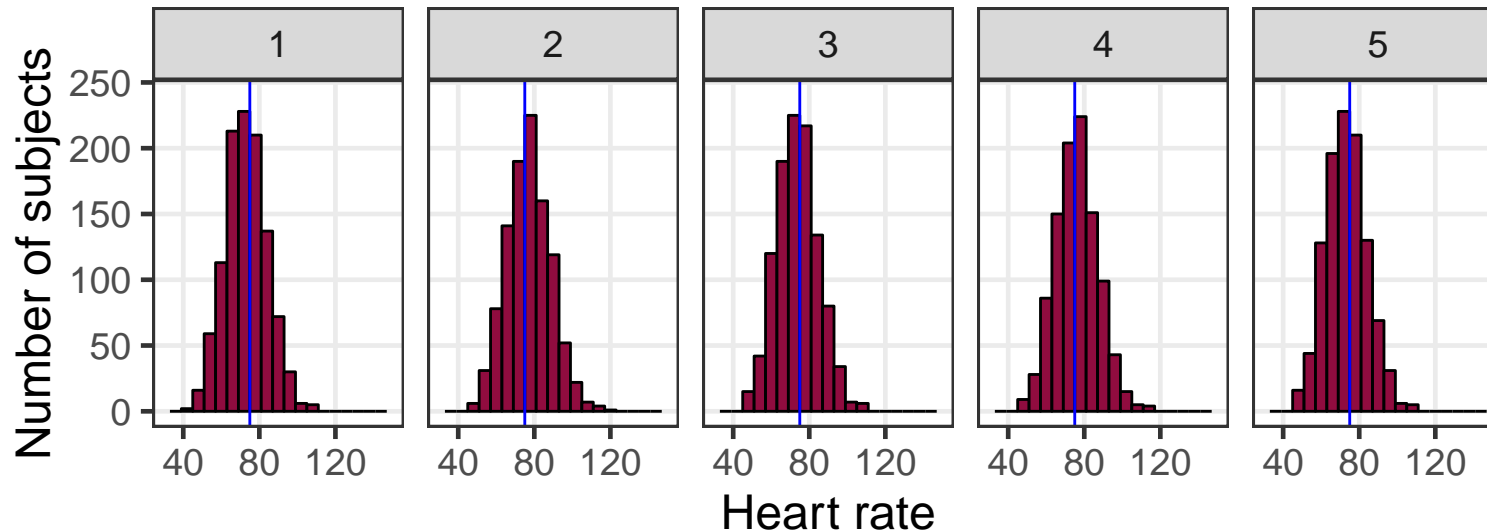
```

```

ylim(ylimits)+
xlim(xlimits)+
geom_vline(xintercept=75, size=.5, color="blue")+
#scale_x_continuous(breaks=c(1,2,3,4,5,6,7,8,9,10) )+
theme_bw(base_size=18)+
theme(axis.text.x=element_text(size=14),
axis.text.y=element_text(size=14),
panel.grid.minor= element_blank(),
panel.background=element_rect(fill="transparent"),
plot.background=element_rect(fill="transparent") )
hrHist

```

Warning: Removed 33222 rows containing non-finite values (stat_bin).



```

#ggsave(hrHist, filename=paste(adir, "/hrHist.png", sep=""), bg="transparent", height=2.8, width=10.45, units="in")

```

FIGURE 2: Interaction plots

```

# PWB
mod = lmer(hr ~ stress*pwb2 + (1 + stress | M2ID), data=dfLs)

```

```

# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
pwb2_lo = mean(dfLsW$pwb2, na.rm=T) - sd(dfLsW$pwb2, na.rm=T)
pwb2_hi = mean(dfLsW$pwb2, na.rm=T) + sd(dfLsW$pwb2, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, pwb2=c(pwb2_lo, pwb2_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

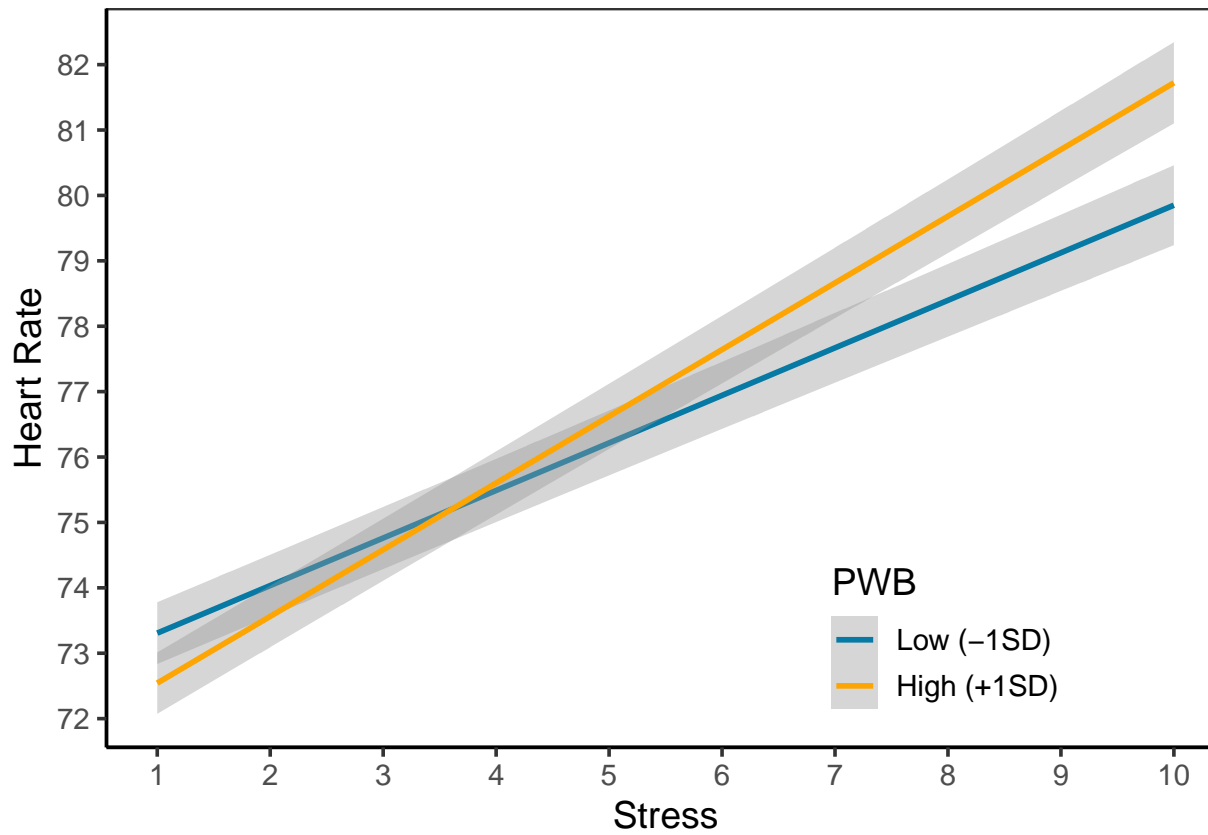
modelplot = ggplot() +
  geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,
    colour=as.factor(pwb2), group=as.factor(pwb2)),
    data = yHats, stat = "identity")

#modelplot

pwb2plot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +
  scale_color_manual(name = "PWB",
    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#0679A4", "#FDA603")) +
  theme_bw(base_size = 14) +
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
    panel.background = element_blank(), axis.line = element_line(colour = "black"))

pwb2plot

```



```
## CESD
mod = lmer(hr ~ stress*P4_CESD + (1 + stress | M2ID), data=dfLs)
# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
P4_CESD_lo = mean(dfLsW$P4_CESD, na.rm=T) - sd(dfLsW$P4_CESD, na.rm=T)
P4_CESD_hi = mean(dfLsW$P4_CESD, na.rm=T) + sd(dfLsW$P4_CESD, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, P4_CESD=c(P4_CESD_lo, P4_CESD_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

modelplot = ggplot() +
```



```

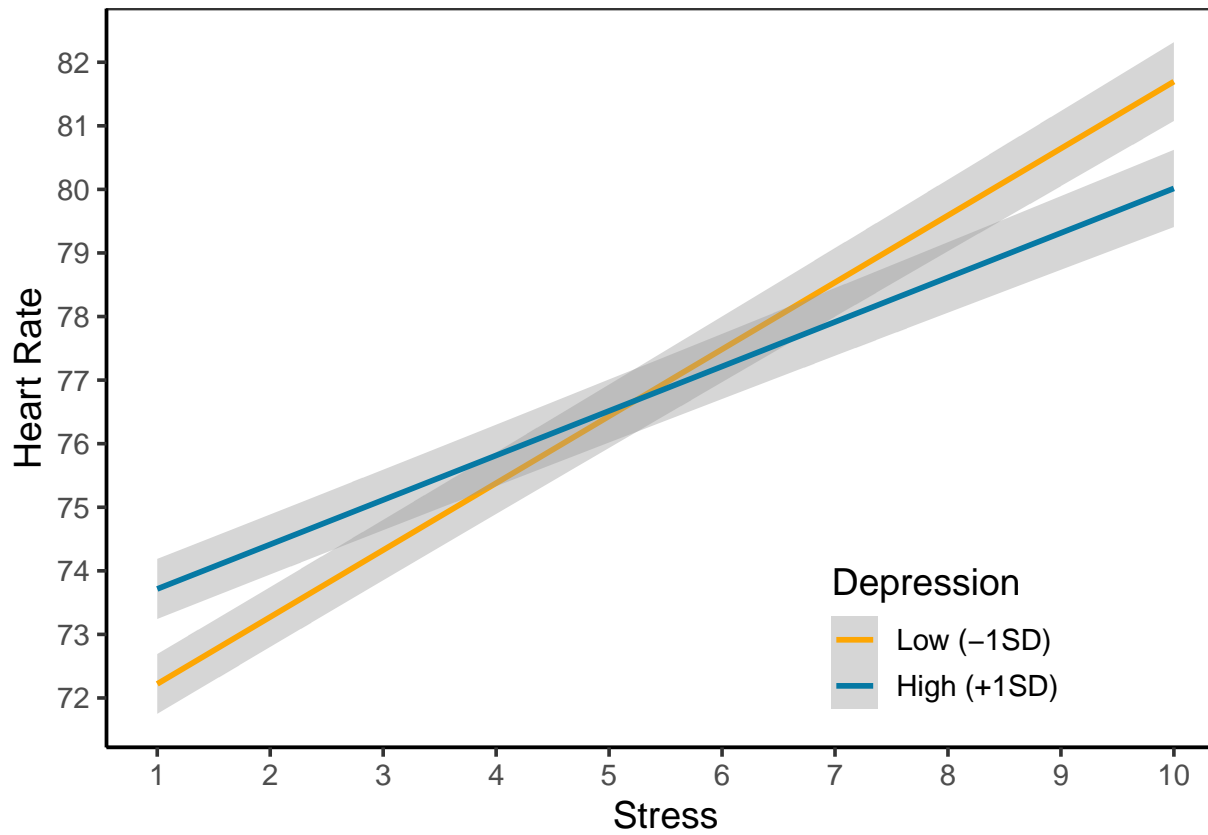
geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,
               colour=as.factor(P4_CESD), group=as.factor(P4_CESD)),
            data = yHats, stat = "identity")

#modelplot

P4_CESDplot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +
  scale_color_manual(name = "Depression",
                    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#FDA603", "#0679A4")) +
  theme_bw(base_size = 14) +
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
        panel.background = element_blank(), axis.line = element_line(colour = "black"))

P4_CESDplot

```



```
## P4_STAItrait
mod = lmer(hr ~ stress*P4_STAItrait +(1 + stress| M2ID), data=dfLs)
# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
P4_STAItrait_lo = mean(dfLsW$P4_STAItrait, na.rm=T) - sd(dfLsW$P4_STAItrait, na.rm=T)
P4_STAItrait_hi = mean(dfLsW$P4_STAItrait, na.rm=T) + sd(dfLsW$P4_STAItrait, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, P4_STAItrait=c(P4_STAItrait_lo, P4_STAItrait_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

modelplot = ggplot() +
```

```

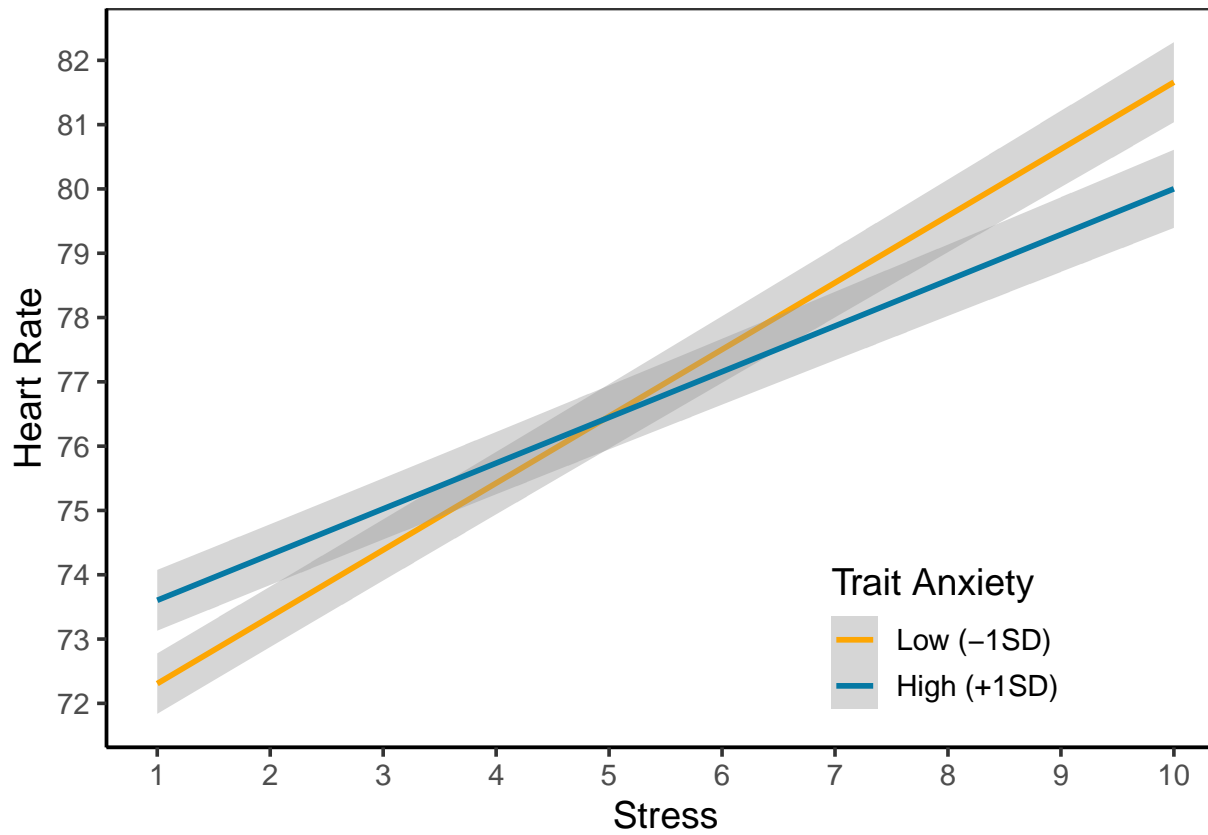
geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,
               colour=as.factor(P4_STAItrait), group=as.factor(P4_STAItrait)),
            data = yHats, stat = "identity")

#modelplot

P4_STAItraitplot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +
  scale_color_manual(name = "Trait Anxiety",
                    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#FDA603", "#0679A4")) +
  theme_bw(base_size = 14) +
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
        panel.background = element_blank(), axis.line = element_line(colour = "black"))

P4_STAItraitplot

```



```
## IL6
mod = lmer(hr ~ stress*IL6_T + (1 + stress | M2ID), data=dfLs)
# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
IL6_T_lo = mean(dfLsW$IL6_T, na.rm=T) - sd(dfLsW$IL6_T, na.rm=T)
IL6_T_hi = mean(dfLsW$IL6_T, na.rm=T) + sd(dfLsW$IL6_T, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, IL6_T=c(IL6_T_lo, IL6_T_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

# Starting plot in which we graph regression lines
```

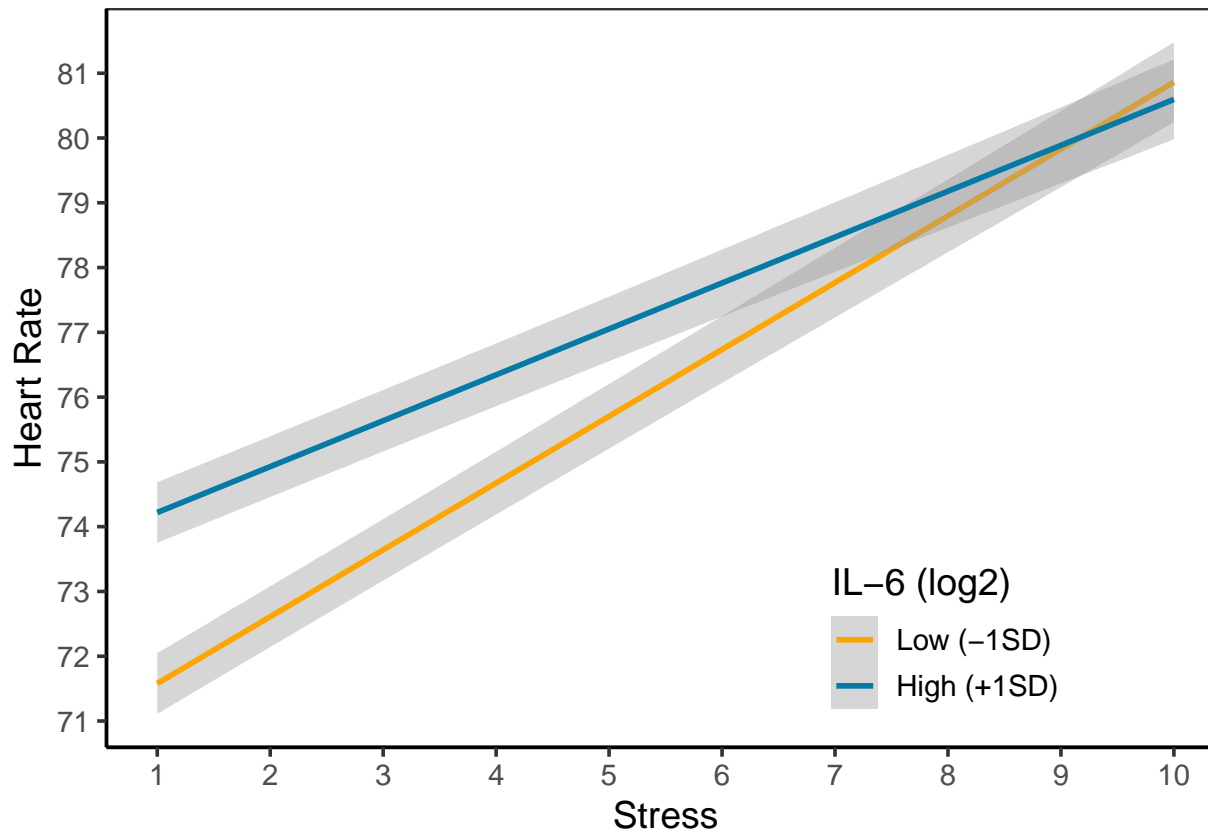
```
modelplot = ggplot() +  
  geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,  
    colour=as.factor(IL6_T), group=as.factor(IL6_T), lineIL6_T=as.factor(IL6_T)),  
    data = yHats, stat = "identity")
```

```
## Warning: Ignoring unknown aesthetics: lineIL6_T
```

```
##modelplot
```

```
IL6_Tplot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +  
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +  
  scale_color_manual(name = "IL-6 (log2)",  
    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#FDA603", "#0679A4")) +  
  theme_bw(base_size = 14) +  
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),  
    panel.background = element_blank(), axis.line = element_line(colour = "black"))
```

```
IL6_Tplot
```



```
## CRP
mod = lmer(hr ~ stress*CRP_T + (1 + stress | M2ID), data=dfLs)
# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
CRP_T_lo = mean(dfLsW$CRP_T, na.rm=T) - sd(dfLsW$CRP_T, na.rm=T)
CRP_T_hi = mean(dfLsW$CRP_T, na.rm=T) + sd(dfLsW$CRP_T, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, CRP_T=c(CRP_T_lo, CRP_T_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

modelplot = ggplot() +
```

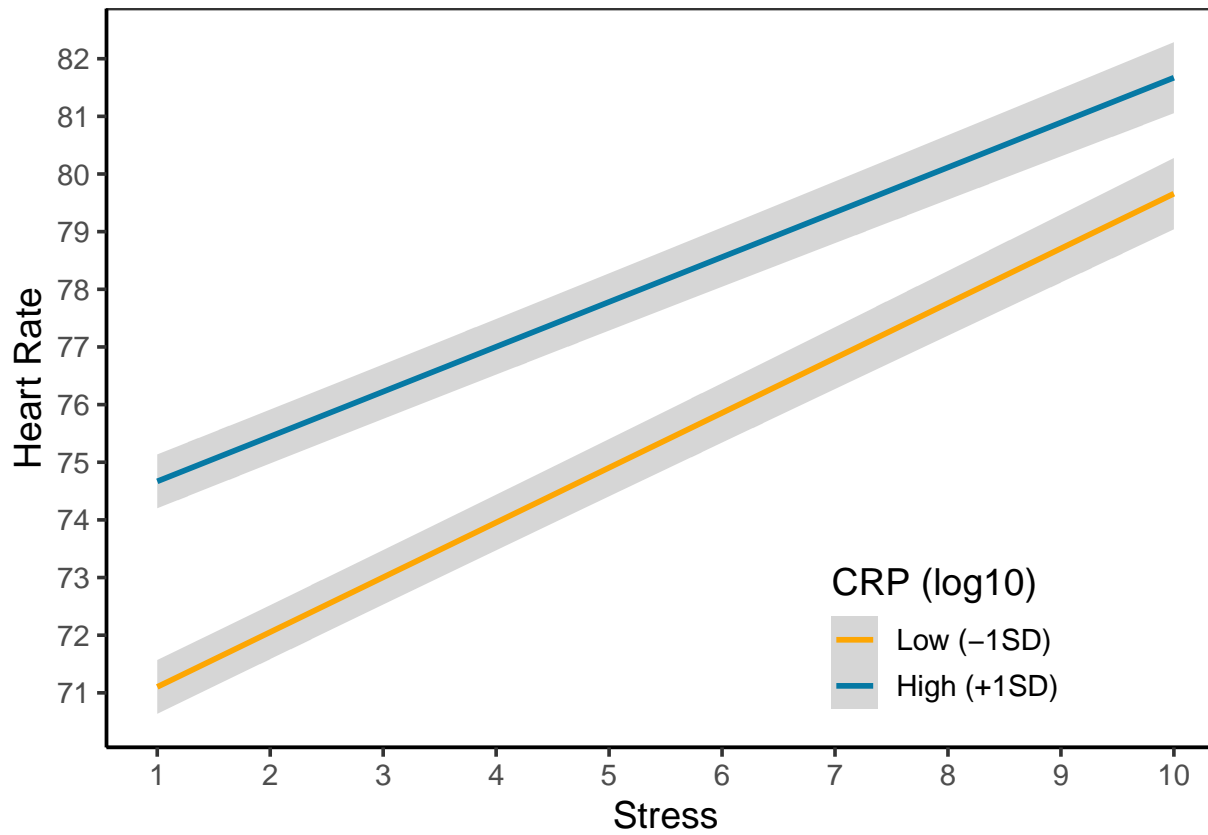
```
geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,  
               colour=as.factor(CRP_T), group=as.factor(CRP_T), lineCRP_T=as.factor(CRP_T)),  
            data = yHats, stat = "identity")
```

```
## Warning: Ignoring unknown aesthetics: lineCRP_T
```

```
#modelplot
```

```
CRP_Tplot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +  
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +  
  scale_color_manual(name = "CRP (log10)",  
                    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#FDA603", "#0679A4")) +  
  theme_bw(base_size = 14) +  
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),  
        panel.background = element_blank(), axis.line = element_line(colour = "black"))
```

```
CRP_Tplot
```



```
## Denial
mod = lmer(hr ~ stress*COPE_denial + (1 + stress | M2ID), data=dfLs)
# Prepare independent variables for ggplot
XToPredict = seq(min(dfLs$stress), max(dfLs$stress), length = 100)
COPE_denial_lo = mean(dfLsW$COPE_denial, na.rm=T) - sd(dfLsW$COPE_denial, na.rm=T)
COPE_denial_hi = mean(dfLsW$COPE_denial, na.rm=T) + sd(dfLsW$COPE_denial, na.rm=T)

# Use modelPredictions() to generate Y-hats
yHats = expand.grid(stress = XToPredict, COPE_denial=c(COPE_denial_lo, COPE_denial_hi)) # all IVs
yHats = modelPredictions(mod, yHats)

modelplot = ggplot() +
```



```
geom_smooth(aes(ymin = CIlo, ymax = CIHi, x = stress, y = Predicted,  
               colour=as.factor(COPE_denial), group=as.factor(COPE_denial), lineCOPE_denial=as.factor(COPE_denial)),  
            data = yHats, stat = "identity")
```

```
## Warning: Ignoring unknown aesthetics: lineCOPE_denial
```

```
#modelplot
```

```
COPE_denialplot = modelplot + scale_x_continuous("Stress", breaks = seq(0, 10, by=1)) +  
  scale_y_continuous("Heart Rate", breaks = seq(60, 100, by=1)) +  
  scale_color_manual(name = "Denial coping",  
                    labels=c("Low (-1SD)", "High (+1SD)"), values=c("#FDA603", "#0679A4")) +  
  theme_bw(base_size = 14) +  
  theme(legend.position = c(0.75, 0.15), panel.grid.major = element_blank(), panel.grid.minor = element_blank(),  
        panel.background = element_blank(), axis.line = element_line(colour = "black"))
```

```
COPE_denialplot
```

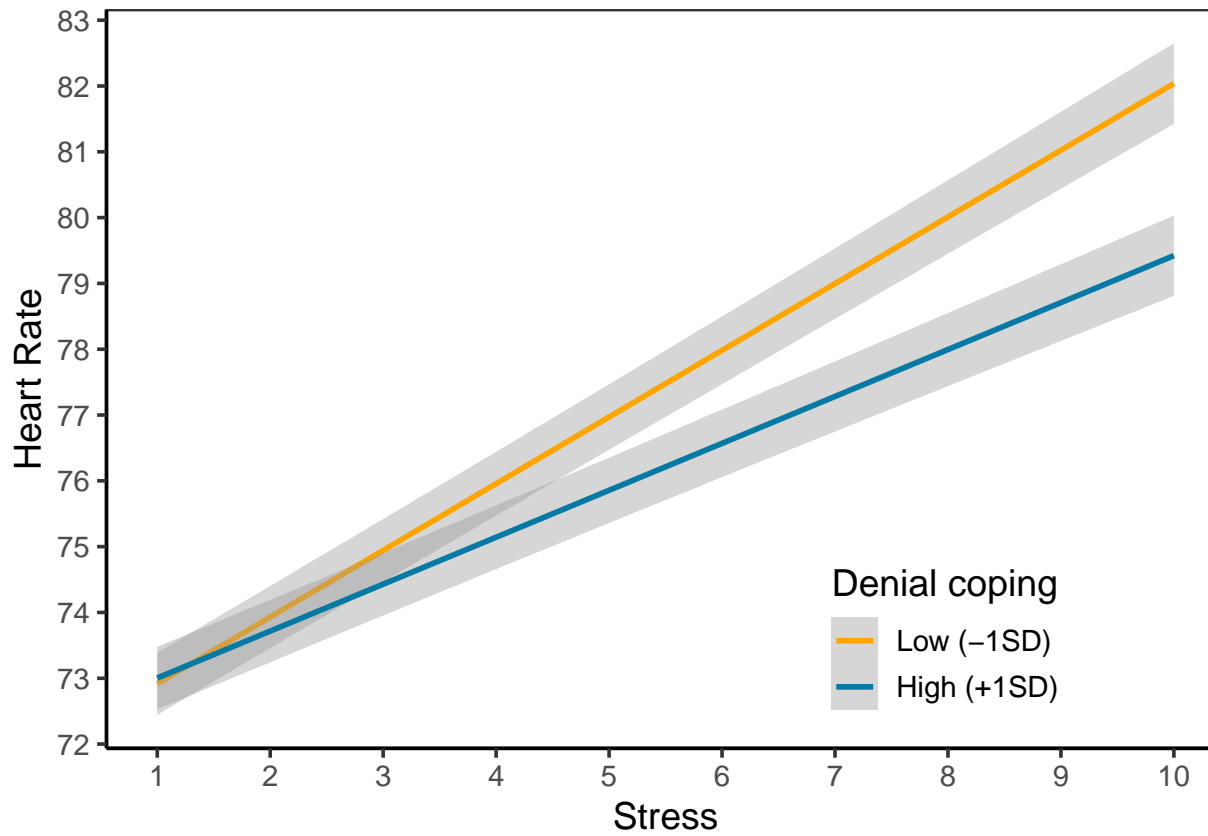


FIGURE 3: Plot individual subject slopes

```

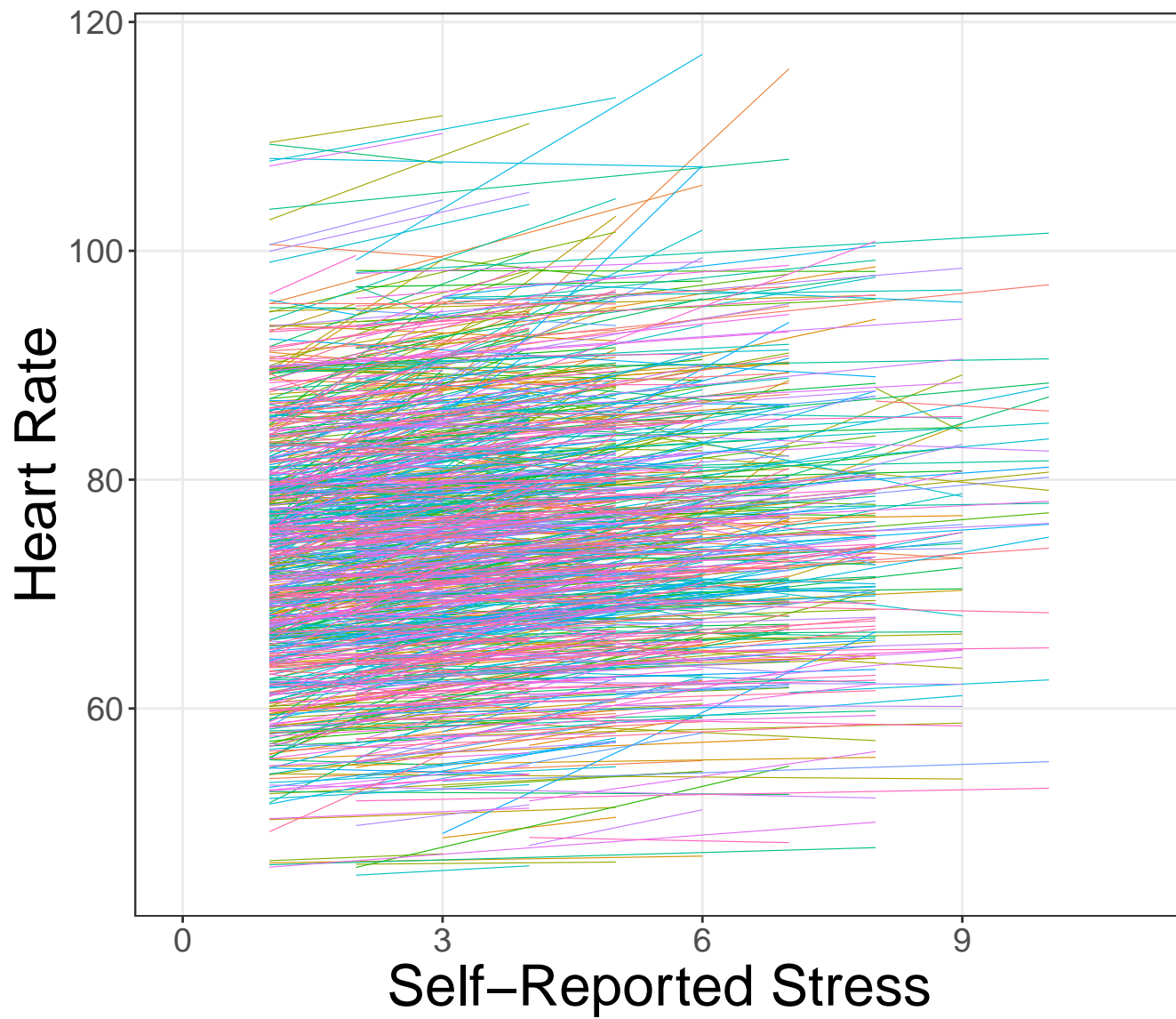
dfL$stressMC = dfL$stress - ave(dfL$stress, dfL$M2ID)
dfL$hrM = ave(dfL$stress, dfL$M2ID)

ggplot(dfL, aes(stress, hr, color=as.factor(M2ID)))+
geom_smooth(aes(group=as.factor(M2ID)),method="lm",se=F,size=.2, alpha=.6, position="jitter")+
xlim(c(0,11))+
theme_bw() +
theme(panel.grid.minor = element_blank(), axis.text=element_text(size=14), axis.title=element_text(size=24)) +

```

```
labs(x="Self-Reported Stress", y="Heart Rate")+  
theme(legend.position="none")
```

```
## Warning: Removed 33248 rows containing non-finite values (stat_smooth).
```



With heat map where color is the magnitude of the slope

```

mycol = c("#0710C4", "gray", # negative & zero
          "#FFEC00", "#FFC300", "#FF5733", "#C70039", "#900C3F", "#581845") # positive
mybreaks = c(-.4, 0,
             .5, 1, 1.5, 2, 3, 4)

ggplot(dfL, aes(stress, hr, color=coherence_slope))+
  geom_smooth(aes(group=as.factor(M2ID)),method="lm",se=F,size=.2, alpha=.6, position="jitter")+
  xlim(c(0,11))+
  theme_bw() +
  theme(panel.grid.minor = element_blank(), axis.text=element_text(size=14), axis.title=element_text(size=24)) +
  labs(x="Self-Reported Stress", y="Heart Rate")+
  scale_colour_gradientn("", colours=mycol, limits=c(-.4, 4.5), values = scales::rescale(c(-0.5, -0.05, 0, 0.05, 0.5,1,2,3,4)), breaks = my
  scale_x_continuous("Stress", breaks = seq(0, 10, by=1))

```

```
## Warning: Removed 33248 rows containing non-finite values (stat_smooth).
```

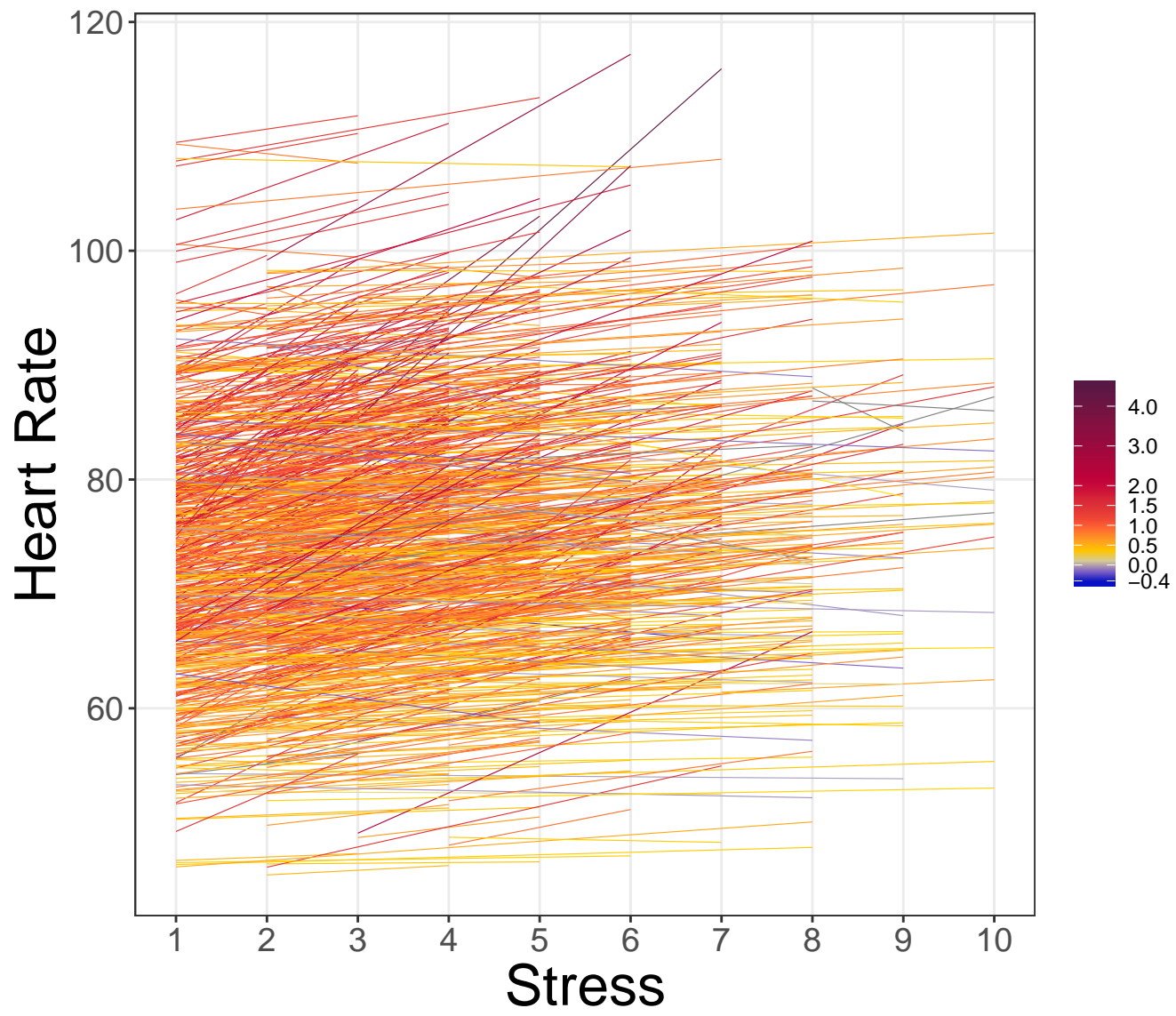
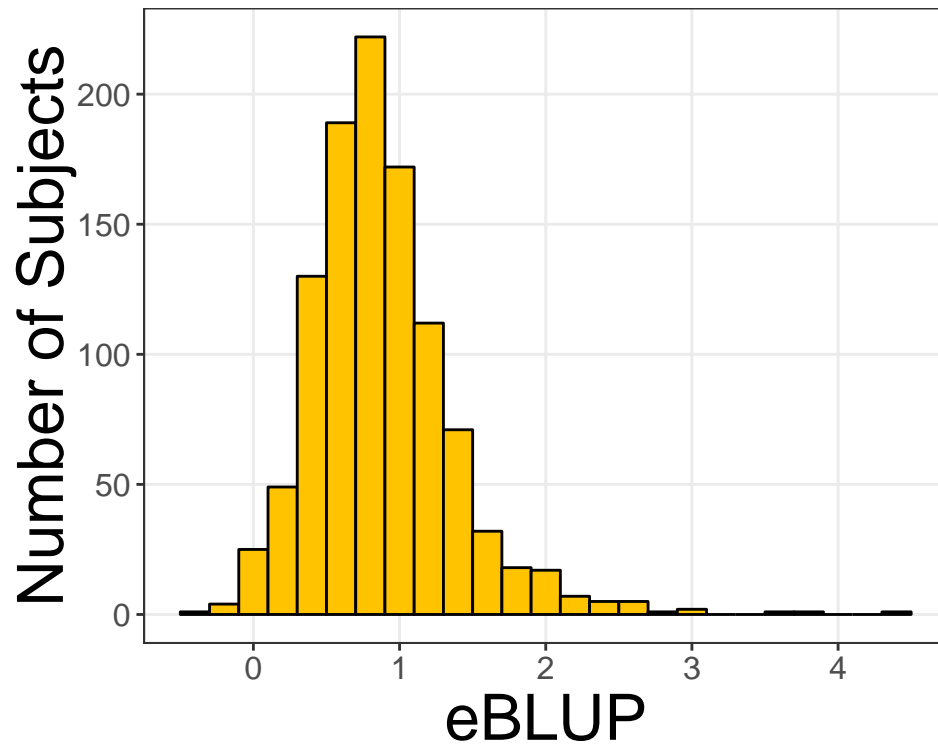


FIGURE 3: Histogram of BLUPS

```
ggplot(dfLsW, aes(coherence_slope)) +  
  geom_histogram(aes(fill=as.factor(coherence_slope)), binwidth=.2, col="black", fill="#FFC300") +  
  #scale_fill_gradientn("Slope", colours=mycol, limits=c(-.4, 4.5), values = scales::rescale(c(-0.5, -0.05, 0, 0.05, 0.5,1,2,3,4)), breaks  
  labs(x="eBLUP", y="Number of Subjects") +  
  theme_bw() +  
  theme(panel.grid.minor = element_blank(), axis.text=element_text(size=12), axis.title=element_text(size=24)) +  
  theme(legend.position="none")
```



SUPPLEMENTAL

I. Correlation (r) as coherence

See Prep_Coherence_MIDUSII.R for correlation computation. There, each subject's set of heart rate and stress measures are subset to their own data frame and a correlation is computed. The resulting within-subject (i.e., single-subject) r's compose a new variable in the main dataframe. ### Center correlations variable

```
varDescribe(dfLsW$coherence_as_r) # .49(.47) median.66 skew = -1.18, kurtosis = .55
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 1019 0.49 0.47 0.66 -1 1 -1.18 0.55
```

```
# Center age for subjects in this analysis
```

```
dfLsW$P4_age_C = dfLsW$P4_age - mean(dfLsW$P4_age[!is.na(dfLsW$coherence_as_r)], na.rm=T)
```

```
# Center correlations
```

```
dfLsW$coherence_as_r_C = dfLsW$coherence_as_r - mean(dfLsW$coherence_as_r, na.rm=T)
```

PWB ~ coherence as r

```
# Run the test
```

```
lmerM = lmer(pwb2 ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: pwb2
```

```
##
```

```
## (Intercept) 45020.082 1 869.78 < 2.2e-16 ***
```

```
## coherence_as_r_C 22.265 1 1009.70 2.709e-06 ***
```

```
## P4_age_C 36.439 1 899.61 2.301e-09 ***
```

```
## ---
```

```
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula: pwb2 ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
```



```

## Data: dfLsW
##
## REML criterion at convergence: 10028.8
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -3.3098 -0.5173  0.1010  0.6546  1.9594
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 311.8    17.66
## Residual              848.9    29.14
## Number of obs: 1015, groups: M2FAMNUM, 902
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    232.7142    1.0960 212.329
## coherence_as_r_C 10.7949    2.2832   4.728
## P4_age_C         0.5901    0.0977   6.040
##
## Correlation of Fixed Effects:
##              (Intr) ch__C
## chrnc_s_r_C  0.008
## P4_age_C     -0.008 -0.043

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs
```

term	statistic	df	Df.res	p.value
(Intercept)	45020	1	870	0
coherence_as_r_C	22.3	1	1010	2.71e-06
P4_age_C	36.4	1	900	2.3e-09

Depression ~ coherence as r

Run the test

```
lmerM = lmer(P4_CESD ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: P4_CESD
```

```
##           F Df Df.res    Pr(>F)
## (Intercept) 1156.707  1 880.23 < 2.2e-16 ***
## coherence_as_r_C  26.764  1 991.53 2.782e-07 ***
## P4_age_C        32.831  1 901.73 1.369e-08 ***
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula: P4_CESD ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
```

```
## Data: dfLsW
```

```
##
```

```
## REML criterion at convergence: 7043.7
```

```
##
```

```
## Scaled residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -1.9587 -0.5336 -0.1845  0.3551  3.9821
```

```
##
```

```
## Random effects:
```

```
## Groups Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 26.33   5.131
## Residual             36.96   6.079
```

```
## Number of obs: 1011, groups: M2FAMNUM, 899
```

```
##
```

```
## Fixed effects:
```

```
##           Estimate Std. Error t value
## (Intercept)      8.80758    0.25887  34.023
## coherence_as_r_C -2.74867    0.53010  -5.185
## P4_age_C         -0.13159    0.02296  -5.732
```

```
##
## Correlation of Fixed Effects:
##      (Intr) ch___C
## chrnc_s_r_C  0.009
## P4_age_C    -0.012 -0.043
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs
```

term	statistic	df	Df.res	p.value
(Intercept)	1157	1	880	1.52e-162
coherence_as_r_C	26.8	1	992	2.78e-07
P4_age_C	32.8	1	902	1.37e-08

Anxiety ~ coherence as r

```
# Run the test
lmerM = lmer(P4_STAItrait ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: P4_STAItrait
##           F Df Df.res  Pr(>F)
## (Intercept) 14579.980  1 876.14 < 2.2e-16 ***
## coherence_as_r_C  26.018  1 996.74 4.048e-07 ***
## P4_age_C       30.794  1 900.17 3.775e-08 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```

## Formula: P4_STAItrait ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 7243.1
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.9139 -0.6078 -0.1262  0.4790  3.1466
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
## M2FAMNUM (Intercept) 28.76    5.363
## Residual              48.04    6.931
## Number of obs: 1011, groups: M2FAMNUM, 898
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   34.37249   0.28453 120.803
## coherence_as_r_C -2.99025   0.58495  -5.112
## P4_age_C       -0.14050   0.02531  -5.552
##
## Correlation of Fixed Effects:
##              (Intr) ch__C
## chrnc_s_r_C  0.008
## P4_age_C     -0.009 -0.048

```

```

table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```

pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs

```

term	statistic	df	Df.res	p.value
(Intercept)	14580	1	876	0
coherence_as_r_C	26	1	997	4.05e-07
P4_age_C	30.8	1	900	3.77e-08

IL6 ~ coherence as r

```
# Run the test
lmerM = lmer(IL6_T ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: IL6_T
##           F Df  Df.res    Pr(>F)
## (Intercept) 1182.49  1  867.60 < 2.2e-16 ***
## coherence_as_r_C  13.15  1 1009.08 0.0003019 ***
## P4_age_C      28.37  1  899.04 1.267e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: IL6_T ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
##   Data: dfLsW
##
## REML criterion at convergence: 2948.3
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -2.4905 -0.5820 -0.0698  0.4970  3.2446
##
## Random effects:
##   Groups   Name                Variance Std.Dev.
## M2FAMNUM (Intercept) 0.2755    0.5249
## Residual              0.7890    0.8882
## Number of obs: 1014, groups: M2FAMNUM, 901
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)  1.141957  0.033184  34.413
## coherence_as_r_C -0.251793  0.069300  -3.633
## P4_age_C      0.015702  0.002946   5.330
```

```
##
## Correlation of Fixed Effects:
##      (Intr) ch___C
## chrnc_s_r_C  0.004
## P4_age_C    -0.011 -0.043
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs
```

term	statistic	df	Df.res	p.value
(Intercept)	1182	1	868	3.53e-164
coherence_as_r_C	13.1	1	1009	0.000302
P4_age_C	28.4	1	899	1.27e-07

CRP ~ coherence as r

```
# Run the test
lmerM = lmer(CRP_T ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: CRP_T
##           F Df Df.res Pr(>F)
## (Intercept) 101.4269  1 876.07 <2e-16 ***
## coherence_as_r_C  1.8679  1 992.28 0.1720
## P4_age_C        0.2395  1 899.91 0.6247
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```

## Formula: CRP_T ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
## Data: dfLsW
##
## REML criterion at convergence: 1491.7
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.52285 -0.54340 -0.05445  0.56941  2.46170
##
## Random effects:
## Groups Name Variance Std.Dev.
## M2FAMNUM (Intercept) 0.1001  0.3164
## Residual 0.1565  0.3956
## Number of obs: 1009, groups: M2FAMNUM, 897
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  0.1660189  0.0164776  10.07
## coherence_as_r_C -0.0462399  0.0337564  -1.37
## P4_age_C      -0.0007146  0.0014594  -0.49
##
## Correlation of Fixed Effects:
##      (Intr) ch___C
## chrnc_s_r_C  0.009
## P4_age_C     -0.019 -0.043

```

```

table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```

pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs

```

term	statistic	df	Df.res	p.value
(Intercept)	101	1	876	1.2e-22
coherence_as_r_C	1.87	1	992	0.172
P4_age_C	0.24	1	900	0.625

Denial ~ coherence as r

```
# Run the test
```

```
lmerM = lmer(COPE_denial ~ coherence_as_r_C + P4_age_C + (1|M2FAMNUM), data=dfLsW)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: COPE_denial
```

```
##           F Df  Df.res    Pr(>F)
```

```
## (Intercept)  7444.9908  1  874.41 < 2.2e-16 ***
```

```
## coherence_as_r_C  17.4605  1 1007.48 3.188e-05 ***
```

```
## P4_age_C         0.7412  1  901.50  0.3895
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula: COPE_denial ~ coherence_as_r_C + P4_age_C + (1 | M2FAMNUM)
```

```
## Data: dfLsW
```

```
##
```

```
## REML criterion at convergence: 4471.1
```

```
##
```

```
## Scaled residuals:
```

```
##      Min       1Q   Median       3Q      Max
```

```
## -1.8207 -0.6923 -0.2848  0.4765  3.8784
```

```
##
```

```
## Random effects:
```

```
## Groups Name          Variance Std.Dev.
```

```
## M2FAMNUM (Intercept) 1.431    1.196
```

```
## Residual              3.362    1.833
```

```
## Number of obs: 1015, groups: M2FAMNUM, 903
```

```
##
```

```
## Fixed effects:
```

```
##           Estimate Std. Error t value
```

```
## (Intercept)  6.091732  0.070556  86.338
```

```
## coherence_as_r_C -0.614323  0.146718  -4.187
```

```
## P4_age_C      0.005407  0.006277   0.861
```



```
##
## Correlation of Fixed Effects:
##           (Intr) ch___C
## chrnc_s_r_C  0.004
## P4_age_C    -0.007 -0.047
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLsW)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLsW): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3) # Using pander() to view the created table, with 3 sig figs
```

term	statistic	df	Df.res	p.value
(Intercept)	7445	1	874	0
coherence_as_r_C	17.5	1	1007	3.19e-05
P4_age_C	0.741	1	901	0.39

Multiple Comparisons Correction

Holm-Bonferonni

```
## p value for each test of a well-being marker/denial
p = c(2.71E-06, 2.78E-07, 4.05E-07, 3.02E-04, 0.172, 3.19E-05)
## Holm-bonferonni
p.adjust(p, method= 'holm')

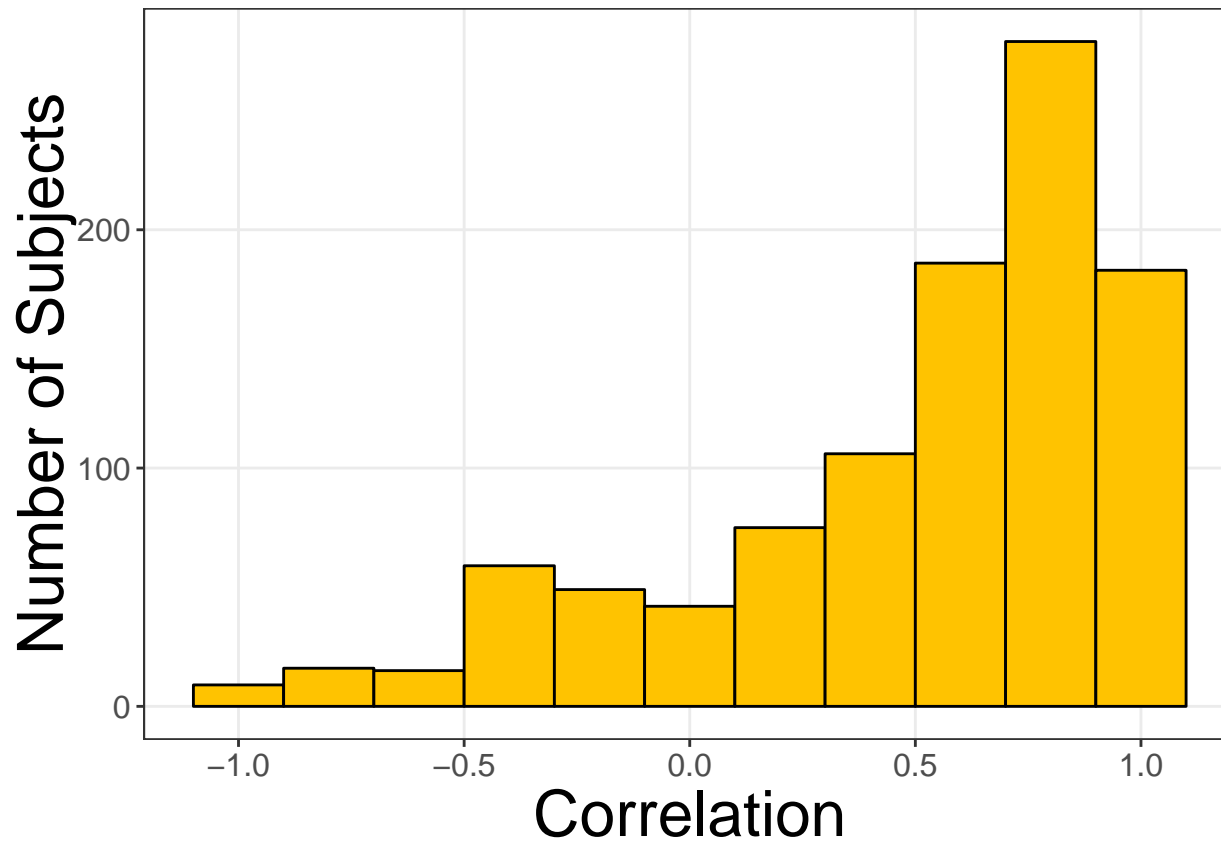
## [1] 1.084e-05 1.668e-06 2.025e-06 6.040e-04 1.720e-01 9.570e-05
# 1.084e-05 1.668e-06 2.025e-06 6.040e-04 1.720e-01 9.570e-05
```

FIGURE S1: Correlations histogram

```
ggplot(dfLsW, aes(coherence_as_r)) +
geom_histogram(aes(fill=as.factor(coherence_as_r)), binwidth=.2, col="black", fill="#FFC300") +
#scale_fill_gradientn("Slope", colours=mycol, limits=c(-.4, 4.5), values = scales::rescale(c(-0.5, -0.05, 0, 0.05, 0.5,1,2,3,4)), breaks =
labs(x="Correlation", y="Number of Subjects") +
```

```
theme_bw() +  
theme(panel.grid.minor = element_blank(), axis.text=element_text(size=12), axis.title=element_text(size=24)) +  
theme(legend.position="none")
```

Warning: Removed 46 rows containing non-finite values (stat_bin).



II. Lag from Survey to Biomarker substudies

There was a lag of 0-60 months from the survey to the stress-induction (biomarker) substudies. The COPE and PWB were completed as part of the Survey substudy. All other measures were collected as part of the stress-induction substudy.

PWB + lag

```
# Center age for subjects in this analysis
length(dfLs$P4_age[!is.na(dfLs$pwb2_C)])

## [1] 5305

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$pwb2_C)], na.rm=T)
# Center lag for subjects in this analysis
length(dfLs$months_P1SAQ_to_P4[!is.na(dfLs$pwb2_C)])

## [1] 5305

dfLs$months_P1SAQ_to_P4_C = dfLs$months_P1SAQ_to_P4 - mean(dfLs$months_P1SAQ_to_P4[!is.na(dfLs$pwb2_C)], na.rm=T)

# Lag moderate?
lmerM = lmer(hr ~ stress_CMC * pwb2_C * months_P1SAQ_to_P4_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df Df.res    Pr(>F)
## (Intercept) 48988.5270  1  897.24 < 2.2e-16 ***
## stress_CMC  686.6727  1  825.97 < 2.2e-16 ***
## pwb2_C      0.0071  1 1056.23  0.932993
## months_P1SAQ_to_P4_C  2.1792  1  898.38  0.140239
## P4_age_C    24.5582  1  951.28  8.532e-07 ***
## stress_CMC:pwb2_C  26.9152  1  822.80  2.679e-07 ***
## stress_CMC:months_P1SAQ_to_P4_C  2.1993  1  791.73  0.138470
## pwb2_C:months_P1SAQ_to_P4_C  0.6201  1 1045.39  0.431197
## stress_CMC:P4_age_C  15.0641  1  843.20  0.000112 ***
## stress_CMC:pwb2_C:months_P1SAQ_to_P4_C  2.8509  1  744.79  0.091740 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * pwb2_C * months_P1SAQ_to_P4_C + P4_age_C *
```

```

##      stress_CMC + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
##      Data: dfLs
##
## REML criterion at convergence: 29114.4
##
## Scaled residuals:
##      Min      1Q  Median      3Q      Max
## -7.1040 -0.4761 -0.0453  0.4029  9.4751
##
## Random effects:
##      Groups   Name      Variance Std.Dev. Corr
##      M2ID     (Intercept) 82.6862  9.0932
##              stress_CMC  0.5195  0.7208  0.18
##      M2FAMNUM (Intercept) 30.2170  5.4970
##      Residual              5.5798  2.3622
## Number of obs: 5154, groups:  M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##
##              Estimate Std. Error t value
## (Intercept)      7.456e+01  3.366e-01 221.475
## stress_CMC        8.817e-01  3.363e-02  26.220
## pwb2_C            7.993e-04  9.488e-03   0.084
## months_P1SAQ_to_P4_C
##                 -3.534e-02  2.390e-02  -1.479
## P4_age_C          -1.514e-01  3.053e-02  -4.959
## stress_CMC:pwb2_C
##                 5.056e-03  9.740e-04   5.191
## stress_CMC:months_P1SAQ_to_P4_C
##                 -3.430e-03  2.311e-03  -1.484
## pwb2_C:months_P1SAQ_to_P4_C
##                 -5.223e-04  6.615e-04  -0.790
## stress_CMC:P4_age_C
##                 -1.197e-02  3.082e-03  -3.884
## stress_CMC:pwb2_C:months_P1SAQ_to_P4_C
##                 -1.095e-04  6.484e-05  -1.689
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC pwb2_C m_P1SA P4_g_C st_CMC:2_C s_CMC:_ p2_C:_
## stress_CMC    0.100
## pwb2_C        0.004 -0.001
## m_P1SAQ__P4  0.028  0.000  0.005
## P4_age_C     -0.009  0.001 -0.186  0.051
## str_CMC:2_C -0.001  0.028  0.104  0.002 -0.019
## s_CMC:_P1SA  0.000  0.017  0.002  0.102  0.005  0.018
## p2_C:_P1SAQ  0.014  0.003 -0.017 -0.006 -0.008 -0.003   -0.001

```

```
## s_CMC:P4_C 0.001 -0.038 -0.019 0.005 0.100 -0.218 0.038 -0.001
## s_CMC:2_C:_ 0.003 0.027 -0.003 -0.001 -0.001 -0.029 0.018 0.107
## s_CMC:P
## stress_CMC
## pwb2_C
## m_P1SAQ__P4
## P4_age_C
## str_CMC:2_C
## s_CMC:_P1SA
## p2_C:_P1SAQ
## s_CMC:P4_C
## s_CMC:2_C:_ -0.018
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48989	1	897	0
stress_CMC	687	1	826	1.24e-110
pwb2_C	0.00707	1	1056	0.933
months_P1SAQ_to_P4_C	2.18	1	898	0.14
P4_age_C	24.6	1	951	8.53e-07
stress_CMC:pwb2_C	26.9	1	823	2.68e-07
stress_CMC:months_P1SAQ_to_P4_C	2.2	1	792	0.138
pwb2_C:months_P1SAQ_to_P4_C	0.62	1	1045	0.431
stress_CMC:P4_age_C	15.1	1	843	0.000112
stress_CMC:pwb2_C:months_P1SAQ_to_P4_C	2.85	1	745	0.0917

```
# Adjust for lag
lmerM = lmer(hr ~ stress_CMC * pwb2_C + months_P1SAQ_to_P4_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
## Response: hr
##
##           F Df  Df.res    Pr(>F)
## (Intercept) 49004.7489  1  898.19 < 2.2e-16 ***
## stress_CMC   692.4292  1  827.74 < 2.2e-16 ***
## pwb2_C       0.0049  1 1057.37 0.9441624
## months_P1SAQ_to_P4_C 1.7921  1  895.61 0.1810050
## P4_age_C     24.5394  1  952.25 8.612e-07 ***
## stress_CMC:pwb2_C 26.7247  1  822.69 2.947e-07 ***
## stress_CMC:P4_age_C 14.9189  1  845.95 0.0001208 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * pwb2_C + months_P1SAQ_to_P4_C + P4_age_C *
##   stress_CMC + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 29079.2
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.0803 -0.4737 -0.0411  0.4044  9.4762
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 82.4498  9.0802
##           stress_CMC  0.5159  0.7183  0.18
##   M2FAMNUM (Intercept) 30.4158  5.5150
##   Residual                5.5895  2.3642
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept) 74.5628781  0.3366110 221.511
## stress_CMC  0.8835150  0.0335559  26.330
## pwb2_C      0.0006656  0.0094850   0.070
## months_P1SAQ_to_P4_C -0.0319043  0.0237671  -1.342
```

```
## P4_age_C          -0.1513089  0.0305267  -4.957
## stress_CMC:pwb2_C  0.0050275  0.0009719   5.173
## stress_CMC:P4_age_C -0.0118830  0.0030747  -3.865
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC pwb2_C m_P1SA P4_g_C s_CMC:2
## stress_CMC  0.101
## pwb2_C      0.005 -0.001
## m_P1SAQ__P4 0.029 -0.002  0.005
## P4_age_C    -0.009  0.001 -0.186  0.051
## str_CMC:2_C -0.001  0.028  0.105  0.000 -0.019
## s_CMC:P4__C 0.001 -0.038 -0.019  0.001  0.102 -0.219
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49005	1	898	0
stress_CMC	692	1	828	2.25e-111
pwb2_C	0.00491	1	1057	0.944
months_P1SAQ_to_P4_C	1.79	1	896	0.181
P4_age_C	24.5	1	952	8.61e-07
stress_CMC:pwb2_C	26.7	1	823	2.95e-07
stress_CMC:P4_age_C	14.9	1	846	0.000121

Denial + lag

```
# Center age for subjects in this analysis
length(dfLs$P4_age[!is.na(dfLs$COPE_denial_C)])
```

```
## [1] 5300
```

```

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$COPE_denial_C)], na.rm=T)
# Center lag for subjects in this analysis
length(dfLs$months_P1SAQ_to_P4[!is.na(dfLs$COPE_denial_C)])

## [1] 5300

dfLs$months_P1SAQ_to_P4_C = dfLs$months_P1SAQ_to_P4 - mean(dfLs$months_P1SAQ_to_P4[!is.na(dfLs$COPE_denial_C)], na.rm=T)

# Lag moderate?
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C * months_P1SAQ_to_P4_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res
## (Intercept) 48761.5860 1 895.68
## stress_CMC 694.0683 1 820.02
## COPE_denial_C 0.0519 1 1055.60
## months_P1SAQ_to_P4_C 2.4453 1 891.75
## P4_age_C 24.6019 1 946.35
## stress_CMC:COPE_denial_C 20.4366 1 854.53
## stress_CMC:months_P1SAQ_to_P4_C 2.8355 1 788.64
## COPE_denial_C:months_P1SAQ_to_P4_C 0.3430 1 1030.15
## stress_CMC:P4_age_C 7.1730 1 827.56
## stress_CMC:COPE_denial_C:months_P1SAQ_to_P4_C 0.0763 1 858.26
##
##           Pr(>F)
## (Intercept) < 2.2e-16 ***
## stress_CMC < 2.2e-16 ***
## COPE_denial_C 0.819858
## months_P1SAQ_to_P4_C 0.118231
## P4_age_C 8.353e-07 ***
## stress_CMC:COPE_denial_C 7.033e-06 ***
## stress_CMC:months_P1SAQ_to_P4_C 0.092598 .
## COPE_denial_C:months_P1SAQ_to_P4_C 0.558259
## stress_CMC:P4_age_C 0.007548 **
## stress_CMC:COPE_denial_C:months_P1SAQ_to_P4_C 0.782407
## ---

```



```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * COPE_denial_C * months_P1SAQ_to_P4_C + P4_age_C *
## stress_CMC + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfls
##
## REML criterion at convergence: 29018.5
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.2209 -0.4774 -0.0413  0.4087  9.4570
##
## Random effects:
##   Groups      Name                Variance Std.Dev. Corr
##   M2ID        (Intercept)          84.4202   9.1880
##              stress_CMC           0.4889   0.6992   0.18
##   M2FAMNUM    (Intercept)          29.2166   5.4052
##   Residual                                5.5416   2.3541
## Number of obs: 5149, groups:  M2ID, 1060; M2FAMNUM, 936
##
## Fixed effects:
##
##              Estimate Std. Error
## (Intercept)    74.5871496   0.3375500
## stress_CMC      0.8704579   0.0330203
## COPE_denial_C  -0.0338159   0.1482474
## months_P1SAQ_to_P4_C
## -0.0376248   0.0240167
## P4_age_C       -0.1490200   0.0300271
## stress_CMC:COPE_denial_C
## -0.0686662   0.0151799
## stress_CMC:months_P1SAQ_to_P4_C
## -0.0038323   0.0022746
## COPE_denial_C:months_P1SAQ_to_P4_C
## 0.0062525   0.0106480
## stress_CMC:P4_age_C
## -0.0079143   0.0029532
## stress_CMC:COPE_denial_C:months_P1SAQ_to_P4_C
## 0.0002999   0.0010848
##
##              t value
## (Intercept)    220.966
## stress_CMC      26.361
## COPE_denial_C  -0.228
```

```

## months_P1SAQ_to_P4_C          -1.567
## P4_age_C                      -4.963
## stress_CMC:COPE_denial_C      -4.523
## stress_CMC:months_P1SAQ_to_P4_C -1.685
## COPE_denial_C:months_P1SAQ_to_P4_C 0.587
## stress_CMC:P4_age_C          -2.680
## stress_CMC:COPE_denial_C:months_P1SAQ_to_P4_C 0.276
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC COPE_d_C m_P1SA P4_g_C st_CMC:COPE__C s_CMC:_
## stress_CMC      0.100
## COPE_denl_C    -0.010  0.000
## m_P1SAQ__P4     0.028  0.000 -0.017
## P4_age_C        -0.008  0.001 -0.018   0.052
## st_CMC:COPE__C  0.000  0.013  0.101  -0.002 -0.004
## s_CMC:_P1SA     0.000  0.016 -0.003   0.102  0.006 -0.016
## COPE__C:_P1    -0.016 -0.002 -0.004  -0.002  0.031  0.000   0.000
## s_CMC:P4__C     0.001 -0.033 -0.004   0.006  0.101 -0.036   0.044
## s_CMC:COPE__C: -0.002 -0.016  0.000   0.000  0.003 -0.027   0.021
##      COPE__C: s_CMC:P
## stress_CMC
## COPE_denl_C
## m_P1SAQ__P4
## P4_age_C
## st_CMC:COPE__C
## s_CMC:_P1SA
## COPE__C:_P1
## s_CMC:P4__C      0.003
## s_CMC:COPE__C:  0.101   0.051

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

Table 46: Table continues below

term	statistic	df	Df.res
(Intercept)	48762	1	896
stress_CMC	694	1	820
COPE_denial_C	0.0519	1	1056
months_P1SAQ_to_P4_C	2.45	1	892
P4_age_C	24.6	1	946
stress_CMC:COPE_denial_C	20.4	1	855
stress_CMC:months_P1SAQ_to_P4_C	2.84	1	789
COPE_denial_C:months_P1SAQ_to_P4_C	0.343	1	1030
stress_CMC:P4_age_C	7.17	1	828
stress_CMC:COPE_denial_C:months_P1SAQ_to_P4_C	0.0763	1	858

p.value
0
2.61e-111
0.82
0.118
8.35e-07
7.03e-06
0.0926
0.558
0.00755
0.782

```
# Adjust for lag
lmerM = lmer(hr ~ stress_CMC * COPE_denial_C + months_P1SAQ_to_P4_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfL)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##          F Df  Df.res    Pr(>F)
## (Intercept) 48766.0503  1  896.78 < 2.2e-16 ***
```

```

## stress_CMC                697.6348  1  821.19 < 2.2e-16 ***
## COPE_denial_C             0.0527  1 1056.66  0.818475
## months_P1SAQ_to_P4_C      1.9550  1  890.35  0.162396
## P4_age_C                  24.6873  1  947.14  7.998e-07 ***
## stress_CMC:COPE_denial_C  20.6837  1  853.22  6.201e-06 ***
## stress_CMC:P4_age_C       6.9081  1  829.92  0.008739 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * COPE_denial_C + months_P1SAQ_to_P4_C + P4_age_C *
##   stress_CMC + (1 + stress_CMC | M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 28992.3
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.1780 -0.4780 -0.0415  0.4063  9.4735
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 83.9333  9.1615
##          stress_CMC  0.4857  0.6969  0.18
## M2FAMNUM (Intercept) 29.6581  5.4459
## Residual                5.5476  2.3553
## Number of obs: 5149, groups: M2ID, 1060; M2FAMNUM, 936
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  74.589990  0.337551 220.974
## stress_CMC    0.871111  0.032960  26.429
## COPE_denial_C -0.034070  0.148200  -0.230
## months_P1SAQ_to_P4_C -0.033501  0.023894  -1.402
## P4_age_C      -0.149210  0.030013  -4.971
## stress_CMC:COPE_denial_C -0.068942  0.015149  -4.551
## stress_CMC:P4_age_C  -0.007738  0.002942  -2.630

```

```
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC COPE__ m_P1SA P4_g_C s_CMC:C
## stress_CMC   0.101
## COPE_den1_C -0.010  0.000
## m_P1SAQ__P4  0.028 -0.002 -0.017
## P4_age_C     -0.007  0.001 -0.017  0.052
## s_CMC:COPE_  0.000  0.013  0.102 -0.001 -0.004
## s_CMC:P4__C  0.001 -0.033 -0.004  0.001  0.101 -0.034

table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	48766	1	897	0
stress_CMC	698	1	821	9.08e-112
COPE_denial_C	0.0527	1	1057	0.818
months_P1SAQ_to_P4_C	1.96	1	890	0.162
P4_age_C	24.7	1	947	8e-07
stress_CMC:COPE_denial_C	20.7	1	853	6.2e-06
stress_CMC:P4_age_C	6.91	1	830	0.00874

III. PWB subscales

Exploratory analyses investigating individual subscales of the Psychological Well-Being Scales

```
# Center age for subjects in this analysis
varDescribe(dfLs$pwb2_C)

##   vars   n mean   sd median   min   max skew kurtosis
## X1    1 5305    0 35.23   5.19 -135.81 61.19 -0.7    0.14

length(dfLs$P4_age[!is.na(dfLs$pwb2_C)])
```

```
## [1] 5305
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$pwb2_C)], na.rm=T)
```

Autonomy

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * autonomy2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49034.4174	1	904.95	< 2.2e-16 ***
## stress_CMC	676.6076	1	831.90	< 2.2e-16 ***
## autonomy2_C	0.0001	1	1051.89	0.992530
## P4_age_C	24.3123	1	947.70	9.669e-07 ***
## stress_CMC:autonomy2_C	4.2915	1	830.99	0.038610 *
## stress_CMC:P4_age_C	9.0387	1	839.98	0.002722 **

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula: hr ~ stress_CMC * autonomy2_C + P4_age_C * stress_CMC + (1 +
```

```
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```
##   Data: dfLs
```

```
##
```

```
## REML criterion at convergence: 29091.1
```

```
##
```

```
## Scaled residuals:
```

##	Min	1Q	Median	3Q	Max
##	-7.1009	-0.4729	-0.0443	0.4022	9.4548

```
##
```

```
## Random effects:
```

##	Groups	Name	Variance	Std.Dev.	Corr
----	--------	------	----------	----------	------

```

## M2ID      (Intercept) 83.0622  9.1138
##          stress_CMC  0.5349  0.7314  0.19
## M2FAMNUM (Intercept) 29.9432  5.4720
## Residual                5.5989  2.3662
## Number of obs: 5154, groups:  M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    74.5786003  0.3365674 221.586
## stress_CMC      0.8826133  0.0339117  26.027
## autonomy2_C    -0.0004671  0.0497839  -0.009
## P4_age_C       -0.1489096  0.0301827  -4.934
## stress_CMC:autonomy2_C  0.0105787  0.0051036   2.073
## stress_CMC:P4_age_C  -0.0091880  0.0030543  -3.008
##
## Correlation of Fixed Effects:
##      (Intr) st_CMC atn2_C P4_g_C s_CMC:2
## stress_CMC  0.106
## autonomy2_C -0.007 -0.001
## P4_age_C    -0.008  0.001 -0.121
## str_CMC:2_C -0.001  0.035  0.109 -0.014
## s_CMC:P4__C  0.001 -0.036 -0.014  0.107 -0.124

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49034	1	905	0
stress_CMC	677	1	832	1.26e-109
autonomy2_C	8.77e-05	1	1052	0.993
P4_age_C	24.3	1	948	9.67e-07
stress_CMC:autonomy2_C	4.29	1	831	0.0386
stress_CMC:P4_age_C	9.04	1	840	0.00272

Environmental Mastery

```
# Run the test
lmerM = lmer(hr ~ stress_CMC * envMast2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49062.6979	1	905.16	< 2.2e-16 ***
## stress_CMC	689.1703	1	828.03	< 2.2e-16 ***
## envMast2_C	0.1037	1	1058.09	0.7475
## P4_age_C	22.7475	1	961.59	2.133e-06 ***
## stress_CMC:envMast2_C	23.9722	1	825.22	1.176e-06 ***
## stress_CMC:P4_age_C	16.4475	1	863.28	5.454e-05 ***

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * envMast2_C + P4_age_C * stress_CMC + (1 + stress_CMC |
## M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 29071.4
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -7.0699 -0.4760 -0.0435 0.4051 9.4820
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## M2ID (Intercept) 83.1025 9.1161
## stress_CMC 0.5189 0.7203 0.19
## M2FAMNUM (Intercept) 29.8517 5.4637
## Residual 5.5900 2.3643
```



```
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
```

```
##
```

```
## Fixed effects:
```

```
##           Estimate Std. Error t value
## (Intercept)      74.577110   0.336463 221.650
## stress_CMC         0.882616   0.033601  26.268
## envMast2_C       -0.014026   0.043465  -0.323
## P4_age_C         -0.146770   0.030755  -4.772
## stress_CMC:envMast2_C 0.021893   0.004469   4.899
## stress_CMC:P4_age_C -0.012700   0.003130  -4.058
```

```
##
```

```
## Correlation of Fixed Effects:
```

```
##           (Intr) st_CMC enM2_C P4_g_C s_CMC:M
## stress_CMC  0.106
## envMast2_C  0.002  0.000
## P4_age_C   -0.009  0.001 -0.227
## st_CMC:M2_C -0.001  0.024  0.110 -0.026
## s_CMC:P4__C 0.001 -0.038 -0.026  0.106 -0.280
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49063	1	905	0
stress_CMC	689	1	828	5.36e-111
envMast2_C	0.104	1	1058	0.747
P4_age_C	22.7	1	962	2.13e-06
stress_CMC:envMast2_C	24	1	825	1.18e-06
stress_CMC:P4_age_C	16.4	1	863	5.45e-05

Personal Growth

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * persGrow2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49076.8992	1	905.01	< 2.2e-16 ***
## stress_CMC	682.8387	1	828.37	< 2.2e-16 ***
## persGrow2_C	0.0921	1	1058.73	0.7615953
## P4_age_C	24.2902	1	945.48	9.781e-07 ***
## stress_CMC:persGrow2_C	13.7872	1	821.09	0.0002186 ***
## stress_CMC:P4_age_C	9.5863	1	839.10	0.0020256 **

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula: hr ~ stress_CMC * persGrow2_C + P4_age_C * stress_CMC + (1 +
```

```
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
```

```
##   Data: dfLs
```

```
##
```

```
## REML criterion at convergence: 29081.3
```

```
##
```

```
## Scaled residuals:
```

```
##   Min      1Q  Median      3Q      Max
```

```
## -6.9893 -0.4692 -0.0449  0.4008  9.5146
```

```
##
```

```
## Random effects:
```

```
##   Groups   Name                Variance Std.Dev.  Corr
```

```
##   M2ID     (Intercept) 83.2885   9.1263
```

```
##           stress_CMC  0.5239   0.7238  0.19
```

```
##   M2FAMNUM (Intercept) 29.6629   5.4464
```

```
##   Residual                5.5990   2.3662
```

```
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
```

```
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)      74.578359   0.336418 221.683
## stress_CMC         0.881072   0.033697  26.147
## persGrow2_C       -0.014627   0.048120  -0.304
## P4_age_C          -0.148115   0.030036  -4.931
## stress_CMC:persGrow2_C  0.018304   0.004927   3.715
## stress_CMC:P4_age_C  -0.009370   0.003025  -3.098
##
## Correlation of Fixed Effects:
##           (Intr) st_CMC prG2_C P4_g_C s_CMC:G
## stress_CMC   0.106
## persGrow2_C  0.002  0.000
## P4_age_C     -0.009  0.001 -0.076
## st_CMC:G2_C  0.000  0.016  0.112 -0.007
## s_CMC:P4__C  0.001 -0.034 -0.007  0.107 -0.086
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49077	1	905	0
stress_CMC	683	1	828	2.96e-110
persGrow2_C	0.0921	1	1059	0.762
P4_age_C	24.3	1	945	9.78e-07
stress_CMC:persGrow2_C	13.8	1	821	0.000219
stress_CMC:P4_age_C	9.59	1	839	0.00203

Positive Relations with Others

```
# Run the test
lmerM = lmer(hr ~ stress_CMC * posRela2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
## (Intercept)	49124.0666	1	903.61	< 2.2e-16 ***
## stress_CMC	687.8391	1	827.31	< 2.2e-16 ***
## posRela2_C	1.2684	1	1057.99	0.2603247
## P4_age_C	25.9641	1	947.83	4.197e-07 ***
## stress_CMC:posRela2_C	23.0475	1	802.05	1.885e-06 ***
## stress_CMC:P4_age_C	14.8001	1	849.96	0.0001285 ***

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
```

```
## Formula:
```

```
## hr ~ stress_CMC * posRela2_C + P4_age_C * stress_CMC + (1 + stress_CMC |
```

```
## M2ID) + (1 | M2FAMNUM)
```

```
## Data: dfLs
```

```
##
```

```
## REML criterion at convergence: 29072.5
```

```
##
```

```
## Scaled residuals:
```

```
##   Min      1Q  Median      3Q      Max
```

```
## -7.1346 -0.4717 -0.0410  0.4027  9.4414
```

```
##
```

```
## Random effects:
```

```
##  Groups   Name      Variance Std.Dev.  Corr
```

```
## M2ID     (Intercept) 82.9150  9.1058
```

```
##          stress_CMC  0.5166  0.7188  0.17
```

```
## M2FAMNUM (Intercept) 29.8756  5.4659
```

```
## Residual                5.5946  2.3653
```

```
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
```

```
##
```

```
## Fixed effects:
```

```
##              Estimate Std. Error t value
## (Intercept)    74.57943   0.33626 221.788
## stress_CMC      0.88091   0.03357  26.242
## posRela2_C      0.05221   0.04629   1.128
## P4_age_C       -0.15601   0.03060  -5.099
## stress_CMC:posRela2_C 0.02277   0.00474   4.804
## stress_CMC:P4_age_C -0.01189   0.00309  -3.849
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC psR2_C P4_g_C s_CMC:R
## stress_CMC    0.098
## posRela2_C    0.012 -0.001
## P4_age_C     -0.011  0.001 -0.208
## st_CMC:R2_C  -0.001  0.015  0.102 -0.021
## s_CMC:P4__C  0.001 -0.035 -0.021  0.099 -0.237
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49124	1	904	0
stress_CMC	688	1	827	8.14e-111
posRela2_C	1.27	1	1058	0.26
P4_age_C	26	1	948	4.2e-07
stress_CMC:posRela2_C	23	1	802	1.89e-06
stress_CMC:P4_age_C	14.8	1	850	0.000128

Purpose in Life

```
# Run the test
lmerM = lmer(hr ~ stress_CMC * purpLife2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##           F Df  Df.res   Pr(>F)
## (Intercept) 49052.8574  1  905.18 < 2.2e-16 ***
## stress_CMC   682.6914  1  829.00 < 2.2e-16 ***
## purpLife2_C    0.1229  1 1058.85  0.725976
## P4_age_C      24.2779  1  947.71 9.838e-07 ***
## stress_CMC:purpLife2_C 19.3809  1  836.88 1.209e-05 ***
## stress_CMC:P4_age_C  10.2231  1  837.54  0.001439 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * purpLife2_C + P4_age_C * stress_CMC + (1 +
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 29075.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.1596 -0.4731 -0.0432  0.4046  9.4353
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.0364  9.1124
##           stress_CMC  0.5251  0.7247  0.19
##   M2FAMNUM (Intercept) 29.9263  5.4705
##   Residual                5.5886  2.3640
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept) 74.576549  0.336495 221.628
## stress_CMC   0.881153  0.033704  26.144
## purpLife2_C -0.017454  0.049705  -0.351
## P4_age_C    -0.148133  0.030047  -4.930
```

```
## stress_CMC:purpLife2_C 0.022370 0.005079 4.405
## stress_CMC:P4_age_C -0.009688 0.003028 -3.199
##
## Correlation of Fixed Effects:
## (Intr) st_CMC prL2_C P4_g_C s_CMC:L
## stress_CMC 0.107
## purpLife2_C 0.005 -0.001
## P4_age_C -0.010 0.001 -0.078
## st_CMC:L2_C -0.001 0.012 0.112 -0.009
## s_CMC:P4__C 0.001 -0.034 -0.009 0.108 -0.096
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49053	1	905	0
stress_CMC	683	1	829	2.94e-110
purpLife2_C	0.123	1	1059	0.726
P4_age_C	24.3	1	948	9.84e-07
stress_CMC:purpLife2_C	19.4	1	837	1.21e-05
stress_CMC:P4_age_C	10.2	1	838	0.00144

Self Acceptance

```
# Run the test
lmerM = lmer(hr ~ stress_CMC * selfAcce2_C + P4_age_C*stress_CMC + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
```

	F	Df	Df.res	Pr(>F)
--	---	----	--------	--------

```

## (Intercept)          49054.6598  1  904.71 < 2.2e-16 ***
## stress_CMC           692.6108  1  828.21 < 2.2e-16 ***
## selfAcce2_C          0.0372  1 1058.70  0.847026
## P4_age_C             24.1982  1  949.56 1.024e-06 ***
## stress_CMC:selfAcce2_C 21.8916  1  800.38 3.386e-06 ***
## stress_CMC:P4_age_C  13.7539  1  842.77  0.000222 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * selfAcce2_C + P4_age_C * stress_CMC + (1 +
##   stress_CMC | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 29074.5
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -7.0548 -0.4735 -0.0431  0.4064  9.4796
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 83.0666  9.1141
##           stress_CMC  0.5143  0.7172  0.18
##   M2FAMNUM (Intercept) 29.8927  5.4674
##   Residual                5.5991  2.3662
## Number of obs: 5154, groups:  M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)    74.576559  0.336488 221.632
## stress_CMC      0.883295  0.033543  26.333
## selfAcce2_C     0.007714  0.039906   0.193
## P4_age_C       -0.149799  0.030434  -4.922
## stress_CMC:selfAcce2_C 0.018883  0.004034   4.682
## stress_CMC:P4_age_C -0.011376  0.003066  -3.711
##
## Correlation of Fixed Effects:

```



```
##          (Intr) st_CMC slA2_C P4_g_C s_CMC:A
## stress_CMC  0.103
## selfAcce2_C 0.006 -0.001
## P4_age_C    -0.010  0.001 -0.177
## st_CMC:A2_C -0.001  0.032  0.108 -0.018
## s_CMC:P4__C 0.001 -0.039 -0.018  0.103 -0.208
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	49055	1	905	0
stress_CMC	693	1	828	2.07e-111
selfAcce2_C	0.0372	1	1059	0.847
P4_age_C	24.2	1	950	1.02e-06
stress_CMC:selfAcce2_C	21.9	1	800	3.39e-06
stress_CMC:P4_age_C	13.8	1	843	0.000222

Non-linear Age

Including age² in our model did not impact results.

Center age (been centered for subsets of participants on different analyses where participants are missing data on well-being indicators)

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age, na.rm=T)
```

```
dfLs$P4_age_C2 = dfLs$P4_age_C^2
```

HR ~ age²

```
lmerM = lmer(hr ~ P4_age_C + P4_age_C2 + (1|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
```

a

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##           F Df Df.res    Pr(>F)
## (Intercept) 28012.6195  1 904.80 < 2.2e-16 ***
## P4_age_C     23.2375  1 944.22 1.668e-06 ***
## P4_age_C2     0.2268  1 951.34   0.634
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

`summary(lmerM)`

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ P4_age_C + P4_age_C2 + (1 | M2ID) + (1 | M2FAMNUM)
##   Data: dfLs
##
## REML criterion at convergence: 30408.7
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -4.7670 -0.5209 -0.0751  0.4372  7.9457
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
##   M2ID     (Intercept) 80.451   8.969
##   M2FAMNUM (Intercept) 32.383   5.691
##   Residual                8.935   2.989
## Number of obs: 5174, groups:  M2ID, 1065; M2FAMNUM, 940
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept) 74.417042  0.444334 167.480
## P4_age_C    -0.153042  0.031730  -4.823
## P4_age_C2    0.001090  0.002288   0.477
##
## Correlation of Fixed Effects:
##           (Intr) P4_g_C
## P4_age_C   0.211
```

```
## P4_age_C2 -0.651 -0.334
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =  
## dfLs): The following column names in ANOVA output were not recognized or  
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	28013	1	905	0
P4_age_C	23.2	1	944	1.67e-06
P4_age_C2	0.227	1	951	0.634

PWB + age²

```
# Center age for subjects in this analysis  
varDescribe(dfLs$pwb2_C)
```

```
## vars n mean sd median min max skew kurtosis  
## X1 1 5305 0 35.23 5.19 -135.81 61.19 -0.7 0.14
```

```
length(dfLs$P4_age[!is.na(dfLs$pwb2_C)])
```

```
## [1] 5305
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$pwb2_C)], na.rm=T)
```

```
dfLs$P4_age_C2 = dfLs$P4_age_C^2
```

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * pwb2_C + P4_age_C + P4_age_C2 + (1+ stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##           F Df Df.res Pr(>F)  
## (Intercept) 28241.5889 1 903.34 < 2.2e-16 ***  
## stress_CMC 677.3817 1 829.20 < 2.2e-16 ***
```

```

## pwb2_C          0.0000  1 1058.09   0.9997
## P4_age_C       18.7926  1  941.97 1.614e-05 ***
## P4_age_C2      0.0474  1  944.39   0.8276
## stress_CMC:pwb2_C 19.4558  1  817.13 1.167e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * pwb2_C + P4_age_C + P4_age_C2 + (1 + stress_CMC |
## M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 29090.7
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0394 -0.4727 -0.0429  0.4053  9.4972
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 83.129   9.118
##          stress_CMC  0.530   0.728  0.18
## M2FAMNUM (Intercept) 29.971   5.475
## Residual                    5.591   2.365
## Number of obs: 5154, groups: M2ID, 1061; M2FAMNUM, 936
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    7.451e+01 4.429e-01 168.234
## stress_CMC      8.798e-01 3.379e-02 26.042
## pwb2_C          3.793e-06 9.494e-03  0.000
## P4_age_C       -1.394e-01 3.211e-02 -4.342
## P4_age_C2      4.995e-04 2.290e-03  0.218
## stress_CMC:pwb2_C 4.217e-03 9.555e-04  4.413
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC pwb2_C P4_g_C P4__C2

```

```
## stress_CMC 0.080
## pwb2_C 0.005 -0.001
## P4_age_C 0.205 0.005 -0.175
## P4_age_C2 -0.650 -0.001 -0.002 -0.327
## str_CMC:2_C -0.001 0.020 0.106 0.003 0.001
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	28242	1	903	0
stress_CMC	677	1	829	1.25e-109
pwb2_C	1.59e-07	1	1058	1
P4_age_C	18.8	1	942	1.61e-05
P4_age_C2	0.0474	1	944	0.828
stress_CMC:pwb2_C	19.5	1	817	1.17e-05

Depression + age²

```
# Center age for subjects in this analysis
varDescribe(dfLs$P4_CESD_C)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 5285 0 8.1 -2.61 -8.61 45.39 1.61 3.17
```

```
length(dfLs$P4_age[!is.na(dfLs$P4_CESD_C)])
```

```
## [1] 5285
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$P4_CESD_C)], na.rm=T)
```

```
dfLs$P4_age_C2 = dfLs$P4_age_C^2
```

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * P4_CESD_C + P4_age_C + P4_age_C2 + (1 + hr_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl =
```

```
## control$checkConv, : unable to evaluate scaled gradient
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl =
## control$checkConv, : Model failed to converge: degenerate Hessian with 1
## negative eigenvalues
```

```
a = Anova(lmerM, type=3, test="F")
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##          F Df Df.res Pr(>F)
## (Intercept)          1    Inf
## stress_CMC          0  1 2879      1
## P4_CESD_C           1    Inf
## P4_age_C            1    Inf
## P4_age_C2           1    Inf
## stress_CMC:P4_CESD_C 0  1 2877      1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * P4_CESD_C + P4_age_C + P4_age_C2 + (1 + hr_CMC |
## M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: -46388.1
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.971e-06 -3.146e-07 -5.640e-08  1.989e-07  2.363e-06
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 3.183e+01 5.642e+00
##          hr_CMC      2.623e+01 5.122e+00 -0.63
## M2FAMNUM (Intercept) 4.638e+00 2.153e+00
## Residual                2.292e-11 4.788e-06
## Number of obs: 4800, groups: M2ID, 960; M2FAMNUM, 859
```

```

##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)      7.653e+01  2.110e-01 362.714
## stress_CMC       -9.057e-14  5.960e-08   0.000
## P4_CESD_C        2.764e-02  1.955e-02   1.414
## P4_age_C         -1.759e-01  1.533e-02 -11.479
## P4_age_C2        3.539e-03  1.138e-03   3.109
## stress_CMC:P4_CESD_C 1.857e-15  6.948e-09   0.000
##
## Correlation of Fixed Effects:
##           (Intr) st_CMC P4_CES P4_g_C P4__C2
## stress_CMC   0.000
## P4_CESD_C    0.024  0.000
## P4_age_C     0.196  0.000  0.207
## P4_age_C2   -0.657  0.000 -0.048 -0.268
## s_CMC:P4_CE 0.000 -0.126  0.000  0.000  0.000
## convergence code: 0
## unable to evaluate scaled gradient
## Model failed to converge: degenerate Hessian with 1 negative eigenvalues
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
pander(table_obj, digits = 3)

```

term	statistic	df	Df.res	p.value
(Intercept)	NA	1	Inf	NA
stress_CMC	2.31e-12	1	2879	1
P4_CESD_C	NA	1	Inf	NA
P4_age_C	NA	1	Inf	NA
P4_age_C2	NA	1	Inf	NA
stress_CMC:P4_CESD_C	7.15e-14	1	2877	1

Anxiety + age²

```
# Center age for subjects in this analysis
varDescribe(dfLs$P4_STAItrait_C)

##      vars      n mean   sd median   min max skew kurtosis
## X1      1 5285    0 8.98   -1.2 -14.2 36.8 0.84    0.4

length(dfLs$P4_age[!is.na(dfLs$P4_STAItrait_C)])

## [1] 5285

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$P4_STAItrait_C)], na.rm=T)
dfLs$P4_age_C2 = dfLs$P4_age_C^2
# Run the test
lmerM = lmer(hr ~ stress_CMC * P4_STAItrait_C + P4_age_C + P4_age_C2 + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##
##              F Df  Df.res    Pr(>F)
## (Intercept) 28183.5673  1  902.00 < 2.2e-16 ***
## stress_CMC   683.1555  1  825.76 < 2.2e-16 ***
## P4_STAItrait_C    0.7483  1 1050.55  0.3872
## P4_age_C       17.9748  1  936.65 2.460e-05 ***
## P4_age_C2      0.1943  1  940.69  0.6595
## stress_CMC:P4_STAItrait_C  25.2136  1  768.77 6.383e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

summary(lmerM)

## Linear mixed model fit by REML ['lmerMod']
## Formula: hr ~ stress_CMC * P4_STAItrait_C + P4_age_C + P4_age_C2 + (1 +
##      stress_CMC | M2ID) + (1 | M2FAMNUM)
##      Data: dfLs
##
## REML criterion at convergence: 28957.7
##
```



```

## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.0524 -0.4783 -0.0413  0.4103  9.5026
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   M2ID     (Intercept) 82.9260  9.1064
##           stress_CMC   0.5216  0.7222  0.20
##   M2FAMNUM (Intercept) 30.2846  5.5031
##   Residual                5.5810  2.3624
## Number of obs: 5134, groups: M2ID, 1057; M2FAMNUM, 932
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)      74.467443   0.443101 168.060
## stress_CMC         0.881004   0.033687  26.153
## P4_STAItrait_C     0.032431   0.037425   0.867
## P4_age_C          -0.136744   0.032204  -4.246
## P4_age_C2          0.001006   0.002280   0.441
## stress_CMC:P4_STAItrait_C -0.018367   0.003656  -5.024
##
## Correlation of Fixed Effects:
##              (Intr) st_CMC P4_STA P4_g_C P4__C2
## stress_CMC    0.087
## P4_STAItr_C  0.020  0.001
## P4_age_C      0.210  0.006  0.182
## P4_age_C2    -0.648 -0.001 -0.041 -0.337
## s_CMC:P4_ST  0.000 -0.034  0.117 -0.002  0.001

```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```

## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res

```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	28184	1	902	0
stress_CMC	683	1	826	3.3e-110

term	statistic	df	Df.res	p.value
P4_STAItrait_C	0.748	1	1051	0.387
P4_age_C	18	1	937	2.46e-05
P4_age_C2	0.194	1	941	0.659
stress_CMC:P4_STAItrait_C	25.2	1	769	6.38e-07

IL6 + age²

```
# Center age for subjects in this analysis
varDescribe(dfLs$IL6_T_C)

##      vars      n mean  sd median  min max skew kurtosis
## X1      1 5290    0 1.06 -0.07 -3.09 3.3 0.31    0.46

length(dfLs$P4_age[!is.na(dfLs$IL6_T_C)])

## [1] 5290

dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$IL6_T_C)], na.rm=T)
dfLs$P4_age_C2 = dfLs$P4_age_C^2
# Run the test
lmerM = lmer(hr ~ stress_CMC * IL6_T_C + P4_age_C + P4_age_C2 + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
a = Anova(lmerM, type=3, test="F")
a

## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
##
## Response: hr
##              F Df  Df.res    Pr(>F)
## (Intercept) 28397.2334 1  901.76 < 2.2e-16 ***
## stress_CMC   695.8501 1  820.98 < 2.2e-16 ***
## IL6_T_C      13.9561 1 1055.42 0.0001971 ***
## P4_age_C     25.5974 1  939.76 5.058e-07 ***
## P4_age_C2     0.3543 1  938.24 0.5518418
## stress_CMC:IL6_T_C 25.4905 1  773.24 5.548e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(lmerM)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * IL6_T_C + P4_age_C + P4_age_C2 + (1 + stress_CMC |
## M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 28979.5
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -7.1438 -0.4799 -0.0427 0.4044 9.4522
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## M2ID (Intercept) 84.2004 9.1761
## stress_CMC 0.4929 0.7021 0.23
## M2FAMNUM (Intercept) 27.9994 5.2914
## Residual 5.5832 2.3629
## Number of obs: 5147, groups: M2ID, 1058; M2FAMNUM, 933
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 74.397161 0.440991 168.704
## stress_CMC 0.874287 0.033123 26.395
## IL6_T_C 1.178947 0.314964 3.743
## P4_age_C -0.160345 0.031643 -5.067
## P4_age_C2 0.001355 0.002273 0.596
## stress_CMC:IL6_T_C -0.154875 0.030658 -5.052
##
## Correlation of Fixed Effects:
## (Intr) st_CMC IL6_T_ P4_g_C P4__C2
## stress_CMC 0.099
## IL6_T_C 0.025 -0.002
## P4_age_C 0.203 0.006 -0.136
## P4_age_C2 -0.649 0.000 -0.043 -0.322
## s_CMC:IL6_T 0.000 -0.011 0.135 -0.003 -0.001
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	28397	1	902	0
stress_CMC	696	1	821	1.5e-111
IL6_T_C	14	1	1055	0.000197
P4_age_C	25.6	1	940	5.06e-07
P4_age_C2	0.354	1	938	0.552
stress_CMC:IL6_T_C	25.5	1	773	5.55e-07

CRP + age²

```
# Center age for subjects in this analysis
varDescribe(dfLs$CRP_T_C)
```

```
## vars n mean sd median min max skew kurtosis
## X1 1 5260 0 0.51 -0.03 -1.02 1.61 0.05 -0.44
```

```
length(dfLs$P4_age[!is.na(dfLs$CRP_T_C)])
```

```
## [1] 5260
```

```
dfLs$P4_age_C = dfLs$P4_age - mean(dfLs$P4_age[!is.na(dfLs$CRP_T_C)], na.rm=T)
```

```
dfLs$P4_age_C2 = dfLs$P4_age_C^2
```

```
# Run the test
```

```
lmerM = lmer(hr ~ stress_CMC * CRP_T_C + P4_age_C + P4_age_C2 + (1 + stress_CMC|M2ID) + (1|M2FAMNUM), data=dfLs)
```

```
a = Anova(lmerM, type=3, test="F")
```

```
a
```

```
## Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)
```

```
##
```

```
## Response: hr
```

```
##
```

	F	Df	Df.res	Pr(>F)
--	---	----	--------	--------

```

## (Intercept)      28222.4019  1  900.55 < 2.2e-16 ***
## stress_CMC       670.5415  1  819.88 < 2.2e-16 ***
## CRP_T_C          24.2691  1 1045.86 9.732e-07 ***
## P4_age_C         20.2115  1  932.30 7.806e-06 ***
## P4_age_C2         0.7039  1  934.49  0.4017
## stress_CMC:CRP_T_C 6.3996  1  827.38  0.0116 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
summary(lmerM)
```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula:
## hr ~ stress_CMC * CRP_T_C + P4_age_C + P4_age_C2 + (1 + stress_CMC |
##      M2ID) + (1 | M2FAMNUM)
## Data: dfLs
##
## REML criterion at convergence: 28826.4
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -7.1343 -0.4778 -0.0401  0.4001  9.4480
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## M2ID     (Intercept) 78.8713  8.881
##          stress_CMC  0.5113  0.715  0.22
## M2FAMNUM (Intercept) 32.5930  5.709
## Residual                    5.5956  2.365
## Number of obs: 5117, groups: M2ID, 1052; M2FAMNUM, 928
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  74.307688  0.441866 168.168
## stress_CMC    0.869309  0.033551  25.910
## CRP_T_C       3.209457  0.650282   4.935
## P4_age_C     -0.141302  0.031385  -4.502
## P4_age_C2     0.001912  0.002275   0.840
## stress_CMC:CRP_T_C -0.166243  0.065678  -2.531
##

```

```
## Correlation of Fixed Effects:
##      (Intr) st_CMC CRP_T_ P4_g_C P4__C2
## stress_CMC   0.092
## CRP_T_C     -0.008 -0.001
## P4_age_C     0.203  0.005  0.012
## P4_age_C2   -0.648  0.000  0.010 -0.325
## s_CMC:CRP_T  0.000 -0.010  0.126 -0.003 -0.001
```

```
table_obj = broom.mixed::tidy(a, effects = c("ran_pars", "fixed"), data=dfLs)
```

```
## Warning in tidy.anova(a, effects = c("ran_pars", "fixed"), data =
## dfLs): The following column names in ANOVA output were not recognized or
## transformed: Df.res
```

```
pander(table_obj, digits = 3)
```

term	statistic	df	Df.res	p.value
(Intercept)	28222	1	901	0
stress_CMC	671	1	820	1.64e-108
CRP_T_C	24.3	1	1046	9.73e-07
P4_age_C	20.2	1	932	7.81e-06
P4_age_C2	0.704	1	934	0.402
stress_CMC:CRP_T_C	6.4	1	827	0.0116