UG\_data\_analysis1

Ke

2018-01-15

## Warning in strptime(x, format, tz = tz): unknown timezone 'zone/tz/2017c.  
## 1.0/zoneinfo/America/Vancouver'

variables in the models: - Reappraisal Direction - total stake - Fairness score - clinical groups - education - IncomePerCapita - EXIT (4 missing values) - trial number (within block number) - block number - an impulsivity measure: BIS\_NONPLAN (3 missing values)/UPPS negative urgency - an interpersonal function measure: IIP15INTAMBV (4 missing values)

# Whether HLM is needed?

## Intercept only

##   
## =============================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ---------------------------------------------  
## Constant 0.656\*\*\*   
## (0.021)   
##   
## ---------------------------------------------  
## Observations 10,088   
## Log Likelihood -6,477.375   
## Akaike Inf. Crit. 12,956.750   
## =============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## Null model: random intercept only

##   
## ===============================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -----------------------------------------------  
## Constant 0.836\*\*\*   
## (0.102)   
##   
## -----------------------------------------------  
## Observations 10,088   
## Log Likelihood -5,871.774   
## Akaike Inf. Crit. 11,747.550   
## Bayesian Inf. Crit. 11,761.990   
## ===============================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

By adding the ID (nested), the AIC (1|D) is smaller than the AIC (1). So HLM is necessary.

The variance of the intercept in the *null model is 1.157*. That is the variance can’t be explained by the random effect of ID. Compare the variance with more complicated models. If the intercept variance gets smaller, that is an indication of the additional predictors adding more explanation to the DV.

## Intraclass Correlation (ICC)

Test if HLM is needed: whether there is variation over the level 2 variable (participant ID). If the ICC > 0, then HLM is needed.

## ICC is 0.5365138

The ICC > 0, the HLM is needed.

# correlation matrix of the subject level variables

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 4 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 12 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 4 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 12 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 4 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 3 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 12 rows containing missing values

## Warning: Removed 4 rows containing missing values (geom\_point).  
  
## Warning: Removed 4 rows containing missing values (geom\_point).  
  
## Warning: Removed 4 rows containing missing values (geom\_point).

## Warning: Removed 4 rows containing non-finite values (stat\_density).

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 7 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 7 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 15 rows containing missing values

## Warning: Removed 3 rows containing missing values (geom\_point).  
  
## Warning: Removed 3 rows containing missing values (geom\_point).  
  
## Warning: Removed 3 rows containing missing values (geom\_point).

## Warning: Removed 7 rows containing missing values (geom\_point).

## Warning: Removed 3 rows containing non-finite values (stat\_density).

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 4 rows containing missing values

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 12 rows containing missing values

## Warning: Removed 3 rows containing missing values (geom\_point).  
  
## Warning: Removed 3 rows containing missing values (geom\_point).  
  
## Warning: Removed 3 rows containing missing values (geom\_point).

## Warning: Removed 7 rows containing missing values (geom\_point).

## Warning: Removed 4 rows containing missing values (geom\_point).

## Warning: Removed 3 rows containing non-finite values (stat\_density).

## Warning in (function (data, mapping, alignPercent = 0.6, method =  
## "pearson", : Removed 13 rows containing missing values

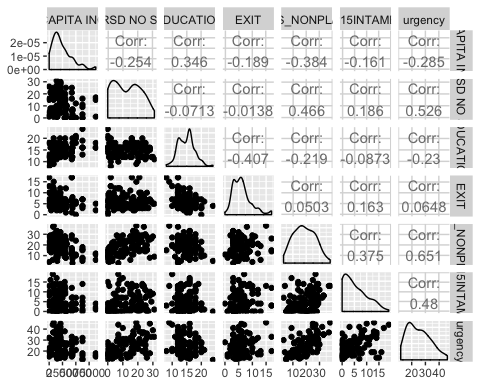
## Warning: Removed 12 rows containing missing values (geom\_point).  
  
## Warning: Removed 12 rows containing missing values (geom\_point).  
  
## Warning: Removed 12 rows containing missing values (geom\_point).

## Warning: Removed 15 rows containing missing values (geom\_point).

## Warning: Removed 12 rows containing missing values (geom\_point).

## Warning: Removed 13 rows containing missing values (geom\_point).

## Warning: Removed 12 rows containing non-finite values (stat\_density).

 The following variables are moderately/highly correlated: DRS x income, **education x income**, **EXIT x education**, **BIS nonplan x income**, BIS nonplan x HSD, **interpersonal x BIS nonplan**, urgency x HSD, urgency x BIS nonplan, **urgency x interpersonal**.

# Level 1 model (Random intercept and fixed slopes with random effect (1|ID))

## No interaction model

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.992\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## Constant 2.326\*\*\*   
## (0.183)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,449.298   
## Akaike Inf. Crit. 10,916.590   
## Bayesian Inf. Crit. 10,983.670   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

# Level 1 model with predictor (random effect (1|ID))

## No interaction effect

The model with 4 groups and 5 groups:

## [1] "model with 4 groups"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.234   
## (0.374)   
##   
## group4depression 0.642   
## (0.414)   
##   
## group4ideator 0.293   
## (0.429)   
##   
## Constant 2.204\*\*\*   
## (0.299)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.670   
## Akaike Inf. Crit. 10,917.340   
## Bayesian Inf. Crit. 11,006.770   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "model with 5 groups"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group5AttempterHL -0.273   
## (0.452)   
##   
## group5AttempterLL -0.196   
## (0.446)   
##   
## group5depression 0.642   
## (0.414)   
##   
## group5ideator 0.293   
## (0.428)   
##   
## Constant 2.205\*\*\*   
## (0.299)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.658   
## Akaike Inf. Crit. 10,919.320   
## Bayesian Inf. Crit. 11,016.200   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Clinically groups are not significantly different from HC in terms of gamble acceptance.

### The model with an individual subject level variable

## [1] "Education"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.129   
## (0.387)   
##   
## group4depression 0.661   
## (0.413)   
##   
## group4ideator 0.323   
## (0.428)   
##   
## scale(EDUCATION) 0.135   
## (0.135)   
##   
## Constant 2.177\*\*\*   
## (0.299)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.171   
## Akaike Inf. Crit. 10,918.340   
## Bayesian Inf. Crit. 11,015.230   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "income"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.185   
## (0.396)   
##   
## group4depression 0.671   
## (0.422)   
##   
## group4ideator 0.330   
## (0.439)   
##   
## scale(IncomePerCapita) 0.051   
## (0.138)   
##   
## Constant 2.170\*\*\*   
## (0.313)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.602   
## Akaike Inf. Crit. 10,919.200   
## Bayesian Inf. Crit. 11,016.090   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "EXIT"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.239\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.888\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.992\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.098   
## (0.374)   
##   
## group4depression 0.593   
## (0.408)   
##   
## group4ideator 0.325   
## (0.421)   
##   
## scale(EXIT) -0.254\*   
## (0.136)   
##   
## Constant 2.222\*\*\*   
## (0.295)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,444.962   
## Akaike Inf. Crit. 10,915.920   
## Bayesian Inf. Crit. 11,012.810   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "MMSE"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.992\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.072   
## (0.388)   
##   
## group4depression 0.671   
## (0.411)   
##   
## group4ideator 0.335   
## (0.426)   
##   
## scale(MMSE) 0.176   
## (0.128)   
##   
## Constant 2.153\*\*\*   
## (0.299)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,445.744   
## Akaike Inf. Crit. 10,917.490   
## Bayesian Inf. Crit. 11,014.370   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "UPPSP NEG URGENCY"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.992\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.069   
## (0.439)   
##   
## group4depression 0.746\*   
## (0.439)   
##   
## group4ideator 0.420   
## (0.463)   
##   
## scale(urgency) -0.124   
## (0.174)   
##   
## Constant 2.068\*\*\*   
## (0.355)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.418   
## Akaike Inf. Crit. 10,918.840   
## Bayesian Inf. Crit. 11,015.720   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "IIP15INTAMBV, interpersonal"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.052\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.120   
## (0.388)   
##   
## group4depression 0.695\*   
## (0.415)   
##   
## group4ideator 0.391   
## (0.437)   
##   
## scale(IIP15INTAMBV) -0.140   
## (0.136)   
##   
## Constant 2.120\*\*\*   
## (0.309)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.142   
## Akaike Inf. Crit. 10,918.280   
## Bayesian Inf. Crit. 11,015.170   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "nonplan"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 2.238\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.051\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.025)   
##   
## Fairness\_score2 -0.177   
## (0.130)   
##   
## Fairness\_score3 -0.887\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.991\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.567\*\*\*   
## (0.115)   
##   
## group4attempter -0.032   
## (0.426)   
##   
## group4depression 0.788\*   
## (0.439)   
##   
## group4ideator 0.469   
## (0.464)   
##   
## scale(BIS\_NONPLAN) -0.191   
## (0.195)   
##   
## Constant 2.007\*\*\*   
## (0.360)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,446.193   
## Akaike Inf. Crit. 10,918.390   
## Bayesian Inf. Crit. 11,015.270   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

is the only subject level variable has significant influence on the gamble acceptance.

## Interaction effect models

Fit specific interaction models. From higher order to lower.

1. x x x four way interaction effect, and see if the model is significant. If not, drop this interaction.

It failed to converge at 4 way interaction

1. x x three way interaction

It failed to converge.

1. x x three way interaction

##   
## ==========================================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------------------------  
## ReappraisalDirectionempathy 2.059\*\*\*   
## (0.150)   
##   
## ReappraisalDirectionpunish -1.201\*\*\*   
## (0.129)   
##   
## scale(totalStake) -0.163\*   
## (0.089)   
##   
## Fairness\_score2 -0.252\*   
## (0.131)   
##   
## Fairness\_score3 -0.895\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -2.062\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.626\*\*\*   
## (0.115)   
##   
## group4attempter 0.143   
## (0.394)   
##   
## group4depression 0.059   
## (0.433)   
##   
## group4ideator 0.324   
## (0.455)   
##   
## ReappraisalDirectionempathy:scale(totalStake) -0.081   
## (0.135)   
##   
## ReappraisalDirectionpunish:scale(totalStake) 0.251\*\*   
## (0.123)   
##   
## ReappraisalDirectionempathy:group4attempter -0.915\*\*\*   
## (0.195)   
##   
## ReappraisalDirectionpunish:group4attempter -0.399\*\*   
## (0.171)   
##   
## ReappraisalDirectionempathy:group4depression 1.431\*\*\*   
## (0.206)   
##   
## ReappraisalDirectionpunish:group4depression 0.771\*\*\*   
## (0.162)   
##   
## ReappraisalDirectionempathy:group4ideator 0.092   
## (0.249)   
##   
## ReappraisalDirectionpunish:group4ideator -0.101   
## (0.205)   
##   
## scale(totalStake):group4attempter 0.075   
## (0.116)   
##   
## scale(totalStake):group4depression -0.081   
## (0.116)   
##   
## scale(totalStake):group4ideator -0.030   
## (0.140)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4attempter 0.370\*\*   
## (0.180)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4attempter 0.086   
## (0.164)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4depression 0.243   
## (0.191)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4depression 0.299\*   
## (0.155)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4ideator 0.257   
## (0.228)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4ideator 0.227   
## (0.196)   
##   
## Constant 2.366\*\*\*   
## (0.312)   
##   
## ------------------------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,322.116   
## Akaike Inf. Crit. 10,702.230   
## Bayesian Inf. Crit. 10,918.350   
## ==========================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

x x has weak significant influence on gamble acceptance.

1. x two way interaction

##   
## ============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------  
## ReappraisalDirectionempathy 2.269\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.058\*\*\*   
## (0.059)   
##   
## scale(totalStake) 0.034   
## (0.026)   
##   
## Fairness\_score2 -0.337   
## (0.284)   
##   
## Fairness\_score3 -1.194\*\*\*   
## (0.249)   
##   
## Fairness\_score4 -2.428\*\*\*   
## (0.248)   
##   
## Fairness\_score5 -3.291\*\*\*   
## (0.250)   
##   
## group4attempter 0.190   
## (0.504)   
##   
## group4depression -0.494   
## (0.498)   
##   
## group4ideator -0.099   
## (0.562)   
##   
## Fairness\_score2:group4attempter -0.865\*\*   
## (0.408)   
##   
## Fairness\_score3:group4attempter -0.628\*   
## (0.364)   
##   
## Fairness\_score4:group4attempter -0.277   
## (0.362)   
##   
## Fairness\_score5:group4attempter -0.351   
## (0.364)   
##   
## Fairness\_score2:group4depression 0.636\*   
## (0.345)   
##   
## Fairness\_score3:group4depression 0.829\*\*\*   
## (0.299)   
##   
## Fairness\_score4:group4depression 1.022\*\*\*   
## (0.297)   
##   
## Fairness\_score5:group4depression 1.773\*\*\*   
## (0.299)   
##   
## Fairness\_score2:group4ideator 0.605   
## (0.468)   
##   
## Fairness\_score3:group4ideator 0.617   
## (0.399)   
##   
## Fairness\_score4:group4ideator 0.256   
## (0.395)   
##   
## Fairness\_score5:group4ideator 0.406   
## (0.396)   
##   
## Constant 2.654\*\*\*   
## (0.363)   
##   
## ------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,391.625   
## Akaike Inf. Crit. 10,831.250   
## Bayesian Inf. Crit. 11,010.110   
## ============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Fairness score and group has significant interaction.

1. x two way interaction

##   
## ========================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------  
## scale(totalStake) 0.035   
## (0.026)   
##   
## Fairness\_score2 -0.176   
## (0.131)   
##   
## Fairness\_score3 -0.890\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -2.007\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.597\*\*\*   
## (0.115)   
##   
## ReappraisalDirectionempathy 2.094\*\*\*   
## (0.149)   
##   
## ReappraisalDirectionpunish -1.180\*\*\*   
## (0.128)   
##   
## group4attempter 0.148   
## (0.392)   
##   
## group4depression 0.054   
## (0.430)   
##   
## group4ideator 0.317   
## (0.451)   
##   
## ReappraisalDirectionempathy:group4attempter -0.972\*\*\*   
## (0.192)   
##   
## ReappraisalDirectionpunish:group4attempter -0.394\*\*   
## (0.169)   
##   
## ReappraisalDirectionempathy:group4depression 1.418\*\*\*   
## (0.205)   
##   
## ReappraisalDirectionpunish:group4depression 0.775\*\*\*   
## (0.161)   
##   
## ReappraisalDirectionempathy:group4ideator 0.082   
## (0.247)   
##   
## ReappraisalDirectionpunish:group4ideator -0.086   
## (0.204)   
##   
## Constant 2.313\*\*\*   
## (0.310)   
##   
## ------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,357.968   
## Akaike Inf. Crit. 10,751.940   
## Bayesian Inf. Crit. 10,886.080   
## ========================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

reappraisal direction x group4 has significant interaction.

1. x two way interaction

##   
## ============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------  
## scale(totalStake) 0.034   
## (0.026)   
##   
## ReappraisalDirectionempathy 2.269\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.058\*\*\*   
## (0.059)   
##   
## Fairness\_score2 -0.337   
## (0.285)   
##   
## Fairness\_score3 -1.194\*\*\*   
## (0.249)   
##   
## Fairness\_score4 -2.428\*\*\*   
## (0.248)   
##   
## Fairness\_score5 -3.291\*\*\*   
## (0.250)   
##   
## group4attempter 0.190   
## (0.504)   
##   
## group4depression -0.494   
## (0.498)   
##   
## group4ideator -0.099   
## (0.563)   
##   
## Fairness\_score2:group4attempter -0.865\*\*   
## (0.408)   
##   
## Fairness\_score3:group4attempter -0.628\*   
## (0.364)   
##   
## Fairness\_score4:group4attempter -0.277   
## (0.362)   
##   
## Fairness\_score5:group4attempter -0.351   
## (0.364)   
##   
## Fairness\_score2:group4depression 0.635\*   
## (0.345)   
##   
## Fairness\_score3:group4depression 0.829\*\*\*   
## (0.299)   
##   
## Fairness\_score4:group4depression 1.022\*\*\*   
## (0.298)   
##   
## Fairness\_score5:group4depression 1.773\*\*\*   
## (0.299)   
##   
## Fairness\_score2:group4ideator 0.605   
## (0.469)   
##   
## Fairness\_score3:group4ideator 0.617   
## (0.400)   
##   
## Fairness\_score4:group4ideator 0.256   
## (0.395)   
##   
## Fairness\_score5:group4ideator 0.406   
## (0.397)   
##   
## Constant 2.654\*\*\*   
## (0.363)   
##   
## ------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,391.625   
## Akaike Inf. Crit. 10,831.250   
## Bayesian Inf. Crit. 11,010.110   
## ============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

fairness score x group4 has significant interaction.

1. x two way interaction

##   
## ==============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## --------------------------------------------------------------  
## scale(totalStake) -0.087\*   
## (0.053)   
##   
## ReappraisalDirectionempathy 2.241\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.052\*\*\*   
## (0.059)   
##   
## Fairness\_score2 -0.176   
## (0.131)   
##   
## Fairness\_score3 -0.888\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -1.994\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.571\*\*\*   
## (0.115)   
##   
## group4attempter -0.236   
## (0.375)   
##   
## group4depression 0.640   
## (0.415)   
##   
## group4ideator 0.292   
## (0.430)   
##   
## scale(totalStake):group4attempter 0.229\*\*\*   
## (0.070)   
##   
## scale(totalStake):group4depression 0.117\*   
## (0.067)   
##   
## scale(totalStake):group4ideator 0.117   
## (0.085)   
##   
## Constant 2.209\*\*\*   
## (0.300)   
##   
## --------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,441.396   
## Akaike Inf. Crit. 10,912.790   
## Bayesian Inf. Crit. 11,024.580   
## ==============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

total stake x group4 has significant interaction.

1. x two way interaction

##   
## =============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------------  
## scale(totalStake) -0.443\*\*\*   
## (0.147)   
##   
## ReappraisalDirectionempathy 2.276\*\*\*   
## (0.074)   
##   
## ReappraisalDirectionpunish -1.053\*\*\*   
## (0.060)   
##   
## Fairness\_score2 -0.374\*\*   
## (0.149)   
##   
## Fairness\_score3 -1.107\*\*\*   
## (0.134)   
##   
## Fairness\_score4 -2.197\*\*\*   
## (0.134)   
##   
## Fairness\_score5 -2.783\*\*\*   
## (0.136)   
##   
## group4attempter -0.235   
## (0.376)   
##   
## group4depression 0.645   
## (0.416)   
##   
## group4ideator 0.295   
## (0.431)   
##   
## scale(totalStake):Fairness\_score2 0.069   
## (0.171)   
##   
## scale(totalStake):Fairness\_score3 0.435\*\*\*   
## (0.157)   
##   
## scale(totalStake):Fairness\_score4 0.656\*\*\*   
## (0.153)   
##   
## scale(totalStake):Fairness\_score5 0.464\*\*\*   
## (0.154)   
##   
## Constant 2.412\*\*\*   
## (0.309)   
##   
## -------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,420.051   
## Akaike Inf. Crit. 10,872.100   
## Bayesian Inf. Crit. 10,991.340   
## =============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

total stake x fairness score has significant interaction.

**Select the best model among the interaction models:**

## Model selection table   
## (Int) Frn\_scr gr4 RpD scl(ttS) gr4:RpD gr4:scl(ttS)  
## m2\_3interaction2 2.366 + + + -0.16300 + +  
## m2\_2interaction2 2.313 + + + 0.03550 +   
## m2\_2interaction1 2.654 + + + 0.03441   
## m2\_2interaction3 2.654 + + + 0.03441   
## m2\_2interaction5 2.412 + + + -0.44310   
## m2\_2interaction4 2.209 + + + -0.08691 +  
## RpD:scl(ttS) gr4:RpD:scl(ttS) Frn\_scr:gr4  
## m2\_3interaction2 + +   
## m2\_2interaction2   
## m2\_2interaction1 +  
## m2\_2interaction3 +  
## m2\_2interaction5   
## m2\_2interaction4   
## Frn\_scr:scl(ttS) df logLik AICc delta weight  
## m2\_3interaction2 29 -5322.116 10702.4 0.00 1  
## m2\_2interaction2 18 -5357.968 10752.0 49.62 0  
## m2\_2interaction1 24 -5391.625 10831.3 128.97 0  
## m2\_2interaction3 24 -5391.625 10831.3 128.97 0  
## m2\_2interaction5 + 16 -5420.051 10872.1 169.77 0  
## m2\_2interaction4 15 -5441.396 10912.8 210.46 0  
## Models ranked by AICc(x)   
## Random terms (all models):   
## '1 | ID'

## Data: allData  
## Models:  
## m2\_2interaction2: allData$AcceptOffer ~ scale(totalStake) + Fairness\_score + ReappraisalDirection \*   
## m2\_2interaction2: group4 + (1 | ID)  
## m2\_3interaction2: allData$AcceptOffer ~ ReappraisalDirection + scale(totalStake) +   
## m2\_3interaction2: Fairness\_score + group4 + ReappraisalDirection \* scale(totalStake) \*   
## m2\_3interaction2: group4 + (1 | ID)  
## Df AIC BIC logLik deviance Chisq Chi Df Pr(>Chisq)  
## m2\_2interaction2 18 10752 10886 -5358.0 10716   
## m2\_3interaction2 29 10702 10918 -5322.1 10644 71.704 11 5.788e-11  
##   
## m2\_2interaction2   
## m2\_3interaction2 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

The 3 way interaction is no significantly better than the 2 way interaction. Hence, The best interaction model is x :

##   
## ==========================================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------------------------  
## ReappraisalDirectionempathy 2.059\*\*\*   
## (0.150)   
##   
## ReappraisalDirectionpunish -1.201\*\*\*   
## (0.129)   
##   
## scale(totalStake) -0.163\*   
## (0.089)   
##   
## Fairness\_score2 -0.252\*   
## (0.131)   
##   
## Fairness\_score3 -0.895\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -2.062\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.626\*\*\*   
## (0.115)   
##   
## group4attempter 0.143   
## (0.394)   
##   
## group4depression 0.059   
## (0.433)   
##   
## group4ideator 0.324   
## (0.455)   
##   
## ReappraisalDirectionempathy:scale(totalStake) -0.081   
## (0.135)   
##   
## ReappraisalDirectionpunish:scale(totalStake) 0.251\*\*   
## (0.123)   
##   
## ReappraisalDirectionempathy:group4attempter -0.915\*\*\*   
## (0.195)   
##   
## ReappraisalDirectionpunish:group4attempter -0.399\*\*   
## (0.171)   
##   
## ReappraisalDirectionempathy:group4depression 1.431\*\*\*   
## (0.206)   
##   
## ReappraisalDirectionpunish:group4depression 0.771\*\*\*   
## (0.162)   
##   
## ReappraisalDirectionempathy:group4ideator 0.092   
## (0.249)   
##   
## ReappraisalDirectionpunish:group4ideator -0.101   
## (0.205)   
##   
## scale(totalStake):group4attempter 0.075   
## (0.116)   
##   
## scale(totalStake):group4depression -0.081   
## (0.116)   
##   
## scale(totalStake):group4ideator -0.030   
## (0.140)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4attempter 0.370\*\*   
## (0.180)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4attempter 0.086   
## (0.164)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4depression 0.243   
## (0.191)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4depression 0.299\*   
## (0.155)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4ideator 0.257   
## (0.228)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4ideator 0.227   
## (0.196)   
##   
## Constant 2.366\*\*\*   
## (0.312)   
##   
## ------------------------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,322.116   
## Akaike Inf. Crit. 10,702.230   
## Bayesian Inf. Crit. 10,918.350   
## ==========================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**the (best) interaction model with the subject level variable**

$$Accept\,Offer = Reappraisal\,Direction + scale(total\,Stake) + Fairness\,score + group4 + \\Reappraisal\,Direction \* scale(total\,Stake) \* group4 + VAR+ (1|ID)$$

## [1] "EXIT is the only significant var."

##   
## ==========================================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------------------------  
## ReappraisalDirectionempathy 2.059\*\*\*   
## (0.150)   
##   
## ReappraisalDirectionpunish -1.199\*\*\*   
## (0.129)   
##   
## scale(totalStake) -0.163\*   
## (0.089)   
##   
## Fairness\_score2 -0.252\*   
## (0.131)   
##   
## Fairness\_score3 -0.895\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -2.062\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.626\*\*\*   
## (0.115)   
##   
## group4attempter 0.287   
## (0.395)   
##   
## group4depression 0.008   
## (0.426)   
##   
## group4ideator 0.357   
## (0.448)   
##   
## scale(EXIT) -0.265\*   
## (0.138)   
##   
## ReappraisalDirectionempathy:scale(totalStake) -0.081   
## (0.135)   
##   
## ReappraisalDirectionpunish:scale(totalStake) 0.251\*\*   
## (0.123)   
##   
## ReappraisalDirectionempathy:group4attempter -0.915\*\*\*   
## (0.195)   
##   
## ReappraisalDirectionpunish:group4attempter -0.403\*\*   
## (0.171)   
##   
## ReappraisalDirectionempathy:group4depression 1.433\*\*\*   
## (0.206)   
##   
## ReappraisalDirectionpunish:group4depression 0.770\*\*\*   
## (0.162)   
##   
## ReappraisalDirectionempathy:group4ideator 0.094   
## (0.249)   
##   
## ReappraisalDirectionpunish:group4ideator -0.101   
## (0.205)   
##   
## scale(totalStake):group4attempter 0.075   
## (0.116)   
##   
## scale(totalStake):group4depression -0.081   
## (0.116)   
##   
## scale(totalStake):group4ideator -0.030   
## (0.140)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4attempter 0.370\*\*   
## (0.180)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4attempter 0.086   
## (0.164)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4depression 0.243   
## (0.191)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4depression 0.299\*   
## (0.155)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4ideator 0.257   
## (0.228)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4ideator 0.227   
## (0.196)   
##   
## Constant 2.383\*\*\*   
## (0.308)   
##   
## ------------------------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,320.315   
## Akaike Inf. Crit. 10,700.630   
## Bayesian Inf. Crit. 10,924.200   
## ==========================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Only , among all the subject level variable has significant influence in the gamble acceptance.

**2 way interaction model x with subject level vars:**

## [1] "EXIT is the only significant var."

##   
## ========================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------  
## scale(totalStake) 0.035   
## (0.026)   
##   
## Fairness\_score2 -0.177   
## (0.131)   
##   
## Fairness\_score3 -0.890\*\*\*   
## (0.114)   
##   
## Fairness\_score4 -2.007\*\*\*   
## (0.114)   
##   
## Fairness\_score5 -2.597\*\*\*   
## (0.115)   
##   
## ReappraisalDirectionempathy 2.094\*\*\*   
## (0.149)   
##   
## ReappraisalDirectionpunish -1.178\*\*\*   
## (0.128)   
##   
## group4attempter 0.290   
## (0.392)   
##   
## group4depression 0.003   
## (0.423)   
##   
## group4ideator 0.349   
## (0.444)   
##   
## scale(EXIT) -0.263\*   
## (0.137)   
##   
## ReappraisalDirectionempathy:group4attempter -0.972\*\*\*   
## (0.192)   
##   
## ReappraisalDirectionpunish:group4attempter -0.398\*\*   
## (0.169)   
##   
## ReappraisalDirectionempathy:group4depression 1.420\*\*\*   
## (0.205)   
##   
## ReappraisalDirectionpunish:group4depression 0.774\*\*\*   
## (0.161)   
##   
## ReappraisalDirectionempathy:group4ideator 0.084   
## (0.247)   
##   
## ReappraisalDirectionpunish:group4ideator -0.086   
## (0.203)   
##   
## Constant 2.330\*\*\*   
## (0.306)   
##   
## ------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,356.166   
## Akaike Inf. Crit. 10,750.330   
## Bayesian Inf. Crit. 10,891.930   
## ========================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

The following variable has significant influence in this interaction model: .

The following codes is for the random effect (block|ID), they are using the same procedure with above model with random effect (1|ID).

# Level 1 model (Random intercept and random slopes with random effect (block|ID))

## No interaction model

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 3.322\*\*\*   
## (0.172)   
##   
## ReappraisalDirectionpunish -0.157   
## (0.161)   
##   
## scale(totalStake) 0.037   
## (0.026)   
##   
## Fairness\_score2 -0.192   
## (0.133)   
##   
## Fairness\_score3 -0.937\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.110\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.746\*\*\*   
## (0.119)   
##   
## Constant 2.091\*\*\*   
## (0.256)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,237.789   
## Akaike Inf. Crit. 10,503.580   
## Bayesian Inf. Crit. 10,607.910   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

# Level 1 model with predictor (random effect (block|ID))

## No interaction effect

With 4 clinical groups and 5 groups.

## [1] "model with 4 groups"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 3.325\*\*\*   
## (0.173)   
##   
## ReappraisalDirectionpunish -0.154   
## (0.161)   
##   
## scale(totalStake) 0.037   
## (0.026)   
##   
## Fairness\_score2 -0.192   
## (0.133)   
##   
## Fairness\_score3 -0.937\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.111\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.746\*\*\*   
## (0.119)   
##   
## group4attempter -0.130   
## (0.427)   
##   
## group4depression 0.856\*   
## (0.466)   
##   
## group4ideator 0.307   
## (0.478)   
##   
## Constant 1.875\*\*\*   
## (0.355)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,235.080   
## Akaike Inf. Crit. 10,504.160   
## Bayesian Inf. Crit. 10,630.850   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "model with 5 groups"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 3.324\*\*\*   
## (0.172)   
##   
## ReappraisalDirectionpunish -0.154   
## (0.161)   
##   
## scale(totalStake) 0.037   
## (0.026)   
##   
## Fairness\_score2 -0.192   
## (0.133)   
##   
## Fairness\_score3 -0.937\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.111\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.746\*\*\*   
## (0.119)   
##   
## group5AttempterHL -0.193   
## (0.509)   
##   
## group5AttempterLL -0.066   
## (0.510)   
##   
## group5depression 0.857\*   
## (0.466)   
##   
## group5ideator 0.308   
## (0.477)   
##   
## Constant 1.876\*\*\*   
## (0.354)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,235.055   
## Akaike Inf. Crit. 10,506.110   
## Bayesian Inf. Crit. 10,640.250   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Clinically groups is not significantly influence the gamble acceptance compared to HC in model with no interaction effect. And and have the same influence.

### the model with the an individual subject level variable

## [1] "EXIT model"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 3.313\*\*\*   
## (0.171)   
##   
## ReappraisalDirectionpunish -0.161   
## (0.160)   
##   
## scale(totalStake) 0.037   
## (0.026)   
##   
## Fairness\_score2 -0.190   
## (0.133)   
##   
## Fairness\_score3 -0.935\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.106\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.740\*\*\*   
## (0.118)   
##   
## group4attempter 0.080   
## (0.425)   
##   
## group4depression 0.811\*   
## (0.453)   
##   
## group4ideator 0.352   
## (0.465)   
##   
## scale(EXIT) -0.346\*\*   
## (0.154)   
##   
## Constant 1.968\*\*\*   
## (0.343)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,232.865   
## Akaike Inf. Crit. 10,501.730   
## Bayesian Inf. Crit. 10,635.880   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## [1] "NONPLAN model"

##   
## =======================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------  
## ReappraisalDirectionempathy 3.324\*\*\*   
## (0.172)   
##   
## ReappraisalDirectionpunish -0.155   
## (0.161)   
##   
## scale(totalStake) 0.037   
## (0.026)   
##   
## Fairness\_score2 -0.192   
## (0.133)   
##   
## Fairness\_score3 -0.937\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.110\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.746\*\*\*   
## (0.119)   
##   
## group4attempter 0.127   
## (0.484)   
##   
## group4depression 1.040\*\*   
## (0.493)   
##   
## group4ideator 0.527   
## (0.515)   
##   
## scale(BIS\_NONPLAN) -0.239   
## (0.217)   
##   
## Constant 1.633\*\*\*   
## (0.416)   
##   
## -------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,234.481   
## Akaike Inf. Crit. 10,504.960   
## Bayesian Inf. Crit. 10,639.110   
## =======================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

is the only significant subject level variable.

In the model with variable, the depression group is different to accept gamble compared to the HC.

## models with interaction effect

Fit specific interaction models. From higher order to lower.

1. x x x four way interaction effect, and see if the model is significant. If not, drop this interaction.

It failed to converge at 4 way interaction

1. x x three way interaction

It failed to converge.

1. x x three way interaction

##   
## ==========================================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------------------------  
## ReappraisalDirectionempathy 1.822\*\*\*   
## (0.329)   
##   
## ReappraisalDirectionpunish -1.567\*\*\*   
## (0.319)   
##   
## scale(totalStake) -0.184\*\*   
## (0.094)   
##   
## Fairness\_score2 -0.288\*\*   
## (0.134)   
##   
## Fairness\_score3 -0.948\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.188\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.810\*\*\*   
## (0.119)   
##   
## group4attempter -0.051   
## (0.498)   
##   
## group4depression -0.480   
## (0.513)   
##   
## group4ideator 0.238   
## (0.584)   
##   
## ReappraisalDirectionempathy:scale(totalStake) -0.070   
## (0.140)   
##   
## ReappraisalDirectionpunish:scale(totalStake) 0.275\*\*   
## (0.128)   
##   
## ReappraisalDirectionempathy:group4attempter -0.658   
## (0.479)   
##   
## ReappraisalDirectionpunish:group4attempter -0.098   
## (0.469)   
##   
## ReappraisalDirectionempathy:group4depression 2.923\*\*\*   
## (0.393)   
##   
## ReappraisalDirectionpunish:group4depression 2.065\*\*\*   
## (0.364)   
##   
## ReappraisalDirectionempathy:group4ideator 0.242   
## (0.585)   
##   
## ReappraisalDirectionpunish:group4ideator 0.012   
## (0.564)   
##   
## scale(totalStake):group4attempter 0.061   
## (0.124)   
##   
## scale(totalStake):group4depression -0.136   
## (0.124)   
##   
## scale(totalStake):group4ideator -0.016   
## (0.145)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4attempter 0.398\*\*   
## (0.187)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4attempter 0.114   
## (0.171)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4depression 0.301   
## (0.202)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4depression 0.376\*\*   
## (0.164)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4ideator 0.251   
## (0.235)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4ideator 0.237   
## (0.202)   
##   
## Constant 2.789\*\*\*   
## (0.382)   
##   
## ------------------------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,123.865   
## Akaike Inf. Crit. 10,315.730   
## Bayesian Inf. Crit. 10,569.110   
## ==========================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Reappraisal Direction x totalStake x group4 is marginally significant.

1. x two way interaction

##   
## ============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------  
## ReappraisalDirectionempathy 3.342\*\*\*   
## (0.144)   
##   
## ReappraisalDirectionpunish -0.204   
## (0.133)   
##   
## scale(totalStake) 0.037   
## (0.027)   
##   
## Fairness\_score2 -0.343   
## (0.288)   
##   
## Fairness\_score3 -1.222\*\*\*   
## (0.253)   
##   
## Fairness\_score4 -2.542\*\*\*   
## (0.253)   
##   
## Fairness\_score5 -3.502\*\*\*   
## (0.256)   
##   
## group4attempter 0.415   
## (0.546)   
##   
## group4depression -0.344   
## (0.545)   
##   
## group4ideator -0.067   
## (0.610)   
##   
## Fairness\_score2:group4attempter -0.964\*\*   
## (0.419)   
##   
## Fairness\_score3:group4attempter -0.758\*\*   
## (0.375)   
##   
## Fairness\_score4:group4attempter -0.416   
## (0.375)   
##   
## Fairness\_score5:group4attempter -0.514   
## (0.377)   
##   
## Fairness\_score2:group4depression 0.646\*   
## (0.350)   
##   
## Fairness\_score3:group4depression 0.828\*\*\*   
## (0.303)   
##   
## Fairness\_score4:group4depression 1.061\*\*\*   
## (0.304)   
##   
## Fairness\_score5:group4depression 1.905\*\*\*   
## (0.306)   
##   
## Fairness\_score2:group4ideator 0.592   
## (0.481)   
##   
## Fairness\_score3:group4ideator 0.591   
## (0.410)   
##   
## Fairness\_score4:group4ideator 0.213   
## (0.406)   
##   
## Fairness\_score5:group4ideator 0.412   
## (0.408)   
##   
## Constant 2.339\*\*\*   
## (0.398)   
##   
## ------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,173.398   
## Akaike Inf. Crit. 10,404.800   
## Bayesian Inf. Crit. 10,620.920   
## ============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Fairness score x group has significant interaction effect.

1. x two way interaction

##   
## ========================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------  
## scale(totalStake) 0.035   
## (0.027)   
##   
## Fairness\_score2 -0.197   
## (0.133)   
##   
## Fairness\_score3 -0.932\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.116\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.764\*\*\*   
## (0.119)   
##   
## ReappraisalDirectionempathy 1.870\*\*\*   
## (0.326)   
##   
## ReappraisalDirectionpunish -1.534\*\*\*   
## (0.317)   
##   
## group4attempter -0.037   
## (0.488)   
##   
## group4depression -0.465   
## (0.572)   
##   
## group4ideator 0.223   
## (0.569)   
##   
## ReappraisalDirectionempathy:group4attempter -0.733   
## (0.473)   
##   
## ReappraisalDirectionpunish:group4attempter -0.107   
## (0.463)   
##   
## ReappraisalDirectionempathy:group4depression 2.917\*\*\*   
## (0.399)   
##   
## ReappraisalDirectionpunish:group4depression 2.081\*\*\*   
## (0.370)   
##   
## ReappraisalDirectionempathy:group4ideator 0.231   
## (0.576)   
##   
## ReappraisalDirectionpunish:group4ideator 0.029   
## (0.555)   
##   
## Constant 2.709\*\*\*   
## (0.377)   
##   
## ------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,164.883   
## Akaike Inf. Crit. 10,375.770   
## Bayesian Inf. Crit. 10,547.170   
## ========================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

reappraisal direction x group4 has significant influence.

1. x two way interaction

##   
## ============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------  
## scale(totalStake) 0.037   
## (0.027)   
##   
## ReappraisalDirectionempathy 3.342\*\*\*   
## (0.171)   
##   
## ReappraisalDirectionpunish -0.204   
## (0.157)   
##   
## Fairness\_score2 -0.366   
## (0.289)   
##   
## Fairness\_score3 -1.239\*\*\*   
## (0.253)   
##   
## Fairness\_score4 -2.562\*\*\*   
## (0.254)   
##   
## Fairness\_score5 -3.523\*\*\*   
## (0.257)   
##   
## group4attempter 0.401   
## (0.554)   
##   
## group4depression -0.356   
## (0.547)   
##   
## group4ideator -0.072   
## (0.610)   
##   
## Fairness\_score2:group4attempter -0.933\*\*   
## (0.419)   
##   
## Fairness\_score3:group4attempter -0.735\*\*   
## (0.375)   
##   
## Fairness\_score4:group4attempter -0.390   
## (0.374)   
##   
## Fairness\_score5:group4attempter -0.487   
## (0.376)   
##   
## Fairness\_score2:group4depression 0.673\*   
## (0.350)   
##   
## Fairness\_score3:group4depression 0.848\*\*\*   
## (0.304)   
##   
## Fairness\_score4:group4depression 1.084\*\*\*   
## (0.304)   
##   
## Fairness\_score5:group4depression 1.930\*\*\*   
## (0.306)   
##   
## Fairness\_score2:group4ideator 0.611   
## (0.480)   
##   
## Fairness\_score3:group4ideator 0.604   
## (0.410)   
##   
## Fairness\_score4:group4ideator 0.229   
## (0.407)   
##   
## Fairness\_score5:group4ideator 0.428   
## (0.409)   
##   
## Constant 2.350\*\*\*   
## (0.414)   
##   
## ------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,173.392   
## Akaike Inf. Crit. 10,404.780   
## Bayesian Inf. Crit. 10,620.910   
## ============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

fairness score x group4 has significant influence.

1. x two way interaction

##   
## ==============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## --------------------------------------------------------------  
## scale(totalStake) -0.098\*   
## (0.055)   
##   
## ReappraisalDirectionempathy 3.329\*\*\*   
## (0.173)   
##   
## ReappraisalDirectionpunish -0.153   
## (0.161)   
##   
## Fairness\_score2 -0.193   
## (0.133)   
##   
## Fairness\_score3 -0.939\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.114\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.751\*\*\*   
## (0.119)   
##   
## group4attempter -0.136   
## (0.427)   
##   
## group4depression 0.852\*   
## (0.466)   
##   
## group4ideator 0.304   
## (0.478)   
##   
## scale(totalStake):group4attempter 0.232\*\*\*   
## (0.074)   
##   
## scale(totalStake):group4depression 0.146\*\*   
## (0.069)   
##   
## scale(totalStake):group4ideator 0.134   
## (0.087)   
##   
## Constant 1.880\*\*\*   
## (0.356)   
##   
## --------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,230.112   
## Akaike Inf. Crit. 10,500.220   
## Bayesian Inf. Crit. 10,649.270   
## ==============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

total stake x group4 has significant influence.

1. x two way interaction

##   
## =============================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## -------------------------------------------------------------  
## scale(totalStake) -0.468\*\*\*   
## (0.152)   
##   
## ReappraisalDirectionempathy 3.410\*\*\*   
## (0.175)   
##   
## ReappraisalDirectionpunish -0.115   
## (0.164)   
##   
## Fairness\_score2 -0.403\*\*\*   
## (0.153)   
##   
## Fairness\_score3 -1.171\*\*\*   
## (0.138)   
##   
## Fairness\_score4 -2.333\*\*\*   
## (0.138)   
##   
## Fairness\_score5 -2.979\*\*\*   
## (0.141)   
##   
## group4attempter -0.135   
## (0.430)   
##   
## group4depression 0.865\*   
## (0.471)   
##   
## group4ideator 0.310   
## (0.482)   
##   
## scale(totalStake):Fairness\_score2 0.075   
## (0.177)   
##   
## scale(totalStake):Fairness\_score3 0.463\*\*\*   
## (0.162)   
##   
## scale(totalStake):Fairness\_score4 0.703\*\*\*   
## (0.158)   
##   
## scale(totalStake):Fairness\_score5 0.484\*\*\*   
## (0.160)   
##   
## Constant 2.066\*\*\*   
## (0.368)   
##   
## -------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,206.548   
## Akaike Inf. Crit. 10,455.100   
## Bayesian Inf. Crit. 10,611.600   
## =============================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

total stake x fairness score has significant influence.

**which interaction model is the best model among all the interaction models:**

## Model selection table   
## (Int) Frn\_scr gr4 RpD scl(ttS) gr4:RpD gr4:scl(ttS)  
## m9\_3interaction 2.789 + + + -0.18410 + +  
## m9\_2interaction2 2.709 + + + 0.03506 +   
## m9\_2interaction3 2.350 + + + 0.03730   
## m9\_2interaction1 2.339 + + + 0.03696   
## m9\_2interaction5 2.066 + + + -0.46790   
## m9\_2interaction4 1.880 + + + -0.09776 +  
## RpD:scl(ttS) gr4:RpD:scl(ttS) Frn\_scr:gr4  
## m9\_3interaction + +   
## m9\_2interaction2   
## m9\_2interaction3 +  
## m9\_2interaction1 +  
## m9\_2interaction5   
## m9\_2interaction4   
## Frn\_scr:scl(ttS) control df logLik AICc  
## m9\_3interaction g(c.F,l(20000)) 34 -5123.865 10315.9  
## m9\_2interaction2 g(b) 23 -5164.883 10375.9  
## m9\_2interaction3 g(b) 29 -5173.392 10404.9  
## m9\_2interaction1 g(c.F,l(20000)) 29 -5173.398 10404.9  
## m9\_2interaction5 + g(b) 21 -5206.548 10455.2  
## m9\_2interaction4 g(b) 20 -5230.112 10500.3  
## delta weight  
## m9\_3interaction 0.00 1  
## m9\_2interaction2 59.94 0  
## m9\_2interaction3 89.00 0  
## m9\_2interaction1 89.01 0  
## m9\_2interaction5 139.25 0  
## m9\_2interaction4 184.37 0  
## Abbreviations:  
## control: g(b) = 'glmerControl(bobyqa)',   
## g(c.F,l(20000)) = 'glmerControl(calc.FALSE,list(20000))'  
## Models ranked by AICc(x)   
## Random terms (all models):   
## 'block | ID'

The best interaction model is x x 3 way interaction.

**the (best) interaction model with the subject level variable**

$$Accept\,Offer = Reappraisal\,Direction + scale(total\,Stake) + Fairness\,score + group4 + \\Reappraisal\,Direction \* scale(total\,Stake) \* group4 + VAR + (block|ID)$$

##   
## ==========================================================================================  
## Dependent variable:   
## ---------------------------  
## AcceptOffer   
## ------------------------------------------------------------------------------------------  
## ReappraisalDirectionempathy 1.847\*\*\*   
## (0.327)   
##   
## ReappraisalDirectionpunish -1.543\*\*\*   
## (0.317)   
##   
## scale(totalStake) -0.181\*   
## (0.093)   
##   
## Fairness\_score2 -0.290\*\*   
## (0.134)   
##   
## Fairness\_score3 -0.948\*\*\*   
## (0.117)   
##   
## Fairness\_score4 -2.187\*\*\*   
## (0.117)   
##   
## Fairness\_score5 -2.810\*\*\*   
## (0.119)   
##   
## group4attempter 0.156   
## (0.482)   
##   
## group4depression -0.388   
## (0.495)   
##   
## group4ideator 0.273   
## (0.556)   
##   
## scale(EXIT) -0.348\*\*   
## (0.152)   
##   
## ReappraisalDirectionempathy:scale(totalStake) -0.076   
## (0.140)   
##   
## ReappraisalDirectionpunish:scale(totalStake) 0.273\*\*   
## (0.128)   
##   
## ReappraisalDirectionempathy:group4attempter -0.693   
## (0.477)   
##   
## ReappraisalDirectionpunish:group4attempter -0.133   
## (0.467)   
##   
## ReappraisalDirectionempathy:group4depression 2.908\*\*\*   
## (0.391)   
##   
## ReappraisalDirectionpunish:group4depression 2.046\*\*\*   
## (0.362)   
##   
## ReappraisalDirectionempathy:group4ideator 0.264   
## (0.581)   
##   
## ReappraisalDirectionpunish:group4ideator 0.031   
## (0.559)   
##   
## scale(totalStake):group4attempter 0.058   
## (0.123)   
##   
## scale(totalStake):group4depression -0.139   
## (0.124)   
##   
## scale(totalStake):group4ideator -0.017   
## (0.144)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4attempter 0.404\*\*   
## (0.187)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4attempter 0.114   
## (0.171)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4depression 0.308   
## (0.202)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4depression 0.377\*\*   
## (0.164)   
##   
## ReappraisalDirectionempathy:scale(totalStake):group4ideator 0.256   
## (0.235)   
##   
## ReappraisalDirectionpunish:scale(totalStake):group4ideator 0.237   
## (0.201)   
##   
## Constant 2.791\*\*\*   
## (0.367)   
##   
## ------------------------------------------------------------------------------------------  
## Observations 12,740   
## Log Likelihood -5,121.504   
## Akaike Inf. Crit. 10,313.010   
## Bayesian Inf. Crit. 10,573.850   
## ==========================================================================================  
## Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Only has significant influence.

Compare (1|ID) and (block|ID) models:

## Model selection table   
## (Int) Frn\_scr gr4 RpD scl(EXI) scl(ttS) gr4:RpD gr4:scl(ttS)  
## m\_exit3 2.791 + + + -0.3484 -0.18110 + +  
## m\_exit2 1.968 + + + -0.3461 0.03687   
## m\_exit1 2.383 + + + -0.2651 -0.16290 + +  
## m\_exit 2.222 + + + -0.2543 0.03427   
## RpD:scl(ttS) gr4:RpD:scl(ttS) control random df logLik  
## m\_exit3 + + g(c.F,l(20000)) b|I 35 -5121.504  
## m\_exit2 g(b) b|I 18 -5232.865  
## m\_exit1 + + g(b) I 30 -5320.315  
## m\_exit g(b) I 13 -5444.962  
## AICc delta weight  
## m\_exit3 10313.2 0.00 1  
## m\_exit2 10501.8 188.58 0  
## m\_exit1 10700.8 387.57 0  
## m\_exit 10916.0 602.74 0  
## Abbreviations:  
## control: g(b) = 'glmerControl(bobyqa)',   
## g(c.F,l(20000)) = 'glmerControl(calc.FALSE,list(20000))'  
## Models ranked by AICc(x)   
## Random terms:   
## b|I = 'block | ID'  
## I = '1 | ID'