**R Code for Meta-Analysis**

library(metafor)

library(clubSandwich)

library(dplyr)

library(funModeling)

##Read csv file

meta.clean<- read.csv(file = "megamain.csv", header = TRUE)

##create total minutes variable

main$minutes.total <- main$txt.sessions\*main$txt.sessions.minutes

##set variables to the correct type

meta.clean$hedges.g <- as.numeric(meta.clean$hedges.g)

meta.clean$variance <- as.numeric(meta.clean$variance)

##check data

hist(meta.clean$hedges.g)

boxplot(meta.clean$hedges.g)

skewness(meta.clean$hedges.g)

kurtosis(meta.clean$hedges.g)

##create sampling covariance matrix

v\_mat <- impute\_covariance\_matrix(vi = meta.clean$variance,

cluster = meta.clean$study.id,

r = 0.8)

#fit working model in metafor

megameta <- rma.mv(hedges.g ~ 1, V = v\_mat,

random = ~ 1 | study.id/study.treat,

test="t",

data = meta.clean,

method= "REML")

megameta

##meta-regression

megaregression <- rma.mv(hedges.g ~ 1 + factor(grade.level) + factor(no.disability) +

factor(content) + group.size.calc + minutes.total + year + factor (study.design) + factor (developer) + qi.percent, #effect size

V = v\_mat, #variance matrix

random = ~ 1 | study.id/study.treat, #nesting structure: highest / lowest

test= "t", #use t-tests

data = meta.clean, #define data

method="REML")

ci\_megaregression <- conf\_int(megaregression, vcov = "CR2")

ci\_megaregression

coef\_megaregression <- coef\_test (megaregression, cluster = meta.clean$study.id, vcov = 'CR2')

coef\_megaregression

##Are RCT and SCRD ES statistically sign diff?

Wald\_test(megaregression, constraints = constrain\_equal(15:16), vcov = "CR2")

#Calculate meta without outliers

##calculate outliers within data set

tukey\_outlier(meta.clean$hedges.g)

##outliers considered >-2.49 or <3.64

##Outlier Dataset

main\_alt <- filter(meta.clean, hedges.g > -2.487382, hedges.g < 3.643773)

##create sampling covariance matrix w/o outliers

v\_mat2 <- impute\_covariance\_matrix(vi = main\_alt$variance,

cluster = main\_alt$study.id,

r = 0.8)

##model without outliers

megameta\_wo <- rma.mv(hedges.g ~ 1, V = v\_mat2,

random = ~ 1 | study.id/study.treat,

test="t",

data = main\_alt,

method= "REML")

megameta\_wo

##meta-regression without outliers

megaregression\_wo <- rma.mv(hedges.g ~ 1 + factor(grade.level) + factor(no.disability) +

factor(content) + group.size.calc + minutes.total + year + factor (study.design) + factor (developer) + qi.percent, #effect size

V = v\_mat2, #variance matrix

random = ~ 1 | study.id/study.treat, #nesting structure: highest / lowest

test= "t", #use t-tests

data = main\_alt, #define data

method="REML")

ci\_regression\_wo <- conf\_int(megaregression\_wo, vcov = "CR2")

ci\_regression\_wo

coef\_megaregression\_wo <- coef\_test (megaregression\_wo, cluster = main\_alt$study.id, vcov = 'CR2')

coef\_megaregression\_wo

##Publication Bias

regtest(x = hedges.g,

vi= variance, data = meta.clean,

model="rma", predictor="vi", ret.fit=FALSE)

regtest(x = hedges.g,

vi= variance, data = main\_alt,

model="rma", predictor="vi", ret.fit=FALSE)