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# Program: MultiStep Multiple Mediation Bootstrapping Through Model
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# Script Includes:
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# Reading in Data
  setwd("C:/Users/vetsatwinstudy/Documents/VETSA/Current
Projects/Carol/SES_Cortisol")
  data <- read.csv("childadv042712.csv")

  data$dep <- as.numeric(data$dep)
  data$SES55 <- as.numeric(data$SES55)
  data$Y <- as.numeric(data$Y)
  data$X <- as.numeric(data$X)
  data$IQ <- as.numeric(data$IQ)

  data <- na.omit(data)

# Split off A and B twins
  twinA <- data[data$twin=="A",]
  twinB <- data[data$twin=="B",]

# Merge into Single Data Set by Case
  mergedata <- merge(twinA, twinB,
by=c("case", "X", "ethnicity"), all=T, suffixes=c("A", "B"))

# Create Separate Data Sets for MZ / DZ Twin
  MZdata <- na.omit(mergedata[mergedata$zyg09A==1|mergedata
$zyg09B==1, "case"])
  DZdata <- na.omit(mergedata[mergedata$zyg09A==2|mergedata
$zyg09B==2, "case"])

# Loading NLME Library
  library(nlme)

## BOOTSTRAP ##

# Initialize
  bootdata <- c()
  A1 <- c()

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A2 <- c()
A3 <- c()
B1 <- c()
B2 <- c()
CPRIME <- c()
C <- c()

for(b in 1:100){
  print(b)
  # Sampling Twins
  MZlist <- sample(MZdata,204,replace=TRUE)
  DZlist <- sample(DZdata,195,replace=TRUE)
  bootdata <- c()

  # Creating Data Set
  for(m in 1:204){
    bootdata <- rbind(bootdata,data[data
$case==MZlist[m],])}
  for(d in 1:195){
    bootdata <- rbind(bootdata,data[data
$case==DZlist[d],])}

  # Fitting Mixed Models
  fitCORT <- lme(Y ~ X + IQ + SES55 +
as.factor(ethnicity) + as.factor(currsmoke) + as.factor(dep), random =
~1 | case, data=bootdata,
na.action="na.exclude",control=lmeControl(returnObject=TRUE))

  fitSES <- lme(SES55 ~ X + IQ + as.factor(ethnicity) +
as.factor(currsmoke) + as.factor(dep), random = ~1 | case,
data=bootdata,
na.action="na.exclude",control=lmeControl(returnObject=TRUE))

  fitAFQT <- lme(IQ ~ X + as.factor(ethnicity), random
= ~1 | case, data=bootdata,
na.action="na.exclude",control=lmeControl(returnObject=TRUE))

  fitTOT <- lme(Y ~ X + as.factor(ethnicity) +
as.factor(currsmoke) + as.factor(dep), random = ~1 | case,
data=bootdata,
na.action="na.exclude",control=lmeControl(returnObject=TRUE))

  # Grabbing Coefficients
  cp <- as.numeric(fitCORT$coefficients$fixed)[2]
  b1 <- as.numeric(fitCORT$coefficients$fixed)[3]
  b2 <- as.numeric(fitCORT$coefficients$fixed)[4]

  a2 <- as.numeric(fitSES$coefficients$fixed)[2]
  a3 <- as.numeric(fitSES$coefficients$fixed)[3]

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a1 <- as.numeric(fitAFQT$coefficients$fixed)[2]

c <- as.numeric(fitTOT$coefficients$fixed)[2]

# Creating Stored Vectors
A1 <- c(A1,a1)
A2 <- c(A2,a2)
A3 <- c(A3,a3)
B1 <- c(B1,b1)
B2 <- c(B2,b2)
CPRIME <- c(CPRIME,cp)
C <- c(C,c)
}

out1 <- as.data.frame(cbind(A1,A2,A3,B1,B2,CPRIME,C))

indefects <- as.data.frame(matrix(0,nrow=1000,ncol=4))
names(indefects) <- c("tot","m1","m2","m1andm2")
indefects[,2] <- out1$A1*out1$B1
indefects[,3] <- out1$A2*out1$B2
indefects[,4] <- out1$A1*out1$A3*out1$B2
indefects[,1] <- indefects[,2]+indefects[,3]+indefects[,4]

summary(indefects)

for(i in 1:4){
print(names(indefects)[i])
print(quantile(indefects[,i],c(.025,.975)))}

summary(out1)

for(i in 1:7){
print(names(out1)[i])
print(quantile(out1[,i],c(.025,.975)))}

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