Untitled

Eva

3/29/2022

```
library(MASS);
library(nlme);
source("D:/WPI/prediction/Lib_Prediction.R");
source("D:/WPI/prediction/Lib_simu_genetic_data.R");
```

```
## Rlab 2.15.1 attached.
```

```
##
## Attaching package: 'Rlab'
```

```
## The following object is masked from 'package:MASS':
##
##     michelson
```

```
## The following objects are masked from 'package:stats':
##
##     dexp, dgamma, dweibull, pexp, pgamma, pweibull, qexp, qgamma,
##     qweibull, rexp, rgamma, rweibull
```

```
## The following object is masked from 'package:datasets':
##
##     precip
```

```
source("D:/WPI/prediction/generate_response_formula.R");
```

```
###Parameter setting

###Parameters on the effects / coefficients
beta0 = -0.5;
#For binary trait, the risk at X=0 is 1/(1+exp(-beta0)). The average risk (prevalence) at given coeffic
# Y = array(NA, length(Xbeta));
#  for (i in 1:length(Y)) {
#    Py1x = 1/(1 + exp(-Xbeta[i]) - beta0); # P(y=1 | x) based on logistic model
#    Y[i] = ifelse(runif(1) < Py1x, 1, 0);
#  }
#  mean(Y); #prevalance of Y.

#beta0 = -7; # for binary trait. Risk when X=0 is 1/(1+exp(7))=0.0009110512. Also, at the given coeffic
#beta0 = -3; # for binary trait. Risk when X=0 is 1/(1+exp(3))=0.04742587. Also, at the given coefficie


raceN = 3; #Number of racial groups
```

```
sigma.race = 1; #pair-wise covariance among individuals in the same racial group
beta.race = 1; #treat the "coefficient" of the mix-effect b_i be 1.

beta.acup = 5; #6; #Coeff of acupuncture
beta.mbsr = 5; #6; #Coeff of mbsr
beta.sex = 1; #1;
beta.age = -1; #-1;
beta.edu = log(1.26); #1;
beta.len = log(1.13); #1;
beta.bas = log(0.80);#1;
beta.conc = log(0.77); #1;

markerN = 10; #The # of PainMarkers
beta.biom.v = 1; #=1; #The value of the coeff of the biomarkers
beta.biom = rep(beta.biom.v, markerN); #Coeff of the biomarkers
names.xbiom = paste("xbiom", 1:markerN, sep=""); #variable names for biomarkers

mdfN.acup = 4; #The # of modifiers for acupuncture
beta.mdf.acup.v=1; #The value of the coeff of accupunctur's modifiers
beta.mdf.acup = rep(beta.mdf.acup.v, mdfN.acup); #Vector of coeffs of accupunctur's modifiers
gama.acup.v = 1; #The value of the coeff of the modifier*acupucture interaction terms.
gama.acup = rep(gama.acup.v, mdfN.acup); #Vector of coeffs of the modifier*acupucture interaction terms

names.mdf.acup = paste("zmdfAcup", 1:mdfN.acup, sep=""); #variable names of the modifiers for acupunctu

mdfN.mbsr = 4; #The # of modifiers for MBSR
beta.mdf.mbsr.v=1; #The value of the coeff of MBSR's modifiers
beta.mdf.mbsr = rep(beta.mdf.mbsr.v, mdfN.mbsr); #Vector of coeffs of accupunctur's modifiers
gama.mbsr.v = 1; #The value of the coeff of the modifier*MBSR interaction terms.
gama.mbsr = rep(gama.mbsr.v, mdfN.mbsr); #Vector of coeffs of the modifier*MBSR interaction terms.

names.mdf.mbsr = paste("zmdfMBSR", 1:mdfN.mbsr, sep=""); #variable names of the modifiers for MBSR

errSD=1; #The SD of error term

###Parameters on prodiction process
isRandomCV=T; #Random cross-validation in prediction
nfold=5; #The number of folds in cross-validation
nrepeat=2; #number of repeats of cross-validation

###Parameters on simulations
simuN = 100; #The number of simulations.

###Data simulation and prediction outcomes
predProp = c(0, 0.25, 0.5, 0.75, 1); #Proportion of true predictors besides names.basic that are includ
models = vector(mode = "list", length(predProp)); #prediction models .
outputs = vector(mode = "list", length(predProp)); #prediction outputs .

###Parameters on data
groupSampleSizes = seq(20, 400, by=20);
#groupSampleSizes = seq(500, 2000, by=100);
#groupSampleSizes = seq(150, 500, by=50);
AUC = array(NA, dim=c(length(groupSampleSizes), length(predProp)));
```

```r
#Store AUC over sample sizes and proportions of predictors used.
for(gi in 1:length(groupSampleSizes))
{
  groupSampleSize = groupSampleSizes[gi];
  #sample size for each of the three groups: control, mbsr, and acupuncture.

  ###Looping through simulations
  R2.controls = array(NA, simuN); #Store the R2 of the controlling predictors.
  for(i in 1:simuN)
  {
    ###Generate data
    x0 = rep(1, groupSampleSize*3);

    #The mixed-effect term for racial group
    xrace = sample(1:raceN, size=groupSampleSize*3, replace=T, prob=rep(1/raceN, raceN));
    #Assume equal chance for each racial group to be sampled.

    b.xrace = array(NA, dim=groupSampleSize*3); #b.xrace is the vector of b_i values.
    for (racei in 1:raceN)
    {
      b.xrace[which(xrace==racei)] = rnorm(1, sd=sigma.race);
    }
    #assign the same b_i value for the all in the ith racial group.

    #The "basic" factors
    xacup = c(rep(0, groupSampleSize*2), rep(1, groupSampleSize));
    #acupuncture group indicator
    xmbsr = c(rep(0, groupSampleSize), rep(1, groupSampleSize), rep(0, groupSampleSize)); #MBSR group i
    xsex = rbinom(n=groupSampleSize*3, size=1, prob=0.5); #50% recruited are males??
    xage = rnorm(n=groupSampleSize*3, mean=0, sd=1); #standardized age.
    xedu = rbinom(n=groupSampleSize*3, size=1, prob=0.5);
    xlen = rbinom(n=groupSampleSize*3, size=1, prob=0.5);
    xbas = rnorm(n=groupSampleSize*3, mean=0, sd=1);
    xconc = rbinom(n=groupSampleSize*3, size=1, prob=0.5);

    #PainMarker data
    xbiom = data.frame(matrix(rnorm(n=groupSampleSize*3*markerN), ncol=markerN)); #Assume biomarker val
    names(xbiom) = names.xbiom;

    #acupuncture-modifier data
    zmdfAcup = data.frame(matrix(rnorm(n=groupSampleSize*3*mdfN.acup), ncol=mdfN.acup));
    #Assume acupuncture-modifier values are N(0,1);
    names(zmdfAcup) = names.mdf.acup;

    #mbsr-modifier data
    zmdfMBSR = data.frame(matrix(rnorm(n=groupSampleSize*3*mdfN.mbsr), ncol=mdfN.mbsr)); #Assume acupun
    names(zmdfMBSR) = names.mdf.mbsr;

    Xmatrix = cbind(x0, b.xrace, xacup, xmbsr, xsex, xage, xedu, xlen, xbas, xconc, xbiom, zmdfAcup, zm

    #### Generate response
    names.mainEff  = c("x0", "b.xrace", "xacup", "xmbsr", "xsex", "xage", "xedu", "xlen", "xbas", "xcon
    coeffs.mainEff = c(beta0, beta.race, beta.acup, beta.mbsr, beta.sex, beta.age, beta.edu, beta.len,
```

```
names.trt = c("xacup", "xmbsr"); #variable names of the treatments
names.mdf = list(names.mdf.acup, names.mdf.mbsr); #variable names of the modifiers corresponding to
coeffs.interaction = list(gama.acup, gama.mbsr); #coefficients of the treatment-modifier interactio


# ####----Quantitative Response-----
resp = get.Y.reg(XData=Xmatrix, names.mainEff, coeffs.mainEff, names.trt, names.mdf, coeffs.interac
#print(resp$R2); #proportion of variation explained by all predictors
#
# Calculate the R^2 of the controlling predictors
vars.control = c(varBeta0=0, varRace=sigma.race^2, varAcup=(1/3)*(1-1/3), varMbsr=(1/3)*(1-1/3), va
betas.control = c(beta0, beta.race, beta.acup, beta.mbsr, beta.sex, beta.age, beta.edu, beta.len, be
R2.controls[i] = sum(vars.control*betas.control^2)/var(resp$Y);

####----Binary Response-----
#resp = get.Y.logit(XData=Xmatrix, names.mainEff, coeffs.mainEff, names.trt, names.mdf, coeffs.inte

####Combine data for analysis
xrace = as.factor(xrace); #Convert race into factor variable, which is used in data analysis.
dat = data.frame(Y=resp$Y, Xmatrix, xrace);


####Predictive analysis
names.control = c("xrace", "xacup", "xmbsr", "xsex", "xage", "xedu", "xlen", "xbas", "xconc"); #Con
names.trt.all =  c("xacup", "xmbsr"); #All possible treatments that could have interaction effects.
for (mi in 1:length(predProp)){
  ##Create model formula based on proportion of predictors used.
  xbiom.used    = round(length(names.xbiom)*predProp[mi]);
  mdf.acup.used = round(length(names.mdf.acup)*predProp[mi]);
  mdf.mbsr.used = round(length(names.mdf.mbsr)*predProp[mi]);
  names.main=c(names.control, names.xbiom[0:xbiom.used], names.mdf.acup[0:mdf.acup.used], names.mdf
  if (predProp[mi]==0)
  {
    names.trt = NULL;
  }
  else{
    names.trt = names.trt.all;
    names.mdf = list(names.mdf.acup[0:mdf.acup.used], names.mdf.mbsr[0:mdf.mbsr.used]);
  }
  models[[mi]]= formula.f.r(names.main=names.main, names.trt=names.trt, names.mdf=names.mdf, names.

  # ### ---- Predict quantitative outcome ----
  out = meanPredEvaluCV.lme(fixed=models[[mi]]$fixed, dat=dat, randomf=models[[mi]]$random, model_R=
  #out = meanPredEvaluCV.lme(fixed=models[[mi]]$fixed, dat=dat, randomf=NULL, model_R='lm', loopn=n
  outputs[[mi]] = rbind(outputs[[mi]], t(c(MSE=out[1], L2normRatio=out[2], L1normRatio=out[3], corr


  ### ---- Predict binary outcome ----
  #out = predEvaluCV.glm(formula=models[[mi]]$fixed, dat=dat, nfold=nfold, nrepeat=nrepeat, isRando
  #outputs[[mi]] = rbind(outputs[[mi]], t(c(prob=out[1], sensi=out[2], speci=out[3], AUC=out[4])));
  #outputs[[mi]] = rbind(outputs[[mi]], t(unlist(out)));

}
```

```
  }

  # #True underlying model
  print(c(sampleSize=groupSampleSize*3, raceN=raceN, sigma.race = sigma.race,  beta.acup = beta.acup,
          beta.mbsr = beta.mbsr, beta.sex = beta.sex, beta.age = beta.age, beta.edu=beta.edu, beta.len=
          mdfN.acup=mdfN.acup, beta.mdf.acup.v=beta.mdf.acup.v, gama.acup.v=gama.acup.v,
          mdfN.mbsr=mdfN.mbsr, beta.mdf.mbsr.v=beta.mdf.mbsr.v, gama.mbsr.v=gama.mbsr.v));

  # #R2 of controlling predictors
   mean(R2.controls);

  #Prediction accuracies
  for (mi in 1:length(predProp)){
    print(predProp[mi]);
    print(models[[mi]]$fixed);
    print(apply(outputs[[mi]], 2, mean));
    print(apply(outputs[[mi]], 2, quantile, probs=c(0.05, 0.95)));

    AUC[gi, mi] = apply(outputs[[mi]], 2, mean)[4];
  }
}
```

```
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##      60.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000021f9b9d8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    34.4762209     0.8956956     0.9033391     0.3062150     1.1105529
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  22.92098   0.6998855   0.6902015 -0.01582585     0.7824205
## 95% 51.66868   1.0925786   1.1204193  0.52522969     1.4251395
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000012de9730>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    32.2910873     0.8747367     0.8802645     0.4470913     1.0878229
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  20.39312   0.6878634   0.6792724   0.2268831     0.7431572
## 95% 44.94653   1.0389934   1.0607041   0.6670406     1.4728864
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
```

```
## <environment: 0x0000000012e050a0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.4942921     0.8240170     0.8258345     0.5742827     0.9955303
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  16.18177   0.5968598   0.5999201   0.3260886     0.5399437
## 95% 44.85327   1.0029433   1.0334463   0.7718560     1.5840880
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000021132a18>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    21.3118529     0.7101813     0.7130371     0.7125640     0.7613691
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  11.47311   0.5120429   0.5167713   0.5479653     0.3726039
## 95% 32.78131   0.9396371   0.9694294   0.8508986     1.2234067
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000020e0e0a8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     4.8571502     0.3379453     0.3396615     0.9280411     0.1728309
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  2.731033   0.2482295   0.2375061   0.8908896    0.09044748
## 95% 7.696164   0.4227398   0.4280035   0.9646406    0.28485863
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     120.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000002111c318>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    32.3100734     0.8531212     0.8574848     0.3605642     0.9972992
##         MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  23.8052   0.7081285   0.7145209  0.06535224     0.7490767
## 95% 44.7917   1.0455681   1.0588953  0.54980552     1.3693155
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
```

```
## <environment: 0x0000000021209430>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.7460589     0.8091382     0.8124752     0.5023642     0.9192057
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.25602   0.6552095   0.6439738   0.2801497     0.5960288
## 95% 42.71741   1.0103075   1.0109696   0.6766676     1.3570112
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000022071818>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.6767655     0.7336004     0.7344526     0.6369624     0.7828818
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  14.57808   0.5756086   0.5632965   0.3965059     0.4622803
## 95% 39.72266   0.9841952   0.9873941   0.7771018     1.4848712
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000021387c58>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    15.8225395     0.5944563     0.5969863     0.7781005     0.5400903
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   7.899539   0.4264519   0.4223261   0.5910217     0.2451812
## 95% 31.604465   0.8767814   0.9092196   0.8795532     1.1002701
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000021c7ab80>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     3.2162389     0.2626928     0.2636782     0.9525291     0.1108184
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.272850   0.1652083   0.1646280   0.8950428    0.03759764
## 95% 6.481387   0.4040823   0.4051718   0.9818688    0.25612825
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     180.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
```

```
##     xconc
## <environment: 0x0000000013ab1878>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    31.2156854     0.8363769     0.8393474     0.3777141     0.9516551
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  23.35076   0.7108278   0.7187767   0.1162183     0.7488814
## 95% 43.24985   0.9974028   1.0296545   0.5464492     1.3047112
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x00000000130706a0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    27.0895024     0.7822287     0.7842130     0.5238036     0.8506238
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.36599   0.6468770   0.6419475   0.3007443     0.5960288
## 95% 40.93210   0.9699079   0.9916483   0.6695713     1.3027811
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000021743640>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    21.3398201     0.6927090     0.6933755     0.6655442     0.6906462
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  14.12474   0.5506666   0.5485598   0.4467103      0.424306
## 95% 36.44330   0.9746994   0.9653474   0.7785166      1.404979
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000012dc4488>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    13.5498008     0.5462711     0.5478725     0.8051859     0.4522764
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   7.660621   0.3989390   0.3998063   0.5991979     0.2239259
## 95% 27.416564   0.8345447   0.8436302   0.8897529     1.0231936
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000020fa7170>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    2.59928384    0.23354312    0.23444602    0.96160459    0.08785638
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.156034   0.1559725   0.1564279   0.9008939    0.03323507
```

```
## 95% 6.286678   0.4011138   0.4005094   0.9844357    0.24072759
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     240.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000021c6e4f0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    30.5838701     0.8264396     0.8284895     0.3909239     0.9221006
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  23.71178   0.7150408   0.7145209   0.1785689     0.7419636
## 95% 41.78511   0.9626517   1.0108086   0.5384605     1.2776258
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x00000000219a68e8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    26.1334608     0.7660945     0.7678415     0.5387626     0.8077484
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.45554   0.6468770   0.6427673   0.3316390     0.5943165
## 95% 38.74045   0.9622119   0.9792365   0.6670406     1.2934722
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000013299980>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    19.9940425     0.6683297     0.6685742     0.6837501     0.6355461
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.90213   0.5466143   0.5362105   0.4747391     0.4135057
## 95% 34.27239   0.9188750   0.9493143   0.7791462     1.2939431
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x00000000222eccd0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    12.2160154     0.5166553     0.5179147     0.8223989     0.4004150
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   7.185791   0.3893286   0.3890731   0.6394880     0.2118362
## 95% 25.021505   0.8105331   0.8151315   0.8926912     0.9770769
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
```

```
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x000000002234c0a8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    2.26126245    0.21695987    0.21775302    0.96661898    0.07526616
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.100640   0.1498642   0.1502970   0.9081958    0.03152718
## 95% 5.884358   0.3915561   0.3938855   0.9848243    0.23382717
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     300.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000022280390>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    30.1228183     0.8187941     0.8208736     0.4014656     0.9008572
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  23.86416   0.7146036   0.7084660   0.2182989     0.7419636
## 95% 39.37047   0.9528660   0.9884761   0.5320658     1.2498349
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x00000000134a4678>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    25.4711736     0.7546972     0.7561727     0.5496820     0.7787843
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.46393   0.6451177   0.6417590   0.3464754      0.593447
## 95% 37.87981   0.9377328   0.9603231   0.6626974      1.257293
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x000000000d037230>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    19.1476764     0.6526585     0.6529416     0.6954741     0.6005450
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.86931   0.5417433   0.5345371   0.4942864     0.4096949
## 95% 33.66606   0.9077412   0.9036923   0.7795934     1.1988974
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
```

```
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x000000000cee9bb0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    11.3836674     0.4978551     0.4991780     0.8332995     0.3678205
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   7.081454   0.3878596   0.3852459   0.6568569     0.2097127
## 95% 24.726780   0.7878734   0.7831382   0.8943071     0.9187537
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000013aaf028>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    2.04571219    0.20600977    0.20676713    0.96985268    0.06723078
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.057949   0.1484796   0.1490037   0.9108191    0.03039389
## 95% 5.758288   0.3793554   0.3869221   0.9853029    0.21688086
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     360.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000021462a68>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    29.7512673     0.8124767     0.8143238     0.4085823     0.8864392
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.07780   0.7150408   0.7107440   0.2366557     0.7403761
## 95% 38.06551   0.9430290   0.9683672   0.5318937     1.2173048
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000013270908>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    24.9284875     0.7452105     0.7466076     0.5581608     0.7575540
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.50826   0.6438867   0.6414942   0.3785529     0.5881233
## 95% 36.41822   0.9264115   0.9392020   0.6626974     1.1974720
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
```

```
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x000000001338cf30>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    18.5062565     0.6404861     0.6409543     0.7039278     0.5757634
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.81797   0.5353323   0.5310240   0.5131750      0.404050
## 95% 32.56827   0.8867576   0.8815332   0.7807127      1.144377
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x00000000217c8750>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    10.7876016     0.4839462     0.4850497     0.8410104     0.3451382
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   7.021092   0.3833661   0.3778606   0.6826295     0.2063154
## 95% 23.735899   0.7612648   0.7647689   0.8952976     0.9031104
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000021918d70>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     1.8981143     0.1983484     0.1990707     0.9720262     0.0618038
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.042332   0.1474040   0.1464474   0.9135190    0.02974936
## 95% 5.518641   0.3714122   0.3739058   0.9855163    0.20846645
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     420.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000000d028ee0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    29.4272667     0.8073466     0.8087648     0.4141425     0.8753484
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.16504   0.7146875   0.7084660   0.2548961     0.7363129
## 95% 37.62677   0.9366279   0.9549527   0.5313913     1.1762859
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
```

```
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000016aaccc0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    24.4772535     0.7376131     0.7387088     0.5647614     0.7413170
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.50826   0.6409471   0.6397593   0.3974902     0.5845699
## 95% 35.28147   0.9221137   0.9114977   0.6623607     1.1747305
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000012e8b6e0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    18.0044676     0.6310572     0.6313302     0.7104989     0.5571296
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.72741   0.5336251   0.5284527   0.5206516     0.4027905
## 95% 31.38346   0.8705176   0.8658966   0.7809183     1.0929112
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x00000000165207c8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    10.3594629     0.4740363     0.4749094     0.8463451     0.3290980
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.995869   0.3801529   0.3758068   0.6858964     0.2049223
## 95% 23.223150   0.7513960   0.7542577   0.8957347     0.8664200
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x000000001349f7c0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.78895465    0.19264675    0.19337025    0.97361489    0.05783816
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.029563   0.1454455   0.1447395   0.9193545    0.02940628
## 95% 5.428039   0.3619694   0.3672444   0.9857043    0.19401271
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     480.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
```

```
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000012f991a8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    29.2569857     0.8035088     0.8046792     0.4178060     0.8673531
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.22231   0.7147851   0.7084660   0.2649277      0.737155
## 95% 36.71286   0.9270691   0.9492324   0.5284884      1.144408
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000015b08dc0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    24.1987689     0.7318937     0.7327066     0.5694855     0.7291810
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.57820   0.6403119   0.6374149   0.4080482     0.5821185
## 95% 34.78803   0.9016406   0.9060099   0.6617003     1.1453082
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x000000000d035fa0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    17.6178073     0.6230153     0.6232127     0.7162259     0.5416563
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.66516   0.5317850   0.5253510   0.5425252     0.3951606
## 95% 30.20072   0.8455608   0.8531073   0.7834644     1.0052927
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000021745160>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    10.0172125     0.4654738     0.4662542     0.8509946     0.3158474
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.925538   0.3760193   0.3728229   0.6999150     0.2005141
## 95% 22.387741   0.7426701   0.7408526   0.8967074     0.8257969
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x00000000048df8d0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.70432850    0.18794125    0.18865983    0.97488632    0.05468761
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
```

```
## 5%  1.019433   0.1446659   0.1436921   0.9225313    0.02909557
## 95% 5.211566   0.3576082   0.3634265   0.9857308    0.18347752
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     540.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000002157c4c0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    29.0801683     0.8004708     0.8012781     0.4220109     0.8596704
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.22231   0.7132984   0.7072467   0.2714496     0.7349126
## 95% 36.40692   0.9203351   0.9361988   0.5284884     1.1276049
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000012f4de80>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.9334199     0.7271294     0.7276424     0.5743119     0.7182134
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.54538   0.6369902   0.6328761   0.4201051     0.5797577
## 95% 33.56166   0.8942056   0.9002580   0.6621379     1.1211258
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x000000001301cf18>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    17.3012444     0.6168619     0.6169693     0.7210020     0.5291281
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.54869   0.5256864   0.5206170   0.5685174     0.3913969
## 95% 29.10891   0.8350112   0.8408634   0.7845694     0.9706903
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000015b25ea8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     9.7506262     0.4590695     0.4596939     0.8546330     0.3054217
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.91696   0.3749673   0.3718879   0.7161666     0.1998706
## 95% 21.39259   0.7299386   0.7327269   0.8974229     0.7776146
## [1] 1
```

```
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x000000002129b920>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.63786762    0.18434194    0.18505188    0.97589002    0.05220576
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.017440   0.1437597   0.1425831   0.9271418    0.02862336
## 95% 5.057987   0.3511951   0.3467201   0.9858309    0.17346701
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     600.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x00000000212c6a38>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.9517814     0.7978266     0.7985733     0.4251396     0.8536380
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.28609   0.7147851   0.7085280   0.2863742     0.7358351
## 95% 35.78832   0.9053101   0.9215473   0.5252075     1.0966064
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000016b974c8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.7079212     0.7227928     0.7232949     0.5785358     0.7089050
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.59514   0.6362218   0.6314232   0.4246463     0.5787335
## 95% 31.77143   0.8850900   0.8820318   0.6623607     1.0936539
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x00000000220f5b00>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    17.0427395     0.6115573     0.6116246     0.7249445     0.5188134
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.48892   0.5252968   0.5205228   0.5705925     0.3907168
## 95% 26.99514   0.8280962   0.8302490   0.7849259     0.9119223
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
```

```
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x000000000546d2a8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     9.5208541     0.4532977     0.4538077     0.8578500     0.2964972
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.858439   0.3741856   0.3709268   0.7223757     0.1984725
## 95% 20.654478   0.7167193   0.7286671   0.8978135     0.7174052
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000012de7e30>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.58217574    0.18120726    0.18196950    0.97673494    0.05012935
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.009639   0.1430472   0.1420931   0.9316461    0.02846356
## 95% 4.787697   0.3407082   0.3372808   0.9859088    0.16199305
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     660.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000021027900>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.8153213     0.7951789     0.7957209     0.4279971     0.8484295
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.30917   0.7142867   0.7072467   0.2901711     0.7377846
## 95% 35.10406   0.9015252   0.9119529   0.5243406     1.0743831
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000021b088c8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.5195279     0.7191630     0.7195541     0.5816884     0.7016783
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.53632   0.6346641   0.6293511   0.4349803     0.5774408
## 95% 30.99494   0.8753779   0.8702872   0.6621379     1.0695132
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
```

```
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000021f60308>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.8193950     0.6069669     0.6068964     0.7281989     0.5103343
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.42559   0.5242353   0.5201220   0.5835939     0.3889604
## 95% 26.21664   0.8196963   0.8112761   0.7853980     0.8846379
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x00000000219a2cb0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     9.3300954     0.4484860     0.4489022     0.8604168     0.2892808
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.82864   0.3725768   0.3707567   0.7320990     0.1963955
## 95% 19.92157   0.7014748   0.6949724   0.8983802     0.6850344
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000016736008>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.53579427    0.17858069    0.17934420    0.97742430    0.04843527
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.003748   0.1421700   0.1415409   0.9348986    0.02845566
## 95% 4.583818   0.3321749   0.3328277   0.9859147    0.14984296
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     720.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000013acdf60>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.6894327     0.7938345     0.7942250     0.4302269     0.8442042
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.30917   0.7145535   0.7068880   0.2962663     0.7398549
## 95% 34.69172   0.8961726   0.9025454   0.5235013     1.0633589
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
```

```
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000012f48350>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.3410347     0.7167288     0.7170685     0.5844524     0.6954485
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.44999   0.6352828   0.6300646   0.4438796     0.5751784
## 95% 30.81582   0.8587707   0.8584614   0.6627645     1.0382927
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000012fe23a8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.6295348     0.6038170     0.6037130     0.7307943     0.5034134
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.40278   0.5239463   0.5200536   0.5958831     0.3867633
## 95% 25.60164   0.8005127   0.7985386   0.7867535     0.8677513
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000014716578>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     9.1658061     0.4448909     0.4452478     0.8625442     0.2832463
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.825876   0.3722930   0.3696362   0.7362346     0.1962391
## 95% 18.604695   0.6617761   0.6849962   0.8983802     0.6699459
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x00000000057df280>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.49674725    0.17657167    0.17732244    0.97799377    0.04702898
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  1.000029   0.1421403   0.1415409   0.9373030    0.02831943
## 95% 4.208382   0.3160125   0.3195960   0.9859821    0.14165657
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     780.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
```

```
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000021f2ac50>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.6088016     0.7923074     0.7927020     0.4314782     0.8411740
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.33905   0.7145953   0.7072467   0.3032738     0.7410189
## 95% 34.44834   0.8901959   0.9006165   0.5217744     1.0562985
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000012e53e40>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.2204848     0.7144623     0.7147420     0.5861955     0.6908651
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.45070   0.6352828   0.6300646   0.4504218     0.5771131
## 95% 30.22609   0.8498425   0.8528377   0.6619759     0.9850376
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x000000001324d0e8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.4703742     0.6006439     0.6004157     0.7330356     0.4974838
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.40278   0.5227349   0.5197924   0.6094845     0.3871775
## 95% 24.85701   0.7713973   0.7751035   0.7863685     0.8519193
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000012d0b838>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     9.0269079     0.4414404     0.4417305     0.8643980     0.2780565
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.824013   0.3714432   0.3691632   0.7440280     0.1959296
## 95% 17.902005   0.6555184   0.6527952   0.8985496     0.6240954
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x00000000222048d8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.46317062    0.17467727    0.17540050    0.97848938    0.04581095
```

```
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9967029   0.1418313   0.1409522   0.9396460    0.02822445
## 95% 4.1089875   0.3103216   0.3065532   0.9860294    0.13661470
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     840.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000002109d370>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.5316198     0.7913175     0.7916697     0.4332901     0.8378885
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.44005   0.7145535   0.7081290   0.3129293     0.7414075
## 95% 34.34782   0.8887601   0.8949966   0.5212185     1.0335750
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x00000000132b4b48>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    23.1057235     0.7127250     0.7129914     0.5882694     0.6861913
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.45975   0.6346705   0.6290999   0.4561713     0.5767204
## 95% 29.81218   0.8464953   0.8428744   0.6618295     0.9587486
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000021a92930>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.3346317     0.5982088     0.5979904     0.7350951     0.4921302
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.40225   0.5226025   0.5196318   0.6175529     0.3867650
## 95% 24.28386   0.7555449   0.7591874   0.7864205     0.7902883
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000020daf848>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.9109501     0.4387805     0.4390223     0.8660029     0.2735759
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.818987   0.3711023   0.3690367   0.7524831     0.1953820
## 95% 17.152049   0.6249160   0.6154523   0.8985942     0.6018725
```

```
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000013e22070>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.43425978    0.17311948    0.17383476    0.97892641    0.04473925
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9938242   0.1416065   0.1409442   0.9444519    0.02809537
## 95% 3.8768810   0.2937419   0.2984842   0.9860766    0.12545479
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     900.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000015621578>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.4638098     0.7901898     0.7904568     0.4348146     0.8350583
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.53480   0.7146945   0.7085301   0.3171428     0.7414075
## 95% 34.08894   0.8851751   0.8926235   0.5209907     1.0142163
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000012eb3958>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.9991379     0.7108738     0.7110555     0.5901795     0.6819894
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.51629   0.6345277   0.6287744   0.4620506     0.5747140
## 95% 29.48693   0.8370407   0.8393128   0.6618295     0.9341441
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000012e61388>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.2066429     0.5957307     0.5954885     0.7370501     0.4872234
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.38812   0.5211043    0.517773   0.6301547     0.3854405
## 95% 23.82335   0.7375575    0.741768   0.7873028     0.7661878
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
```

```
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000021ba0d58>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.8053686     0.4362046     0.4363952     0.8674603     0.2695516
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.80956   0.3708266   0.3685017   0.7645629     0.1948294
## 95% 16.39522   0.6105679   0.6047199   0.8991342     0.5459269
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x00000000164f9880>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.40869138    0.17168265    0.17238055    0.97931070    0.04379833
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9904862   0.1410679   0.1404048   0.9476943    0.02794198
## 95% 3.6331522   0.2876857   0.2879303   0.9861076    0.12122283
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##     960.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000000cfde1b8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.3983572     0.7890807     0.7893504     0.4359107     0.8327479
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.55671   0.7147924   0.7085521   0.3196920     0.7422457
## 95% 33.87919   0.8829281   0.8875715   0.5204479     1.0036610
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000016311798>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.9036742     0.7091725     0.7093745     0.5916619     0.6784966
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.54538   0.6337303   0.6293611   0.4663453     0.5739931
## 95% 29.15297   0.8289686   0.8354611   0.6617003     0.9128879
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
```

```
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000016706f88>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.0980549     0.5935985     0.5933990     0.7385603     0.4832224
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.39711   0.5209649   0.5177730   0.6376161     0.3851883
## 95% 23.25554   0.7248321   0.7369579   0.7874338     0.7384934
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000005cf5a18>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.7125582     0.4339221     0.4341098     0.8686898     0.2661207
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.806812   0.3703335   0.3681355   0.7841954     0.1943045
## 95% 15.591629   0.5980760   0.5914160   0.8993063     0.4890548
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000005205a88>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.38635317    0.17042274    0.17113196    0.97963893    0.04298965
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9896343   0.1409514   0.1403615   0.9507692    0.02791126
## 95% 3.4702937   0.2802261   0.2799651   0.9861178    0.11687001
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##    1020.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000006199ba8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.3501083     0.7878389     0.7879470     0.4371533     0.8304703
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.62363   0.7145131   0.7085301   0.3214414     0.7425764
## 95% 33.71363   0.8802888   0.8836729   0.5200131     0.9934318
## [1] 0.25
```

```
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x000000002113cc80>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.8267797     0.7074457     0.7075731     0.5931331     0.6752273
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.59514   0.6326124   0.6287099   0.4716783     0.5743241
## 95% 28.86771   0.8212375   0.8271141   0.6611547     0.8986739
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x00000000050bb5d8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    16.0073323     0.5915140     0.5912747     0.7399851     0.4795560
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.40225   0.5204959   0.5176152   0.6469691     0.3851883
## 95% 22.75458   0.7175288   0.7233215   0.7874338     0.7137303
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x000000000d0d47f8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.6313583     0.4317096     0.4318435     0.8698479     0.2629569
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.812461   0.3700062   0.3674737   0.7871214     0.1943106
## 95% 14.636771   0.5783870   0.5808735   0.8992284     0.4759693
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000012e30150>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.36625139    0.16920062    0.16989642    0.97994561    0.04224326
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.984712   0.1407200   0.1400416   0.9541517    0.02784453
## 95% 3.212195   0.2733655   0.2745577   0.9861393    0.10945722
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##    1080.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
```

```
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x000000002108e6e0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.2916710     0.7866229     0.7866930     0.4386509     0.8280630
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.70221   0.7124896   0.7075066   0.3246512     0.7419967
## 95% 33.36868   0.8789500   0.8800412   0.5189962     0.9817817
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000020facbd8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.7494344     0.7058632     0.7059833     0.5945913     0.6721127
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.60300   0.6322328   0.6286770   0.4833568     0.5743284
## 95% 28.53512   0.8160485   0.8173247   0.6602524     0.8783490
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x0000000012dcf0c8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    15.9210884     0.5896414     0.5894125     0.7413284     0.4761526
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.39799   0.5196374   0.5170535   0.6523454     0.3854370
## 95% 22.44652   0.7068577   0.7108766   0.7870200     0.6846357
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000015c57068>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.5566418     0.4297392     0.4298642     0.8708978     0.2600926
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.818987   0.3695269   0.3664569   0.7959745     0.1939818
## 95% 14.257815   0.5632820   0.5715376   0.8992716     0.4477624
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x000000000588d990>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
```

```
##    1.34849532    0.16814434    0.16885353    0.98021503    0.04158461
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9832577   0.1403801   0.1398490   0.9575078    0.02782682
## 95% 2.9998521   0.2669933   0.2675197   0.9861393    0.10238882
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##    1140.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000007049710>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.2307926     0.7855615     0.7855456     0.4397274     0.8261502
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.72248   0.7119557   0.7073776   0.3275011     0.7426943
## 95% 33.20240   0.8753949   0.8785685   0.5169607     0.9782621
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000009611ba8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.6742774     0.7044822     0.7045524     0.5957173     0.6695385
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.62546   0.6322328   0.6283711   0.4923788     0.5749071
## 95% 28.33483   0.8082821   0.8130904   0.6590996     0.8676018
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x00000000218f4468>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    15.8351532     0.5879086     0.5876373     0.7425175     0.4731271
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.38812   0.5195365   0.5165087   0.6590413     0.3853874
## 95% 22.01717   0.7002781   0.7042417   0.7867353     0.6672325
## [1] 0.75
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000021ed26e0>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.4858449     0.4279415     0.4280384     0.8718297     0.2575433
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.808974   0.3691429   0.3655462   0.8041119     0.1937664
```

```
## 95% 13.471103   0.5506375   0.5619635   0.8993002     0.4341862
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000012f11e38>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.33243065    0.16721746    0.16792578    0.98044822    0.04100941
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9827856   0.1402617   0.1397445   0.9644913    0.02782682
## 95% 2.7173212   0.2485963   0.2459277   0.9861393    0.08751447
##      sampleSize           raceN      sigma.race       beta.acup       beta.mbsr
##    1200.0000000       3.0000000       1.0000000       5.0000000       5.0000000
##        beta.sex        beta.age        beta.edu        beta.len        beta.bas
##       1.0000000      -1.0000000       0.2311117       0.1222176      -0.2231436
##       beta.conc         markerN     beta.biom.v       mdfN.acup beta.mdf.acup.v
##      -0.2613648      10.0000000       1.0000000       4.0000000       1.0000000
##     gama.acup.v       mdfN.mbsr beta.mdf.mbsr.v     gama.mbsr.v
##       1.0000000       4.0000000       1.0000000       1.0000000
## [1] 0
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc
## <environment: 0x0000000016aad158>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    28.1829279     0.7847588     0.7846493     0.4407545     0.8243672
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  24.74555   0.7119557   0.7069050   0.3299170     0.7433286
## 95% 33.01464   0.8712103   0.8771819   0.5168017     0.9656033
## [1] 0.25
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + zmdfAcup1 + zmdfMBSR1 + xacup *
##     zmdfAcup1 + xmbsr * zmdfMBSR1
## <environment: 0x0000000021def740>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    22.6092034     0.7033350     0.7033729     0.5968476     0.6670826
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  19.64704   0.6314754   0.6271393   0.5016026     0.5749071
## 95% 28.12360   0.8035977   0.8089281   0.6581636     0.8596202
## [1] 0.5
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + zmdfAcup1 +
##     zmdfAcup2 + zmdfMBSR1 + zmdfMBSR2 + xacup * zmdfAcup1 + xacup *
##     zmdfAcup2 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2
## <environment: 0x00000000214b72c8>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    15.7640726     0.5865059     0.5861928     0.7435599     0.4704266
##          MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  13.39465   0.5190445   0.5152673   0.6603702     0.3853874
## 95% 21.81156   0.6957762   0.7004713   0.7867353     0.6550462
## [1] 0.75
```

```
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + zmdfAcup1 + zmdfAcup2 + zmdfAcup3 + zmdfMBSR1 +
##     zmdfMBSR2 + zmdfMBSR3 + xacup * zmdfAcup1 + xacup * zmdfAcup2 +
##     xacup * zmdfAcup3 + xmbsr * zmdfMBSR1 + xmbsr * zmdfMBSR2 +
##     xmbsr * zmdfMBSR3
## <environment: 0x0000000012d9ae50>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##     8.4237716     0.4263950     0.4264433     0.8726816     0.2552171
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%   6.804714   0.3687409   0.3653166   0.8114306     0.1932915
## 95% 13.248994   0.5384069   0.5497879   0.8992711     0.4096211
## [1] 1
## Y ~ xrace + xacup + xmbsr + xsex + xage + xedu + xlen + xbas +
##     xconc + xbiom1 + xbiom2 + xbiom3 + xbiom4 + xbiom5 + xbiom6 +
##     xbiom7 + xbiom8 + xbiom9 + xbiom10 + zmdfAcup1 + zmdfAcup2 +
##     zmdfAcup3 + zmdfAcup4 + zmdfMBSR1 + zmdfMBSR2 + zmdfMBSR3 +
##     zmdfMBSR4 + xacup * zmdfAcup1 + xacup * zmdfAcup2 + xacup *
##     zmdfAcup3 + xacup * zmdfAcup4 + xmbsr * zmdfMBSR1 + xmbsr *
##     zmdfMBSR2 + xmbsr * zmdfMBSR3 + xmbsr * zmdfMBSR4
## <environment: 0x0000000021cf1060>
##           MSE   L2normRatio   L1normRatio   correlation MSEoverObsVar
##    1.31790073    0.16638799    0.16708188    0.98066460    0.04047913
##           MSE L2normRatio L1normRatio correlation MSEoverObsVar
## 5%  0.9820715   0.1398601   0.1394614   0.9674268    0.02782541
## 95% 2.0304508   0.2352280   0.2344993   0.9861393    0.07304756
```

```
cbind(groupSampleSizes*3, AUC);
```

```
##       [,1]      [,2]      [,3]      [,4]      [,5]      [,6]
##  [1,]   60 0.3062150 0.4470913 0.5742827 0.7125640 0.9280411
##  [2,]  120 0.3605642 0.5023642 0.6369624 0.7781005 0.9525291
##  [3,]  180 0.3777141 0.5238036 0.6655442 0.8051859 0.9616046
##  [4,]  240 0.3909239 0.5387626 0.6837501 0.8223989 0.9666190
##  [5,]  300 0.4014656 0.5496820 0.6954741 0.8332995 0.9698527
##  [6,]  360 0.4085823 0.5581608 0.7039278 0.8410104 0.9720262
##  [7,]  420 0.4141425 0.5647614 0.7104989 0.8463451 0.9736149
##  [8,]  480 0.4178060 0.5694855 0.7162259 0.8509946 0.9748863
##  [9,]  540 0.4220109 0.5743119 0.7210020 0.8546330 0.9758900
## [10,]  600 0.4251396 0.5785358 0.7249445 0.8578500 0.9767349
## [11,]  660 0.4279971 0.5816884 0.7281989 0.8604168 0.9774243
## [12,]  720 0.4302269 0.5844524 0.7307943 0.8625442 0.9779938
## [13,]  780 0.4314782 0.5861955 0.7330356 0.8643980 0.9784894
## [14,]  840 0.4332901 0.5882694 0.7350951 0.8660029 0.9789264
## [15,]  900 0.4348146 0.5901795 0.7370501 0.8674603 0.9793107
## [16,]  960 0.4359107 0.5916619 0.7385603 0.8686898 0.9796389
## [17,] 1020 0.4371533 0.5931331 0.7399851 0.8698479 0.9799456
## [18,] 1080 0.4386509 0.5945913 0.7413284 0.8708978 0.9802150
## [19,] 1140 0.4397274 0.5957173 0.7425175 0.8718297 0.9804482
## [20,] 1200 0.4407545 0.5968476 0.7435599 0.8726816 0.9806646
```