Nordic

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Contents


```
# Markdown
library(knitr)
library(kableExtra)
```

```
## Warning: package 'kableExtra' was built under R version 4.0.4
```

```
# Data Analysis
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.0.4
```

```
library(naniar)
```

```
## Warning: package 'naniar' was built under R version 4.0.4
```

```
library(caret)
```

```
## Warning: package 'caret' was built under R version 4.0.4
```

```
library(rpart)
library(rpart.plot)
```

```
## Warning: package 'rpart.plot' was built under R version 4.0.4
```

```
library(rattle)
```

```
## Warning: package 'rattle' was built under R version 4.0.4
```

Check the operation system

```
sessionInfo()
```

```
## R version 4.0.3 (2020-10-10)
## Platform: x86_64-w64-mingw32/x64 (64-bit)
## Running under: Windows 10 x64 (build 19042)
```

```
##
## Matrix products: default
##
## locale:
## [1] LC_COLLATE=German_Germany.1252  LC_CTYPE=German_Germany.1252
## [3] LC_MONETARY=German_Germany.1252 LC_NUMERIC=C
## [5] LC_TIME=German_Germany.1252
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] rattle_5.4.0     bitops_1.0-6     tibble_3.0.4     rpart.plot_3.0.9
##  [5] rpart_4.1-15     caret_6.0-86     ggplot2_3.3.3    lattice_0.20-41
##  [9] naniar_0.6.0     dplyr_1.0.5      kableExtra_1.3.4 knitr_1.30
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_1.0.6           svglite_2.0.0        lubridate_1.7.10
##  [4] class_7.3-17         assertthat_0.2.1     digest_0.6.27
##  [7] ipred_0.9-11         foreach_1.5.1        R6_2.5.0
## [10] plyr_1.8.6           stats4_4.0.3         visdat_0.5.3
## [13] evaluate_0.14        httr_1.4.2           pillar_1.4.7
## [16] rlang_0.4.10         data.table_1.13.6    rstudioapi_0.13
## [19] Matrix_1.2-18        rmarkdown_2.6        splines_4.0.3
## [22] webshot_0.5.2        gower_0.2.2          stringr_1.4.0
## [25] munsell_0.5.0        compiler_4.0.3       xfun_0.20
## [28] pkgconfig_2.0.3      systemfonts_1.0.1    htmltools_0.5.0
## [31] nnet_7.3-14          tidyselect_1.1.0     prodlim_2019.11.13
## [34] codetools_0.2-16     viridisLite_0.3.0    crayon_1.3.4
## [37] withr_2.3.0          MASS_7.3-53          recipes_0.1.15
## [40] ModelMetrics_1.2.2.2 grid_4.0.3           nlme_3.1-149
## [43] gtable_0.3.0         lifecycle_1.0.0      DBI_1.1.1
## [46] magrittr_2.0.1       pROC_1.17.0.1        scales_1.1.1
## [49] stringi_1.5.3        reshape2_1.4.4       timeDate_3043.102
## [52] xml2_1.3.2           ellipsis_0.3.1       generics_0.1.0
## [55] vctrs_0.3.6          lava_1.6.9           iterators_1.0.13
## [58] tools_4.0.3          glue_1.4.2           purrr_0.3.4
## [61] survival_3.2-7       yaml_2.2.1           colorspace_2.0-0
## [64] rvest_1.0.0
```

Versions of packages

```
pkg <- tibble::tibble(
  Package = names(installed.packages()[,3]),
  Version = unname(installed.packages()[,3])
)

usePackages <- c("dplyr","naniar","caret","rpart","rpart.plot","rattle")
version <- dplyr::filter(pkg , Package %in% usePackages )
kable(version,caption = "Versions of packages")%>%
  kable_styling(latex_options =c("striped", "hold_position"))
```

Table 1: Versions of packages

Package	Version
caret	6.0-86
dplyr	1.0.5
naniar	0.6.0
rattle	5.4.0
rpart.plot	3.0.9
rpart	4.1-15

Data

```
dta <- read.csv("PV1.txt",sep="", header = FALSE)
nrow(dta)
```

```
## [1] 9253
```

```
colnames(dta) <- c("ST004D01T","IMMIG","ESCS","MOTIVAT","ANXTEST","EMOSUPS",
                   "BELONG","TEACHSUP","PVSCIE","ST016Q01NA","SENWT",
                   "IMMIG2","IMMIG3")
dta <- as.data.frame(dta[,c("ST004D01T","IMMIG","ESCS","MOTIVAT","ANXTEST",
                            "EMOSUPS","BELONG","TEACHSUP","PVSCIE","ST016Q01NA")])
dta <- dta%>%mutate_at(c("ST016Q01NA"),as.numeric)%>%replace_with_na_all(condition = ~.x==9999)
apply(dta,2,function(x) sum(is.na(x)/nrow(dta)))
```

```
##  ST004D01T      IMMIG       ESCS    MOTIVAT    ANXTEST    EMOSUPS     BELONG
## 0.00000000 0.02215498 0.01707554 0.02355993 0.02258727 0.02118232 0.02496488
##   TEACHSUP     PVSCIE ST016Q01NA
## 0.07013941 0.00000000 0.02323571
```

```
dta <- dta[complete.cases(dta),]#delete NA values in data
dta <- dta%>%mutate(wb=cut(ST016Q01NA,
                                quantile(ST016Q01NA, c(0, .25, .75, 1),na.rm=TRUE),
                                labels = c('Low', 'Medium', 'High'),
                                include.lowest = TRUE))

# Check the proportions of low, middle, and high well-being
round(table(dta$wb,useNA = "always")/nrow(dta),digits = 2)#
```

```
##
##    Low Medium   High   <NA>
##   0.31   0.51   0.18   0.00
```

```r
# Selected only low and high well-being students
dta_n <- dta%>%filter(wb=="Low"|wb=="High")%>%
  select(c("ST004D01T","IMMIG","ESCS","MOTIVAT","ANXTEST","EMOSUPS",
           "BELONG","TEACHSUP","PVSCIE","wb"))
nrow(dta_n)
```

```
## [1] 4155
```

```r
dta_n <- dta_n%>%mutate_at(c("ST004D01T","IMMIG"),as.factor)
dta_n$wb<- factor(dta_n$wb)

# 80% training data
set.seed(1234);train <- sample(1:nrow(dta_n),floor(nrow(dta_n)*0.8),replace = FALSE)
training <- dta_n[train,]
testing <- dta_n[-train,]
```

Model 0: Decision tree for training and testing data

- Baseline: default cp=0.01

```r
#training
set.seed(1234);model <- rpart(wb~.,data=training,method = "class",na.action = na.omit)
Model0 <- summary(model)
```

```
## Call:
## rpart(formula = wb ~ ., data = training, na.action = na.omit,
##     method = "class")
##   n= 3324
##
##           CP nsplit rel error    xerror       xstd
## 1 0.32475884      0 1.0000000 1.0000000 0.02242802
## 2 0.02250804      1 0.6752412 0.7130225 0.02049928
## 3 0.02130225      3 0.6302251 0.6454984 0.01983779
## 4 0.01969453      5 0.5876206 0.6197749 0.01956148
## 5 0.01000000      7 0.5482315 0.5980707 0.01931726
##
## Variable importance
##    BELONG   EMOSUPS   ANXTEST ST004D01T   MOTIVAT      ESCS  TEACHSUP
##        62        24         7         3         2         1         1
##
## Node number 1: 3324 observations,    complexity param=0.3247588
##   predicted class=Low   expected loss=0.3742479  P(node) =1
##     class counts:  2080  1244
##    probabilities: 0.626 0.374
##   left son=2 (2314 obs) right son=3 (1010 obs)
##   Primary splits:
##       BELONG    < 0.48525  to the left,  improve=307.9098, (0 missing)
##       EMOSUPS   < 0.76665  to the left,  improve=266.5294, (0 missing)
##       ANXTEST   < -0.16225 to the right, improve=146.7226, (0 missing)
##       ST004D01T splits as  RL,           improve=145.1907, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=107.0852, (0 missing)
##   Surrogate splits:
##       ANXTEST < -1.0247  to the right, agree=0.715, adj=0.060, (0 split)
##       ESCS    < 1.8952   to the left,  agree=0.697, adj=0.002, (0 split)
##       PVSCIE  < 796.82   to the left,  agree=0.696, adj=0.001, (0 split)
```

```
##
## Node number 2: 2314 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.2320657  P(node) =0.6961492
##     class counts:  1777   537
##    probabilities: 0.768 0.232
##   left son=4 (1715 obs) right son=5 (599 obs)
##   Primary splits:
##       EMOSUPS   < 0.76665  to the left,  improve=97.34052, (0 missing)
##       ST004D01T splits as  RL,           improve=66.29667, (0 missing)
##       BELONG    < -2.3737  to the right, improve=51.49335, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=43.43130, (0 missing)
##       ANXTEST   < -0.6491  to the right, improve=43.29168, (0 missing)
##   Surrogate splits:
##       MOTIVAT < 1.60675  to the left,  agree=0.752, adj=0.042, (0 split)
##       BELONG  < -2.792   to the right, agree=0.751, adj=0.038, (0 split)
##       ESCS    < 1.3735   to the left,  agree=0.747, adj=0.023, (0 split)
##
## Node number 3: 1010 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.3  P(node) =0.3038508
##     class counts:   303   707
##    probabilities: 0.300 0.700
##   left son=6 (378 obs) right son=7 (632 obs)
##   Primary splits:
##       EMOSUPS   < 0.516    to the left,  improve=38.63989, (0 missing)
##       ANXTEST   < 0.52575  to the right, improve=33.40490, (0 missing)
##       BELONG    < 0.8473   to the left,  improve=29.88052, (0 missing)
##       ST004D01T splits as  RL,           improve=27.04718, (0 missing)
##       TEACHSUP  < 0.2479   to the left,  improve=14.79492, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.5708  to the left,  agree=0.648, adj=0.058, (0 split)
##       TEACHSUP < -1.04835 to the left,  agree=0.641, adj=0.040, (0 split)
##       ESCS     < -1.00565 to the left,  agree=0.637, adj=0.029, (0 split)
##       ANXTEST  < 1.88045  to the right, agree=0.630, adj=0.011, (0 split)
##       BELONG   < 0.5179   to the left,  agree=0.630, adj=0.011, (0 split)
##
## Node number 4: 1715 observations
##   predicted class=Low   expected loss=0.1463557  P(node) =0.5159446
##     class counts:  1464   251
##    probabilities: 0.854 0.146
##
## Node number 5: 599 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.4774624  P(node) =0.1802046
##     class counts:   313   286
##    probabilities: 0.523 0.477
##   left son=10 (531 obs) right son=11 (68 obs)
##   Primary splits:
##       BELONG    < -1.76375 to the right, improve=28.937130, (0 missing)
##       ANXTEST   < -0.09165 to the right, improve=24.139420, (0 missing)
##       ST004D01T splits as  RL,           improve=22.988270, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=12.301810, (0 missing)
##       MOTIVAT   < 0.53905  to the left,  improve= 7.913912, (0 missing)
##   Surrogate splits:
##       EMOSUPS < 0.982    to the right, agree=0.888, adj=0.015, (0 split)
##
```

```
## Node number 6: 378 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.478836  P(node) =0.1137184
##     class counts:   181   197
##    probabilities: 0.479 0.521
##   left son=12 (151 obs) right son=13 (227 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=19.449480, (0 missing)
##       ANXTEST   < 0.5469   to the right, improve=12.242440, (0 missing)
##       BELONG    < 0.85785  to the left,  improve=10.551110, (0 missing)
##       PVSCIE    < 383.0415 to the right, improve= 8.046224, (0 missing)
##       TEACHSUP  < 0.635    to the left,  improve= 3.677357, (0 missing)
##   Surrogate splits:
##       ANXTEST  < -0.24555 to the right, agree=0.704, adj=0.258, (0 split)
##       MOTIVAT  < 0.4543   to the right, agree=0.635, adj=0.086, (0 split)
##       TEACHSUP < -1.154   to the left,  agree=0.622, adj=0.053, (0 split)
##       ESCS     < 1.36325  to the right, agree=0.611, adj=0.026, (0 split)
##       EMOSUPS  < -1.5696  to the left,  agree=0.611, adj=0.026, (0 split)
##
## Node number 7: 632 observations
##   predicted class=High  expected loss=0.193038  P(node) =0.1901324
##     class counts:   122   510
##    probabilities: 0.193 0.807
##
## Node number 10: 531 observations,    complexity param=0.01969453
##   predicted class=Low   expected loss=0.4218456  P(node) =0.1597473
##     class counts:   307   224
##    probabilities: 0.578 0.422
##   left son=20 (155 obs) right son=21 (376 obs)
##   Primary splits:
##       ANXTEST   < 0.444    to the right, improve=17.950590, (0 missing)
##       BELONG    < -0.41595 to the left,  improve=16.110850, (0 missing)
##       ST004D01T splits as  RL,           improve=12.721750, (0 missing)
##       TEACHSUP  < 0.3595   to the left,  improve= 7.256387, (0 missing)
##       PVSCIE    < 587.5145 to the right, improve= 3.811584, (0 missing)
##   Surrogate splits:
##       PVSCIE   < 395.287  to the left,  agree=0.725, adj=0.058, (0 split)
##       IMMIG    splits as  RLL,          agree=0.721, adj=0.045, (0 split)
##       TEACHSUP < -1.07145 to the left,  agree=0.714, adj=0.019, (0 split)
##       BELONG   < -1.1089  to the left,  agree=0.710, adj=0.006, (0 split)
##
## Node number 11: 68 observations
##   predicted class=High  expected loss=0.08823529  P(node) =0.02045728
##     class counts:     6    62
##    probabilities: 0.088 0.912
##
## Node number 12: 151 observations
##   predicted class=Low   expected loss=0.3245033  P(node) =0.0454272
##     class counts:   102    49
##    probabilities: 0.675 0.325
##
## Node number 13: 227 observations
##   predicted class=High  expected loss=0.3480176  P(node) =0.06829122
##     class counts:    79   148
##    probabilities: 0.348 0.652
```

```
##
## Node number 20: 155 observations
##   predicted class=Low   expected loss=0.2193548  P(node) =0.04663057
##     class counts:   121    34
##    probabilities: 0.781 0.219
##
## Node number 21: 376 observations,    complexity param=0.01969453
##   predicted class=High  expected loss=0.4946809  P(node) =0.1131167
##     class counts:   186   190
##    probabilities: 0.495 0.505
##   left son=42 (147 obs) right son=43 (229 obs)
##   Primary splits:
##       BELONG    < -0.41595 to the left,  improve=12.108840, (0 missing)
##       PVSCIE    < 581.4345 to the right, improve= 6.342762, (0 missing)
##       ST004D01T splits as  RL,           improve= 6.148936, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve= 5.519050, (0 missing)
##       ANXTEST   < -1.6695  to the right, improve= 5.465778, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.3486  to the left,  agree=0.633, adj=0.061, (0 split)
##       PVSCIE   < 652.192  to the right, agree=0.625, adj=0.041, (0 split)
##       IMMIG    splits as  R-L,          agree=0.617, adj=0.020, (0 split)
##       ANXTEST  < 0.3838   to the right, agree=0.617, adj=0.020, (0 split)
##       TEACHSUP < -1.23805 to the left,  agree=0.612, adj=0.007, (0 split)
##
## Node number 42: 147 observations
##   predicted class=Low   expected loss=0.3469388  P(node) =0.04422383
##     class counts:    96    51
##    probabilities: 0.653 0.347
##
## Node number 43: 229 observations
##   predicted class=High  expected loss=0.3930131  P(node) =0.0688929
##     class counts:    90   139
##    probabilities: 0.393 0.607
```

```
model$cptable[which.min(model$cptable[,"xerror"]),"CP"]#show the cp values and find the small cross-val
```

```
## [1] 0.01
```

```
#variables are used in the tree , choosing cp based on the low xerror
prune0 <- prune(model, cp = 0.01)
Pred0 <- predict(prune0,training,type="class")
acc0<- confusionMatrix(Pred0,training$wb)
acc0
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  Low High
##       Low  1783  385
##       High  297  859
##
##                Accuracy : 0.7948
##                  95% CI : (0.7807, 0.8084)
##     No Information Rate : 0.6258
##     P-Value [Acc > NIR] : < 2.2e-16
##
```

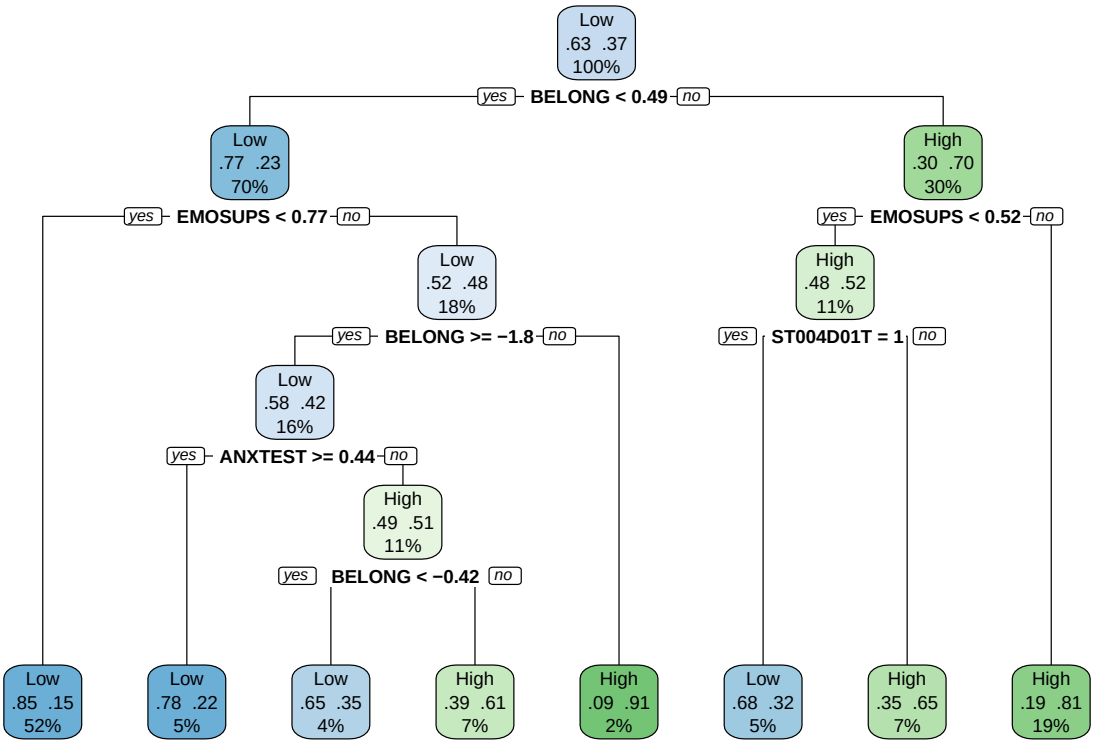
```
##                  Kappa : 0.5556
##
##  Mcnemar's Test P-Value : 0.0008641
##
##             Sensitivity : 0.8572
##             Specificity : 0.6905
##          Pos Pred Value : 0.8224
##          Neg Pred Value : 0.7431
##              Prevalence : 0.6258
##          Detection Rate : 0.5364
##    Detection Prevalence : 0.6522
##       Balanced Accuracy : 0.7739
##
##        'Positive' Class : Low
##
```

```
#testing
PredT0 <- predict(prune0,testing,type="class")
accT0 <- confusionMatrix(PredT0,testing$wb)
accT0
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction Low High
##       Low  441   83
##       High  91  216
##
##                Accuracy : 0.7906
##                  95% CI : (0.7613, 0.8178)
##     No Information Rate : 0.6402
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.5481
##
##  Mcnemar's Test P-Value : 0.5956
##
##             Sensitivity : 0.8289
##             Specificity : 0.7224
##          Pos Pred Value : 0.8416
##          Neg Pred Value : 0.7036
##              Prevalence : 0.6402
##          Detection Rate : 0.5307
##    Detection Prevalence : 0.6306
##       Balanced Accuracy : 0.7757
##
##        'Positive' Class : Low
##
```

Plot and important variables for the baseline model

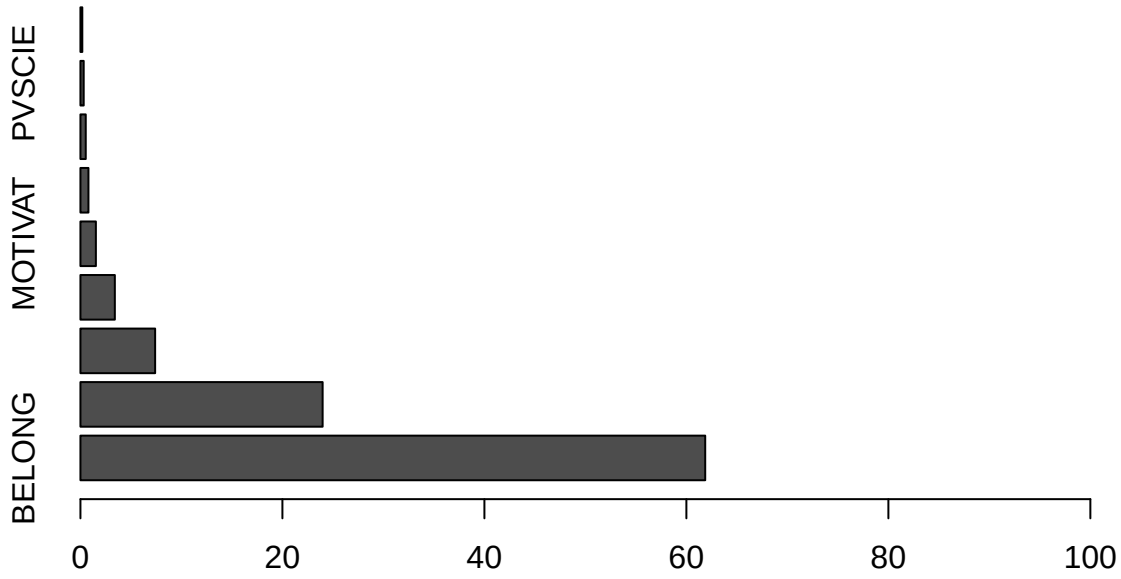
```
rpart.plot(prune0,extra = 104,yesno=2)
```




```
Model0 $variable.importance
```

```
##     BELONG    EMOSUPS    ANXTEST  ST004D01T    MOTIVAT       ESCS   TEACHSUP
## 353.218065 136.921174  42.226504  19.449484   8.727325   4.524452   2.993569
##     PVSCIE       IMMIG
##   1.841392   1.057791
```

```
#importance variables were scaled to 100
barplot(t((Model0 $variable.importance/sum(Model0$variable.importance)*100)),horiz=TRUE,xlim = c(0,100))
```



Model1: Decision tree for training and testing data

- Pruned model: let a tree fully grows(set cp=0), then find a smallest cross-validated error
- the smallest cross-validated error: 0.5972669, corresponding cp=0.0064308682

```
# training
set.seed(1234);model1 <- rpart(wb~.,data=training,method = "class",na.action = na.omit,
                               control=rpart.control(cp=0))
# set seed to make results reproducible
Model1 <- summary(model1)
```

```
## Call:
## rpart(formula = wb ~ ., data = training, na.action = na.omit,
##     method = "class", control = rpart.control(cp = 0))
##   n= 3324
##
##              CP nsplit rel error    xerror       xstd
## 1  0.3247588424      0 1.0000000 1.0000000 0.02242802
## 2  0.0225080386      1 0.6752412 0.7130225 0.02049928
## 3  0.0213022508      3 0.6302251 0.6454984 0.01983779
## 4  0.0196945338      5 0.5876206 0.6197749 0.01956148
## 5  0.0064308682      7 0.5482315 0.5972669 0.01930801
## 6  0.0056270096      9 0.5353698 0.6045016 0.01939070
## 7  0.0044212219     10 0.5297428 0.6028939 0.01937243
## 8  0.0040192926     16 0.5032154 0.5980707 0.01931726
## 9  0.0033762058     19 0.4911576 0.5972669 0.01930801
## 10 0.0028135048     25 0.4702572 0.6004823 0.01934491
```

```
## 11 0.0026795284     29 0.4565916 0.6045016 0.01939070
## 12 0.0024115756     32 0.4485531 0.6077170 0.01942708
## 13 0.0020096463     35 0.4413183 0.6117363 0.01947223
## 14 0.0016077170     43 0.4252412 0.6157556 0.01951703
## 15 0.0013780432     54 0.4059486 0.6189711 0.01955262
## 16 0.0013397642     61 0.3963023 0.6213826 0.01957916
## 17 0.0012861736     64 0.3922830 0.6229904 0.01959679
## 18 0.0010718114     69 0.3858521 0.6302251 0.01967542
## 19 0.0008038585     77 0.3770096 0.6350482 0.01972722
## 20 0.0004019293     86 0.3697749 0.6511254 0.01989639
## 21 0.0002679528     90 0.3681672 0.6672026 0.02006025
## 22 0.0000000000     99 0.3657556 0.6720257 0.02010840
##
## Variable importance
##    BELONG   EMOSUPS   ANXTEST    PVSCIE ST004D01T  TEACHSUP      ESCS   MOTIVAT
##        41        15        13         8         6         5         5         5
##     IMMIG
##         1
##
## Node number 1: 3324 observations,    complexity param=0.3247588
##   predicted class=Low   expected loss=0.3742479  P(node) =1
##     class counts:  2080  1244
##    probabilities: 0.626 0.374
##   left son=2 (2314 obs) right son=3 (1010 obs)
##   Primary splits:
##       BELONG    < 0.48525  to the left,  improve=307.9098, (0 missing)
##       EMOSUPS   < 0.76665  to the left,  improve=266.5294, (0 missing)
##       ANXTEST   < -0.16225 to the right, improve=146.7226, (0 missing)
##       ST004D01T splits as  RL,           improve=145.1907, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=107.0852, (0 missing)
##   Surrogate splits:
##       ANXTEST < -1.0247  to the right, agree=0.715, adj=0.060, (0 split)
##       ESCS    < 1.8952   to the left,  agree=0.697, adj=0.002, (0 split)
##       PVSCIE  < 796.82   to the left,  agree=0.696, adj=0.001, (0 split)
##
## Node number 2: 2314 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.2320657  P(node) =0.6961492
##     class counts:  1777   537
##    probabilities: 0.768 0.232
##   left son=4 (1715 obs) right son=5 (599 obs)
##   Primary splits:
##       EMOSUPS   < 0.76665  to the left,  improve=97.34052, (0 missing)
##       ST004D01T splits as  RL,           improve=66.29667, (0 missing)
##       BELONG    < -2.3737  to the right, improve=51.49335, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=43.43130, (0 missing)
##       ANXTEST   < -0.6491  to the right, improve=43.29168, (0 missing)
##   Surrogate splits:
##       MOTIVAT < 1.60675  to the left,  agree=0.752, adj=0.042, (0 split)
##       BELONG  < -2.792   to the right, agree=0.751, adj=0.038, (0 split)
##       ESCS    < 1.3735   to the left,  agree=0.747, adj=0.023, (0 split)
##
## Node number 3: 1010 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.3  P(node) =0.3038508
##     class counts:   303   707
```

```
##    probabilities: 0.300 0.700
##   left son=6 (378 obs) right son=7 (632 obs)
##   Primary splits:
##       EMOSUPS   < 0.516    to the left,  improve=38.63989, (0 missing)
##       ANXTEST   < 0.52575  to the right, improve=33.40490, (0 missing)
##       BELONG    < 0.8473   to the left,  improve=29.88052, (0 missing)
##       ST004D01T splits as  RL,           improve=27.04718, (0 missing)
##       TEACHSUP  < 0.2479   to the left,  improve=14.79492, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.5708  to the left,  agree=0.648, adj=0.058, (0 split)
##       TEACHSUP < -1.04835 to the left,  agree=0.641, adj=0.040, (0 split)
##       ESCS     < -1.00565 to the left,  agree=0.637, adj=0.029, (0 split)
##       ANXTEST  < 1.88045  to the right, agree=0.630, adj=0.011, (0 split)
##       BELONG   < 0.5179   to the left,  agree=0.630, adj=0.011, (0 split)
##
## Node number 4: 1715 observations,    complexity param=0.003376206
##   predicted class=Low   expected loss=0.1463557  P(node) =0.5159446
##     class counts:  1464   251
##    probabilities: 0.854 0.146
##   left son=8 (994 obs) right son=9 (721 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=36.62399, (0 missing)
##       ANXTEST   < -0.68575 to the right, improve=15.43160, (0 missing)
##       BELONG    < 0.0233   to the left,  improve=14.05568, (0 missing)
##       TEACHSUP  < 1.2768   to the left,  improve=11.08953, (0 missing)
##       PVSCIE    < 448.747  to the right, improve=10.79235, (0 missing)
##   Surrogate splits:
##       ANXTEST  < -0.31845 to the right, agree=0.637, adj=0.136, (0 split)
##       BELONG   < 0.14145  to the left,  agree=0.592, adj=0.031, (0 split)
##       PVSCIE   < 356.427  to the right, agree=0.588, adj=0.019, (0 split)
##       MOTIVAT  < -2.88635 to the right, agree=0.587, adj=0.017, (0 split)
##       TEACHSUP < -2.4491  to the right, agree=0.584, adj=0.011, (0 split)
##
## Node number 5: 599 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.4774624  P(node) =0.1802046
##     class counts:   313   286
##    probabilities: 0.523 0.477
##   left son=10 (531 obs) right son=11 (68 obs)
##   Primary splits:
##       BELONG    < -1.76375 to the right, improve=28.937130, (0 missing)
##       ANXTEST   < -0.09165 to the right, improve=24.139420, (0 missing)
##       ST004D01T splits as  RL,           improve=22.988270, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=12.301810, (0 missing)
##       MOTIVAT   < 0.53905  to the left,  improve= 7.913912, (0 missing)
##   Surrogate splits:
##       EMOSUPS < 0.982    to the right, agree=0.888, adj=0.015, (0 split)
##
## Node number 6: 378 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.478836  P(node) =0.1137184
##     class counts:   181   197
##    probabilities: 0.479 0.521
##   left son=12 (151 obs) right son=13 (227 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=19.449480, (0 missing)
```

```
##       ANXTEST   < 0.5469   to the right, improve=12.242440, (0 missing)
##       BELONG    < 0.85785  to the left,  improve=10.551110, (0 missing)
##       PVSCIE    < 383.0415 to the right, improve= 8.046224, (0 missing)
##       TEACHSUP  < 0.635    to the left,  improve= 3.677357, (0 missing)
##   Surrogate splits:
##       ANXTEST  < -0.24555 to the right, agree=0.704, adj=0.258, (0 split)
##       MOTIVAT  < 0.4543   to the right, agree=0.635, adj=0.086, (0 split)
##       TEACHSUP < -1.154   to the left,  agree=0.622, adj=0.053, (0 split)
##       ESCS     < 1.36325  to the right, agree=0.611, adj=0.026, (0 split)
##       EMOSUPS  < -1.5696  to the left,  agree=0.611, adj=0.026, (0 split)
##
## Node number 7: 632 observations,    complexity param=0.00562701
##   predicted class=High  expected loss=0.193038  P(node) =0.1901324
##     class counts:   122   510
##    probabilities: 0.193 0.807
##   left son=14 (59 obs) right son=15 (573 obs)
##   Primary splits:
##       ANXTEST   < 0.52575  to the right, improve=17.461460, (0 missing)
##       ST004D01T splits as  RL,           improve=10.970540, (0 missing)
##       BELONG    < 1.1613   to the left,  improve=10.305940, (0 missing)
##       TEACHSUP  < 0.2479   to the left,  improve= 5.209231, (0 missing)
##       MOTIVAT   < 1.0092   to the left,  improve= 3.533010, (0 missing)
##
## Node number 8: 994 observations,    complexity param=0.001286174
##   predicted class=Low   expected loss=0.0583501  P(node) =0.2990373
##     class counts:   936    58
##    probabilities: 0.942 0.058
##   left son=16 (924 obs) right son=17 (70 obs)
##   Primary splits:
##       BELONG  < 0.2038   to the left,  improve=4.363856, (0 missing)
##       PVSCIE  < 263.8565 to the right, improve=3.146196, (0 missing)
##       EMOSUPS < -2.40745 to the right, improve=3.037786, (0 missing)
##       MOTIVAT < -0.7962  to the left,  improve=1.562082, (0 missing)
##       ANXTEST < -1.8632  to the right, improve=1.022381, (0 missing)
##
## Node number 9: 721 observations,    complexity param=0.003376206
##   predicted class=Low   expected loss=0.2676838  P(node) =0.2169073
##     class counts:   528   193
##    probabilities: 0.732 0.268
##   left son=18 (594 obs) right son=19 (127 obs)
##   Primary splits:
##       TEACHSUP < 1.1011   to the left,  improve=12.925900, (0 missing)
##       ANXTEST  < 0.07985  to the right, improve= 9.579870, (0 missing)
##       BELONG   < 0.0233   to the left,  improve= 8.541846, (0 missing)
##       PVSCIE   < 474.035  to the right, improve= 7.966201, (0 missing)
##       EMOSUPS  < -1.01265 to the left,  improve= 7.655370, (0 missing)
##   Surrogate splits:
##       EMOSUPS < 0.516    to the left,  agree=0.829, adj=0.031, (0 split)
##       ESCS    < 1.78425  to the left,  agree=0.828, adj=0.024, (0 split)
##       PVSCIE  < 761.893  to the left,  agree=0.825, adj=0.008, (0 split)
##
## Node number 10: 531 observations,    complexity param=0.01969453
##   predicted class=Low   expected loss=0.4218456  P(node) =0.1597473
##     class counts:   307   224
```

```
##    probabilities: 0.578 0.422
##   left son=20 (155 obs) right son=21 (376 obs)
##   Primary splits:
##       ANXTEST   < 0.444    to the right, improve=17.950590, (0 missing)
##       BELONG    < -0.41595 to the left,  improve=16.110850, (0 missing)
##       ST004D01T splits as  RL,           improve=12.721750, (0 missing)
##       TEACHSUP  < 0.3595   to the left,  improve= 7.256387, (0 missing)
##       PVSCIE    < 587.5145 to the right, improve= 3.811584, (0 missing)
##   Surrogate splits:
##       PVSCIE   < 395.287  to the left,  agree=0.725, adj=0.058, (0 split)
##       IMMIG    splits as  RLL,          agree=0.721, adj=0.045, (0 split)
##       TEACHSUP < -1.07145 to the left,  agree=0.714, adj=0.019, (0 split)
##       BELONG   < -1.1089  to the left,  agree=0.710, adj=0.006, (0 split)
##
## Node number 11: 68 observations
##   predicted class=High  expected loss=0.08823529  P(node) =0.02045728
##     class counts:     6    62
##    probabilities: 0.088 0.912
##
## Node number 12: 151 observations,    complexity param=0.006430868
##   predicted class=Low   expected loss=0.3245033  P(node) =0.0454272
##     class counts:   102    49
##    probabilities: 0.675 0.325
##   left son=24 (135 obs) right son=25 (16 obs)
##   Primary splits:
##       PVSCIE  < 388.6835 to the right, improve=6.480157, (0 missing)
##       BELONG  < 0.9802   to the left,  improve=4.075495, (0 missing)
##       ANXTEST < 1.1631   to the right, improve=2.704382, (0 missing)
##       ESCS    < 1.4161   to the left,  improve=2.528087, (0 missing)
##       EMOSUPS < -2.63285 to the right, improve=2.230422, (0 missing)
##
## Node number 13: 227 observations,    complexity param=0.004421222
##   predicted class=High  expected loss=0.3480176  P(node) =0.06829122
##     class counts:    79   148
##    probabilities: 0.348 0.652
##   left son=26 (120 obs) right son=27 (107 obs)
##   Primary splits:
##       BELONG   < 0.8367   to the left,  improve=7.167733, (0 missing)
##       ANXTEST  < 0.54205  to the right, improve=5.716771, (0 missing)
##       TEACHSUP < 0.635    to the left,  improve=3.438821, (0 missing)
##       EMOSUPS  < -0.9147  to the left,  improve=2.421466, (0 missing)
##       PVSCIE   < 383.0415 to the right, improve=2.353661, (0 missing)
##   Surrogate splits:
##       EMOSUPS  < -0.8847  to the left,  agree=0.612, adj=0.178, (0 split)
##       MOTIVAT  < -0.2507  to the left,  agree=0.586, adj=0.121, (0 split)
##       TEACHSUP < 0.30495  to the left,  agree=0.573, adj=0.093, (0 split)
##       ANXTEST  < -1.12425 to the right, agree=0.568, adj=0.084, (0 split)
##       ESCS     < -0.1859  to the right, agree=0.564, adj=0.075, (0 split)
##
## Node number 14: 59 observations,    complexity param=0.004421222
##   predicted class=Low   expected loss=0.440678  P(node) =0.0177497
##     class counts:    33    26
##    probabilities: 0.559 0.441
##   left son=28 (24 obs) right son=29 (35 obs)
```

```
##   Primary splits:
##       PVSCIE    < 480.9275 to the right, improve=2.941889, (0 missing)
##       TEACHSUP  < 0.7792   to the left,  improve=2.837660, (0 missing)
##       MOTIVAT   < -0.97235 to the left,  improve=1.844550, (0 missing)
##       ST004D01T splits as  RL,           improve=1.536028, (0 missing)
##       ESCS      < 0.2252   to the right, improve=1.504800, (0 missing)
##   Surrogate splits:
##       ESCS     < 0.7018   to the right, agree=0.695, adj=0.250, (0 split)
##       ANXTEST  < 0.58045  to the left,  agree=0.661, adj=0.167, (0 split)
##       BELONG   < 0.71715  to the left,  agree=0.661, adj=0.167, (0 split)
##       MOTIVAT  < 1.55275  to the right, agree=0.627, adj=0.083, (0 split)
##       TEACHSUP < 0.4245   to the left,  agree=0.610, adj=0.042, (0 split)
##
## Node number 15: 573 observations,    complexity param=0.001339764
##   predicted class=High  expected loss=0.1553229  P(node) =0.1723827
##     class counts:    89   484
##    probabilities: 0.155 0.845
##   left son=30 (265 obs) right son=31 (308 obs)
##   Primary splits:
##       BELONG    < 1.1613   to the left,  improve=7.979583, (0 missing)
##       ST004D01T splits as  RL,           improve=5.885098, (0 missing)
##       ANXTEST   < -0.37625 to the right, improve=5.327428, (0 missing)
##       TEACHSUP  < 0.2566   to the left,  improve=3.720405, (0 missing)
##       MOTIVAT   < 1.0092   to the left,  improve=2.964532, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -0.4672  to the left,  agree=0.611, adj=0.158, (0 split)
##       TEACHSUP < 1.1011   to the left,  agree=0.581, adj=0.094, (0 split)
##       ANXTEST  < -0.5509  to the right, agree=0.574, adj=0.079, (0 split)
##       PVSCIE   < 613.603  to the right, agree=0.562, adj=0.053, (0 split)
##       ESCS     < -0.59795 to the left,  agree=0.551, adj=0.030, (0 split)
##
## Node number 16: 924 observations
##   predicted class=Low   expected loss=0.04545455  P(node) =0.2779783
##     class counts:   882    42
##    probabilities: 0.955 0.045
##
## Node number 17: 70 observations,    complexity param=0.001286174
##   predicted class=Low   expected loss=0.2285714  P(node) =0.02105897
##     class counts:    54    16
##    probabilities: 0.771 0.229
##   left son=34 (20 obs) right son=35 (50 obs)
##   Primary splits:
##       MOTIVAT  < -1.1764  to the left,  improve=1.785714, (0 missing)
##       TEACHSUP < 0.2716   to the right, improve=1.716825, (0 missing)
##       ANXTEST  < 0.6879   to the right, improve=1.614507, (0 missing)
##       BELONG   < 0.3597   to the right, improve=1.513300, (0 missing)
##       PVSCIE   < 397.6275 to the left,  improve=1.513300, (0 missing)
##   Surrogate splits:
##       PVSCIE < 338.3905 to the left,  agree=0.771, adj=0.2, (0 split)
##
## Node number 18: 594 observations,    complexity param=0.003376206
##   predicted class=Low   expected loss=0.2239057  P(node) =0.1787004
##     class counts:   461   133
##    probabilities: 0.776 0.224
```

```
##   left son=36 (472 obs) right son=37 (122 obs)
##   Primary splits:
##       BELONG  < 0.0233   to the left,  improve=7.993175, (0 missing)
##       ANXTEST < 0.07985  to the right, improve=7.053423, (0 missing)
##       PVSCIE  < 512.145  to the right, improve=6.768267, (0 missing)
##       EMOSUPS < -0.9567  to the left,  improve=4.402185, (0 missing)
##       ESCS    < 1.63535  to the left,  improve=1.867194, (0 missing)
##
## Node number 19: 127 observations,    complexity param=0.003376206
##   predicted class=Low   expected loss=0.4724409  P(node) =0.03820698
##     class counts:    67    60
##    probabilities: 0.528 0.472
##   left son=38 (118 obs) right son=39 (9 obs)
##   Primary splits:
##       BELONG  < -1.87915 to the right, improve=5.391832, (0 missing)
##       EMOSUPS < -1.01595 to the left,  improve=3.198862, (0 missing)
##       ANXTEST < -1.43085 to the right, improve=2.616974, (0 missing)
##       ESCS    < -0.94075 to the left,  improve=1.609468, (0 missing)
##       MOTIVAT < 1.266    to the left,  improve=1.400204, (0 missing)
##
## Node number 20: 155 observations,    complexity param=0.002009646
##   predicted class=Low   expected loss=0.2193548  P(node) =0.04663057
##     class counts:   121    34
##    probabilities: 0.781 0.219
##   left son=40 (67 obs) right son=41 (88 obs)
##   Primary splits:
##       BELONG    < -0.568   to the left,  improve=3.9766800, (0 missing)
##       ESCS      < -0.7816  to the right, improve=3.5915930, (0 missing)
##       PVSCIE    < 323.3385 to the right, improve=2.5182140, (0 missing)
##       ST004D01T splits as  RL,           improve=1.9774880, (0 missing)
##       MOTIVAT   < -1.4593  to the left,  improve=0.9194874, (0 missing)
##   Surrogate splits:
##       PVSCIE   < 486.8785 to the right, agree=0.645, adj=0.179, (0 split)
##       MOTIVAT  < -0.9994  to the left,  agree=0.619, adj=0.119, (0 split)
##       ESCS     < 1.1903   to the right, agree=0.594, adj=0.060, (0 split)
##       TEACHSUP < -1.2229  to the left,  agree=0.594, adj=0.060, (0 split)
##       ANXTEST  < 0.4653   to the left,  agree=0.581, adj=0.030, (0 split)
##
## Node number 21: 376 observations,    complexity param=0.01969453
##   predicted class=High  expected loss=0.4946809  P(node) =0.1131167
##     class counts:   186   190
##    probabilities: 0.495 0.505
##   left son=42 (147 obs) right son=43 (229 obs)
##   Primary splits:
##       BELONG    < -0.41595 to the left,  improve=12.108840, (0 missing)
##       PVSCIE    < 581.4345 to the right, improve= 6.342762, (0 missing)
##       ST004D01T splits as  RL,           improve= 6.148936, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve= 5.519050, (0 missing)
##       ANXTEST   < -1.6695  to the right, improve= 5.465778, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.3486  to the left,  agree=0.633, adj=0.061, (0 split)
##       PVSCIE   < 652.192  to the right, agree=0.625, adj=0.041, (0 split)
##       IMMIG    splits as  R-L,          agree=0.617, adj=0.020, (0 split)
##       ANXTEST  < 0.3838   to the right, agree=0.617, adj=0.020, (0 split)
```

```
##       TEACHSUP < -1.23805 to the left,  agree=0.612, adj=0.007, (0 split)
##
## Node number 24: 135 observations,    complexity param=0.002411576
##   predicted class=Low   expected loss=0.2740741  P(node) =0.04061372
##     class counts:    98    37
##    probabilities: 0.726 0.274
##   left son=48 (84 obs) right son=49 (51 obs)
##   Primary splits:
##       BELONG   < 0.9802   to the left,  improve=3.107874, (0 missing)
##       EMOSUPS  < -0.3339  to the left,  improve=3.063573, (0 missing)
##       ESCS     < 1.4161   to the left,  improve=2.762202, (0 missing)
##       ANXTEST  < -1.75595 to the right, improve=2.094503, (0 missing)
##       TEACHSUP < 0.03215  to the left,  improve=1.422222, (0 missing)
##   Surrogate splits:
##       ESCS     < 1.22325  to the left,  agree=0.659, adj=0.098, (0 split)
##       TEACHSUP < -1.67325 to the right, agree=0.652, adj=0.078, (0 split)
##       MOTIVAT  < 1.0872   to the left,  agree=0.637, adj=0.039, (0 split)
##       PVSCIE   < 423.863  to the right, agree=0.637, adj=0.039, (0 split)
##       ANXTEST  < 0.65965  to the left,  agree=0.630, adj=0.020, (0 split)
##
## Node number 25: 16 observations
##   predicted class=High  expected loss=0.25  P(node) =0.004813478
##     class counts:     4    12
##    probabilities: 0.250 0.750
##
## Node number 26: 120 observations,    complexity param=0.004421222
##   predicted class=High  expected loss=0.4666667  P(node) =0.03610108
##     class counts:    56    64
##    probabilities: 0.467 0.533
##   left son=52 (102 obs) right son=53 (18 obs)
##   Primary splits:
##       PVSCIE   < 383.1315 to the right, improve=3.811765, (0 missing)
##       ANXTEST  < 0.54725  to the right, improve=2.858333, (0 missing)
##       BELONG   < 0.76005  to the right, improve=2.669351, (0 missing)
##       TEACHSUP < 0.635    to the left,  improve=2.408333, (0 missing)
##       ESCS     < 1.19835  to the left,  improve=2.019048, (0 missing)
##   Surrogate splits:
##       IMMIG splits as  LRL, agree=0.858, adj=0.056, (0 split)
##
## Node number 27: 107 observations,    complexity param=0.0008038585
##   predicted class=High  expected loss=0.2149533  P(node) =0.03219013
##     class counts:    23    84
##    probabilities: 0.215 0.785
##   left son=54 (7 obs) right son=55 (100 obs)
##   Primary splits:
##       ANXTEST  < 0.5167   to the right, improve=1.9035780, (0 missing)
##       ESCS     < -0.67965 to the left,  improve=1.4700600, (0 missing)
##       TEACHSUP < 0.2224   to the left,  improve=1.0245790, (0 missing)
##       MOTIVAT  < -1.97915 to the right, improve=0.9080679, (0 missing)
##       EMOSUPS  < 0.06065  to the left,  improve=0.8815890, (0 missing)
##
## Node number 28: 24 observations
##   predicted class=Low   expected loss=0.25  P(node) =0.007220217
##     class counts:    18     6
```

```
##    probabilities: 0.750 0.250
##
## Node number 29: 35 observations,    complexity param=0.004421222
##   predicted class=High  expected loss=0.4285714  P(node) =0.01052948
##     class counts:    15    20
##    probabilities: 0.429 0.571
##   left son=58 (14 obs) right son=59 (21 obs)
##   Primary splits:
##       ANXTEST   < 0.87805  to the left,  improve=3.809524, (0 missing)
##       PVSCIE    < 435.573  to the left,  improve=2.442002, (0 missing)
##       MOTIVAT   < 0.06505  to the left,  improve=2.274436, (0 missing)
##       TEACHSUP  < 0.747    to the left,  improve=1.685341, (0 missing)
##       ST004D01T splits as  RL,           improve=1.618382, (0 missing)
##   Surrogate splits:
##       EMOSUPS  < 0.83245  to the left,  agree=0.743, adj=0.357, (0 split)
##       ESCS     < -0.3297  to the left,  agree=0.686, adj=0.214, (0 split)
##       MOTIVAT  < -0.97235 to the left,  agree=0.686, adj=0.214, (0 split)
##       IMMIG    splits as  RLR,          agree=0.629, adj=0.071, (0 split)
##       TEACHSUP < 0.53265  to the left,  agree=0.629, adj=0.071, (0 split)
##
## Node number 30: 265 observations,    complexity param=0.001339764
##   predicted class=High  expected loss=0.245283  P(node) =0.07972323
##     class counts:    65   200
##    probabilities: 0.245 0.755
##   left son=60 (109 obs) right son=61 (156 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=4.688131, (0 missing)
##       TEACHSUP  < -0.2427  to the left,  improve=3.966968, (0 missing)
##       ANXTEST   < -0.4501  to the right, improve=2.305329, (0 missing)
##       ESCS      < 0.461    to the left,  improve=2.281865, (0 missing)
##       BELONG    < 1.11665  to the right, improve=1.529597, (0 missing)
##   Surrogate splits:
##       TEACHSUP < -0.6262  to the left,  agree=0.611, adj=0.055, (0 split)
##       ESCS     < 1.517    to the right, agree=0.604, adj=0.037, (0 split)
##       ANXTEST  < 0.0994   to the right, agree=0.604, adj=0.037, (0 split)
##       BELONG   < 0.5179   to the left,  agree=0.600, adj=0.028, (0 split)
##       EMOSUPS  < 1.0478   to the left,  agree=0.592, adj=0.009, (0 split)
##
## Node number 31: 308 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.07792208  P(node) =0.09265945
##     class counts:    24   284
##    probabilities: 0.078 0.922
##   left son=62 (69 obs) right son=63 (239 obs)
##   Primary splits:
##       ANXTEST   < -0.3652  to the right, improve=2.1708430, (0 missing)
##       ST004D01T splits as  RL,           improve=1.3402000, (0 missing)
##       TEACHSUP  < 0.4284   to the left,  improve=1.1688310, (0 missing)
##       MOTIVAT   < 0.92735  to the left,  improve=0.8160243, (0 missing)
##       ESCS      < 1.25465  to the left,  improve=0.6619441, (0 missing)
##   Surrogate splits:
##       IMMIG splits as  RRL,          agree=0.779, adj=0.014, (0 split)
##       ESCS  < 2.0593   to the right, agree=0.779, adj=0.014, (0 split)
##
## Node number 34: 20 observations
```

```
##   predicted class=Low   expected loss=0.05  P(node) =0.006016847
##     class counts:    19     1
##    probabilities: 0.950 0.050
##
## Node number 35: 50 observations,    complexity param=0.001286174
##   predicted class=Low   expected loss=0.3  P(node) =0.01504212
##     class counts:    35    15
##    probabilities: 0.700 0.300
##   left son=70 (16 obs) right son=71 (34 obs)
##   Primary splits:
##       TEACHSUP < 0.2716   to the right, improve=2.654412, (0 missing)
##       ANXTEST  < 0.6879   to the right, improve=2.031746, (0 missing)
##       ESCS     < 0.5913   to the right, improve=1.500000, (0 missing)
##       BELONG   < 0.3597   to the right, improve=1.465116, (0 missing)
##       PVSCIE   < 542.4475 to the left,  improve=1.433604, (0 missing)
##   Surrogate splits:
##       ESCS    < -0.64685 to the left,  agree=0.74, adj=0.187, (0 split)
##       ANXTEST < -0.8184  to the left,  agree=0.74, adj=0.187, (0 split)
##       MOTIVAT < -1.0525  to the left,  agree=0.72, adj=0.125, (0 split)
##
## Node number 36: 472 observations,    complexity param=0.001607717
##   predicted class=Low   expected loss=0.1822034  P(node) =0.1419976
##     class counts:   386    86
##    probabilities: 0.818 0.182
##   left son=72 (460 obs) right son=73 (12 obs)
##   Primary splits:
##       ESCS     < 1.5221   to the left,  improve=3.962466, (0 missing)
##       ANXTEST  < -0.08715 to the right, improve=3.447716, (0 missing)
##       BELONG   < -2.2463  to the right, improve=3.393378, (0 missing)
##       PVSCIE   < 419.2835 to the right, improve=3.198976, (0 missing)
##       TEACHSUP < -2.4452  to the right, improve=2.258786, (0 missing)
##
## Node number 37: 122 observations,    complexity param=0.003376206
##   predicted class=Low   expected loss=0.3852459  P(node) =0.03670277
##     class counts:    75    47
##    probabilities: 0.615 0.385
##   left son=74 (90 obs) right son=75 (32 obs)
##   Primary splits:
##       PVSCIE  < 445.4515 to the right, improve=7.925774, (0 missing)
##       ANXTEST < 0.33155  to the right, improve=4.590304, (0 missing)
##       ESCS    < 1.17235  to the right, improve=4.209294, (0 missing)
##       MOTIVAT < 0.3434   to the right, improve=3.528326, (0 missing)
##       BELONG  < 0.36235  to the right, improve=2.426279, (0 missing)
##   Surrogate splits:
##       ANXTEST < 1.0222   to the left,  agree=0.770, adj=0.125, (0 split)
##       IMMIG   splits as  LRL,          agree=0.746, adj=0.031, (0 split)
##       ESCS    < -1.14565 to the right, agree=0.746, adj=0.031, (0 split)
##
## Node number 38: 118 observations,    complexity param=0.002813505
##   predicted class=Low   expected loss=0.4322034  P(node) =0.0354994
##     class counts:    67    51
##    probabilities: 0.568 0.432
##   left son=76 (20 obs) right son=77 (98 obs)
##   Primary splits:
```

```
##       ANXTEST < 0.35735  to the right, improve=3.835662, (0 missing)
##       BELONG  < -0.53235 to the left,  improve=3.032901, (0 missing)
##       EMOSUPS < -1.01595 to the left,  improve=2.985456, (0 missing)
##       PVSCIE  < 654.4425 to the left,  improve=1.733436, (0 missing)
##       MOTIVAT < 1.266    to the left,  improve=1.468713, (0 missing)
##   Surrogate splits:
##       BELONG < -1.4312  to the left,  agree=0.839, adj=0.05, (0 split)
##
## Node number 39: 9 observations
##   predicted class=High  expected loss=0  P(node) =0.002707581
##     class counts:     0     9
##    probabilities: 0.000 1.000
##
## Node number 40: 67 observations
##   predicted class=Low   expected loss=0.08955224  P(node) =0.02015644
##     class counts:    61     6
##    probabilities: 0.910 0.090
##
## Node number 41: 88 observations,    complexity param=0.002009646
##   predicted class=Low   expected loss=0.3181818  P(node) =0.02647413
##     class counts:    60    28
##    probabilities: 0.682 0.318
##   left son=82 (81 obs) right son=83 (7 obs)
##   Primary splits:
##       PVSCIE    < 324.182  to the right, improve=4.4181500, (0 missing)
##       ST004D01T splits as  RL,           improve=1.2071060, (0 missing)
##       ESCS      < -0.32605 to the right, improve=1.1297790, (0 missing)
##       BELONG    < -0.35705 to the right, improve=1.1007370, (0 missing)
##       TEACHSUP  < -0.81905 to the right, improve=0.8994652, (0 missing)
##   Surrogate splits:
##       IMMIG splits as  LRL, agree=0.932, adj=0.143, (0 split)
##
## Node number 42: 147 observations,    complexity param=0.006430868
##   predicted class=Low   expected loss=0.3469388  P(node) =0.04422383
##     class counts:    96    51
##    probabilities: 0.653 0.347
##   left son=84 (133 obs) right son=85 (14 obs)
##   Primary splits:
##       ANXTEST   < -1.6695  to the right, improve=5.958110, (0 missing)
##       PVSCIE    < 568.6475 to the right, improve=4.959184, (0 missing)
##       ST004D01T splits as  RL,           improve=3.363751, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve=2.991192, (0 missing)
##       MOTIVAT   < -1.3925  to the left,  improve=2.881152, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -2.58215 to the right, agree=0.912, adj=0.071, (0 split)
##
## Node number 43: 229 observations,    complexity param=0.004019293
##   predicted class=High  expected loss=0.3930131  P(node) =0.0688929
##     class counts:    90   139
##    probabilities: 0.393 0.607
##   left son=86 (135 obs) right son=87 (94 obs)
##   Primary splits:
##       MOTIVAT   < 0.0827   to the left,  improve=3.568280, (0 missing)
##       TEACHSUP  < 0.30685  to the left,  improve=3.110963, (0 missing)
```

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##       PVSCIE    < 615.8905 to the right, improve=2.257066, (0 missing)
##       ANXTEST   < -0.45625 to the right, improve=2.103878, (0 missing)
##       ST004D01T splits as  RL,           improve=1.594969, (0 missing)
##   Surrogate splits:
##       ESCS     < 1.0942   to the left,  agree=0.712, adj=0.298, (0 split)
##       ANXTEST  < -2.04825 to the right, agree=0.607, adj=0.043, (0 split)
##       BELONG   < 0.336    to the left,  agree=0.607, adj=0.043, (0 split)
##       TEACHSUP < -0.72165 to the right, agree=0.603, adj=0.032, (0 split)
##       PVSCIE   < 431.674  to the right, agree=0.603, adj=0.032, (0 split)
##
## Node number 48: 84 observations
##   predicted class=Low   expected loss=0.1904762  P(node) =0.02527076
##     class counts:    68    16
##    probabilities: 0.810 0.190
##
## Node number 49: 51 observations,    complexity param=0.002411576
##   predicted class=Low   expected loss=0.4117647  P(node) =0.01534296
##     class counts:    30    21
##    probabilities: 0.588 0.412
##   left son=98 (41 obs) right son=99 (10 obs)
##   Primary splits:
##       PVSCIE   < 569.184  to the left,  improve=3.749785, (0 missing)
##       EMOSUPS  < 0.0257   to the left,  improve=2.761438, (0 missing)
##       ANXTEST  < 0.2644   to the right, improve=2.153501, (0 missing)
##       TEACHSUP < 0.9171   to the left,  improve=2.120168, (0 missing)
##       ESCS     < 1.3787   to the left,  improve=1.420168, (0 missing)
##   Surrogate splits:
##       ANXTEST < -0.82245 to the right, agree=0.863, adj=0.3, (0 split)
##
## Node number 52: 102 observations,    complexity param=0.004421222
##   predicted class=Low   expected loss=0.4803922  P(node) =0.03068592
##     class counts:    53    49
##    probabilities: 0.520 0.480
##   left son=104 (12 obs) right son=105 (90 obs)
##   Primary splits:
##       TEACHSUP < -0.66965 to the left,  improve=6.277124, (0 missing)
##       ANXTEST  < -0.04195 to the right, improve=3.911813, (0 missing)
##       EMOSUPS  < 0.2487   to the left,  improve=2.485959, (0 missing)
##       ESCS     < 1.05895  to the left,  improve=2.399617, (0 missing)
##       BELONG   < 0.76005  to the right, improve=2.198292, (0 missing)
##
## Node number 53: 18 observations
##   predicted class=High  expected loss=0.1666667  P(node) =0.005415162
##     class counts:     3    15
##    probabilities: 0.167 0.833
##
## Node number 54: 7 observations
##   predicted class=Low   expected loss=0.4285714  P(node) =0.002105897
##     class counts:     4     3
##    probabilities: 0.571 0.429
##
## Node number 55: 100 observations,    complexity param=0.0004019293
##   predicted class=High  expected loss=0.19  P(node) =0.03008424
##     class counts:    19    81
```

```
##    probabilities: 0.190 0.810
##   left son=110 (70 obs) right son=111 (30 obs)
##   Primary splits:
##       ANXTEST  < -1.2968  to the right, improve=1.3038100, (0 missing)
##       ESCS     < -0.67965 to the left,  improve=1.1319010, (0 missing)
##       TEACHSUP < -0.42885 to the left,  improve=1.0875830, (0 missing)
##       BELONG   < 0.95015  to the right, improve=0.8923596, (0 missing)
##       MOTIVAT  < -1.97915 to the right, improve=0.7140659, (0 missing)
##   Surrogate splits:
##       PVSCIE < 649.259  to the left,  agree=0.72, adj=0.067, (0 split)
##       BELONG < 0.95015  to the right, agree=0.71, adj=0.033, (0 split)
##
## Node number 58: 14 observations
##   predicted class=Low   expected loss=0.2857143  P(node) =0.004211793
##     class counts:    10     4
##    probabilities: 0.714 0.286
##
## Node number 59: 21 observations
##   predicted class=High  expected loss=0.2380952  P(node) =0.00631769
##     class counts:     5    16
##    probabilities: 0.238 0.762
##
## Node number 60: 109 observations,    complexity param=0.001339764
##   predicted class=High  expected loss=0.3577982  P(node) =0.03279182
##     class counts:    39    70
##    probabilities: 0.358 0.642
##   left son=120 (27 obs) right son=121 (82 obs)
##   Primary splits:
##       ANXTEST  < -0.1859  to the right, improve=3.957145, (0 missing)
##       ESCS     < 1.44975  to the left,  improve=2.031606, (0 missing)
##       TEACHSUP < 0.33195  to the left,  improve=1.733820, (0 missing)
##       PVSCIE   < 524.783  to the left,  improve=1.560029, (0 missing)
##       MOTIVAT  < 0.57455  to the left,  improve=1.319385, (0 missing)
##   Surrogate splits:
##       ESCS   < -0.62935 to the left,  agree=0.761, adj=0.037, (0 split)
##       BELONG < 0.99575  to the right, agree=0.761, adj=0.037, (0 split)
##
## Node number 61: 156 observations,    complexity param=0.0004019293
##   predicted class=High  expected loss=0.1666667  P(node) =0.04693141
##     class counts:    26   130
##    probabilities: 0.167 0.833
##   left son=122 (21 obs) right son=123 (135 obs)
##   Primary splits:
##       TEACHSUP < -0.2427  to the left,  improve=2.2285710, (0 missing)
##       BELONG   < 0.86455  to the left,  improve=1.3428190, (0 missing)
##       PVSCIE   < 689.6565 to the right, improve=1.0054330, (0 missing)
##       MOTIVAT  < -0.91835 to the left,  improve=0.8376068, (0 missing)
##       ESCS     < 1.1694   to the left,  improve=0.7731192, (0 missing)
##
## Node number 62: 69 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.1884058  P(node) =0.02075812
##     class counts:    13    56
##    probabilities: 0.188 0.812
##   left son=124 (21 obs) right son=125 (48 obs)
```

```
##   Primary splits:
##       MOTIVAT  < -0.337   to the left,  improve=2.238354, (0 missing)
##       PVSCIE   < 403.3715 to the right, improve=1.861449, (0 missing)
##       TEACHSUP < -0.05745 to the left,  improve=1.450506, (0 missing)
##       ANXTEST  < -0.0731  to the left,  improve=1.069355, (0 missing)
##       BELONG   < 2.0763   to the left,  improve=1.028814, (0 missing)
##   Surrogate splits:
##       TEACHSUP < -0.91475 to the left,  agree=0.725, adj=0.095, (0 split)
##       IMMIG    splits as  RRL,          agree=0.710, adj=0.048, (0 split)
##       ESCS     < -0.52335 to the left,  agree=0.710, adj=0.048, (0 split)
##
## Node number 63: 239 observations
##   predicted class=High  expected loss=0.0460251  P(node) =0.07190132
##     class counts:    11   228
##    probabilities: 0.046 0.954
##
## Node number 70: 16 observations
##   predicted class=Low   expected loss=0.0625  P(node) =0.004813478
##     class counts:    15     1
##    probabilities: 0.938 0.062
##
## Node number 71: 34 observations,    complexity param=0.001286174
##   predicted class=Low   expected loss=0.4117647  P(node) =0.01022864
##     class counts:    20    14
##    probabilities: 0.588 0.412
##   left son=142 (12 obs) right son=143 (22 obs)
##   Primary splits:
##       ESCS     < 0.5913   to the right, improve=2.2281640, (0 missing)
##       ANXTEST  < 0.6879   to the right, improve=2.2128100, (0 missing)
##       TEACHSUP < -0.96825 to the left,  improve=1.2748210, (0 missing)
##       PVSCIE   < 448.9705 to the right, improve=1.0918000, (0 missing)
##       MOTIVAT  < 0.70265  to the left,  improve=0.9513575, (0 missing)
##   Surrogate splits:
##       EMOSUPS  < 0.27745  to the right, agree=0.765, adj=0.333, (0 split)
##       BELONG   < 0.43355  to the right, agree=0.735, adj=0.250, (0 split)
##       ANXTEST  < 1.95355  to the right, agree=0.706, adj=0.167, (0 split)
##       TEACHSUP < -0.68605 to the left,  agree=0.676, adj=0.083, (0 split)
##
## Node number 72: 460 observations,    complexity param=0.001378043
##   predicted class=Low   expected loss=0.1717391  P(node) =0.1383875
##     class counts:   381    79
##    probabilities: 0.828 0.172
##   left son=144 (194 obs) right son=145 (266 obs)
##   Primary splits:
##       ANXTEST  < -0.1636  to the right, improve=3.654536, (0 missing)
##       BELONG   < -0.49425 to the left,  improve=3.402741, (0 missing)
##       PVSCIE   < 543.7305 to the right, improve=2.627460, (0 missing)
##       TEACHSUP < -2.4452  to the right, improve=1.766675, (0 missing)
##       EMOSUPS  < -0.9567  to the left,  improve=1.671100, (0 missing)
##   Surrogate splits:
##       PVSCIE  < 352.0655 to the left,  agree=0.604, adj=0.062, (0 split)
##       BELONG  < -0.81055 to the left,  agree=0.602, adj=0.057, (0 split)
##       MOTIVAT < -0.7561  to the right, agree=0.600, adj=0.052, (0 split)
##       ESCS    < -1.66125 to the left,  agree=0.587, adj=0.021, (0 split)
```

```
##       EMOSUPS < 0.09765  to the right, agree=0.583, adj=0.010, (0 split)
##
## Node number 73: 12 observations
##   predicted class=High  expected loss=0.4166667  P(node) =0.003610108
##     class counts:     5     7
##    probabilities: 0.417 0.583
##
## Node number 74: 90 observations,    complexity param=0.002009646
##   predicted class=Low   expected loss=0.2777778  P(node) =0.02707581
##     class counts:    65    25
##    probabilities: 0.722 0.278
##   left son=148 (21 obs) right son=149 (69 obs)
##   Primary splits:
##       ANXTEST < 0.0814   to the right, improve=4.227053, (0 missing)
##       PVSCIE  < 532.737  to the right, improve=2.276376, (0 missing)
##       ESCS    < 1.0495   to the right, improve=2.033571, (0 missing)
##       MOTIVAT < -1.16855 to the right, improve=1.819667, (0 missing)
##       EMOSUPS < -0.42535 to the left,  improve=1.571141, (0 missing)
##   Surrogate splits:
##       TEACHSUP < -1.0954  to the left,  agree=0.811, adj=0.19, (0 split)
##
## Node number 75: 32 observations,    complexity param=0.003376206
##   predicted class=High  expected loss=0.3125  P(node) =0.009626955
##     class counts:    10    22
##    probabilities: 0.312 0.688
##   left son=150 (7 obs) right son=151 (25 obs)
##   Primary splits:
##       ANXTEST  < 0.36145  to the right, improve=5.3157140, (0 missing)
##       TEACHSUP < -0.0421  to the left,  improve=1.6461040, (0 missing)
##       MOTIVAT  < 0.1232   to the right, improve=1.2014290, (0 missing)
##       PVSCIE   < 416.0085 to the left,  improve=1.0157000, (0 missing)
##       ESCS     < -0.0358  to the left,  improve=0.4323529, (0 missing)
##   Surrogate splits:
##       MOTIVAT < 0.1535   to the right, agree=0.875, adj=0.429, (0 split)
##       IMMIG   splits as  RLR,          agree=0.844, adj=0.286, (0 split)
##       EMOSUPS < -1.5441  to the left,  agree=0.844, adj=0.286, (0 split)
##       BELONG  < 0.402    to the right, agree=0.844, adj=0.286, (0 split)
##       PVSCIE  < 323.773  to the left,  agree=0.812, adj=0.143, (0 split)
##
## Node number 76: 20 observations
##   predicted class=Low   expected loss=0.15  P(node) =0.006016847
##     class counts:    17     3
##    probabilities: 0.850 0.150
##
## Node number 77: 98 observations,    complexity param=0.002813505
##   predicted class=Low   expected loss=0.4897959  P(node) =0.02948255
##     class counts:    50    48
##    probabilities: 0.510 0.490
##   left son=154 (15 obs) right son=155 (83 obs)
##   Primary splits:
##       EMOSUPS < -1.01705 to the left,  improve=2.974773, (0 missing)
##       ANXTEST < -1.43085 to the right, improve=1.920768, (0 missing)
##       BELONG  < -0.53235 to the left,  improve=1.828715, (0 missing)
##       ESCS    < 0.12     to the right, improve=1.655030, (0 missing)
```

```
##       MOTIVAT < 1.266    to the left,  improve=1.643762, (0 missing)
##   Surrogate splits:
##       ESCS < -1.04815 to the left,  agree=0.867, adj=0.133, (0 split)
##
## Node number 82: 81 observations,    complexity param=0.0008038585
##   predicted class=Low   expected loss=0.2716049  P(node) =0.02436823
##     class counts:    59    22
##    probabilities: 0.728 0.272
##   left son=164 (72 obs) right son=165 (9 obs)
##   Primary splits:
##       ESCS      < -0.32605 to the right, improve=1.6327160, (0 missing)
##       ST004D01T splits as  RL,           improve=1.2582780, (0 missing)
##       PVSCIE    < 400.31   to the right, improve=0.9780540, (0 missing)
##       TEACHSUP  < 0.45985  to the left,  improve=0.9433221, (0 missing)
##       BELONG    < 0.2      to the left,  improve=0.6366843, (0 missing)
##
## Node number 83: 7 observations
##   predicted class=High  expected loss=0.1428571  P(node) =0.002105897
##     class counts:     1     6
##    probabilities: 0.143 0.857
##
## Node number 84: 133 observations,    complexity param=0.002679528
##   predicted class=Low   expected loss=0.3007519  P(node) =0.04001203
##     class counts:    93    40
##    probabilities: 0.699 0.301
##   left son=168 (39 obs) right son=169 (94 obs)
##   Primary splits:
##       PVSCIE    < 579.51   to the right, improve=5.529048, (0 missing)
##       MOTIVAT   < -1.3925  to the left,  improve=3.000590, (0 missing)
##       ST004D01T splits as  RL,           improve=2.304001, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve=1.790190, (0 missing)
##       BELONG    < -1.33975 to the right, improve=1.789850, (0 missing)
##   Surrogate splits:
##       ANXTEST < -0.8969  to the left,  agree=0.737, adj=0.103, (0 split)
##
## Node number 85: 14 observations
##   predicted class=High  expected loss=0.2142857  P(node) =0.004211793
##     class counts:     3    11
##    probabilities: 0.214 0.786
##
## Node number 86: 135 observations,    complexity param=0.004019293
##   predicted class=High  expected loss=0.4666667  P(node) =0.04061372
##     class counts:    63    72
##    probabilities: 0.467 0.533
##   left son=172 (22 obs) right son=173 (113 obs)
##   Primary splits:
##       PVSCIE   < 619.922  to the right, improve=3.570072, (0 missing)
##       MOTIVAT  < -0.27895 to the right, improve=2.700000, (0 missing)
##       TEACHSUP < 0.9171   to the left,  improve=2.120168, (0 missing)
##       ANXTEST  < -0.748   to the right, improve=2.064635, (0 missing)
##       ESCS     < 1.38635  to the left,  improve=1.985433, (0 missing)
##   Surrogate splits:
##       ESCS < -1.4309  to the left,  agree=0.852, adj=0.091, (0 split)
##
```

```
## Node number 87: 94 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.287234  P(node) =0.02827918
##     class counts:    27    67
##    probabilities: 0.287 0.713
##   left son=174 (42 obs) right son=175 (52 obs)
##   Primary splits:
##       ESCS     < 1.20095  to the right, improve=2.0974200, (0 missing)
##       TEACHSUP < 0.33195  to the left,  improve=2.0175670, (0 missing)
##       ANXTEST  < -0.1694  to the right, improve=1.3264660, (0 missing)
##       PVSCIE   < 524.479  to the left,  improve=0.8059150, (0 missing)
##       BELONG   < -0.11675 to the left,  improve=0.7474262, (0 missing)
##   Surrogate splits:
##       TEACHSUP < 0.0341   to the left,  agree=0.670, adj=0.262, (0 split)
##       MOTIVAT  < 1.6252   to the right, agree=0.638, adj=0.190, (0 split)
##       PVSCIE   < 568.113  to the right, agree=0.617, adj=0.143, (0 split)
##       BELONG   < 0.303    to the right, agree=0.585, adj=0.071, (0 split)
##
## Node number 98: 41 observations
##   predicted class=Low   expected loss=0.3170732  P(node) =0.01233454
##     class counts:    28    13
##    probabilities: 0.683 0.317
##
## Node number 99: 10 observations
##   predicted class=High  expected loss=0.2  P(node) =0.003008424
##     class counts:     2     8
##    probabilities: 0.200 0.800
##
## Node number 104: 12 observations
##   predicted class=Low   expected loss=0  P(node) =0.003610108
##     class counts:    12     0
##    probabilities: 1.000 0.000
##
## Node number 105: 90 observations,    complexity param=0.004421222
##   predicted class=High  expected loss=0.4555556  P(node) =0.02707581
##     class counts:    41    49
##    probabilities: 0.456 0.544
##   left son=210 (18 obs) right son=211 (72 obs)
##   Primary splits:
##       ANXTEST < -0.04195 to the right, improve=4.672222, (0 missing)
##       ESCS    < 1.19835  to the left,  improve=1.878046, (0 missing)
##       EMOSUPS < 0.2487   to the left,  improve=1.535553, (0 missing)
##       BELONG  < 0.76005  to the right, improve=1.522493, (0 missing)
##       MOTIVAT < -1.42025 to the right, improve=1.469444, (0 missing)
##   Surrogate splits:
##       PVSCIE < 407.1025 to the left,  agree=0.844, adj=0.222, (0 split)
##       ESCS   < -1.0811  to the left,  agree=0.811, adj=0.056, (0 split)
##
## Node number 110: 70 observations,    complexity param=0.0004019293
##   predicted class=High  expected loss=0.2428571  P(node) =0.02105897
##     class counts:    17    53
##    probabilities: 0.243 0.757
##   left son=220 (7 obs) right son=221 (63 obs)
##   Primary splits:
##       ANXTEST < -1.0886  to the left,  improve=1.6793650, (0 missing)
```

```
##       ESCS    < -0.67965 to the left,  improve=1.5428570, (0 missing)
##       MOTIVAT < -1.5969  to the right, improve=0.4761905, (0 missing)
##       PVSCIE  < 462.06   to the right, improve=0.3857143, (0 missing)
##       EMOSUPS < 0.06065  to the left,  improve=0.3765001, (0 missing)
##
## Node number 111: 30 observations
##   predicted class=High  expected loss=0.06666667  P(node) =0.009025271
##     class counts:     2    28
##    probabilities: 0.067 0.933
##
## Node number 120: 27 observations,    complexity param=0.0008038585
##   predicted class=Low   expected loss=0.4074074  P(node) =0.008122744
##     class counts:    16    11
##    probabilities: 0.593 0.407
##   left son=240 (8 obs) right son=241 (19 obs)
##   Primary splits:
##       TEACHSUP < -0.1891  to the left,  improve=1.8133530, (0 missing)
##       PVSCIE   < 466.5665 to the right, improve=1.5645100, (0 missing)
##       ESCS     < 0.59715  to the left,  improve=0.7074916, (0 missing)
##       ANXTEST  < 0.05595  to the left,  improve=0.2798942, (0 missing)
##       MOTIVAT  < 0.3808   to the left,  improve=0.2723312, (0 missing)
##   Surrogate splits:
##       ANXTEST < -0.01105 to the left,  agree=0.778, adj=0.25, (0 split)
##       PVSCIE  < 366.813  to the left,  agree=0.778, adj=0.25, (0 split)
##
## Node number 121: 82 observations,    complexity param=0.001071811
##   predicted class=High  expected loss=0.2804878  P(node) =0.02466907
##     class counts:    23    59
##    probabilities: 0.280 0.720
##   left son=242 (67 obs) right son=243 (15 obs)
##   Primary splits:
##       PVSCIE   < 440.087  to the right, improve=1.6786560, (0 missing)
##       TEACHSUP < 0.33195  to the left,  improve=1.5081890, (0 missing)
##       ESCS     < 0.461    to the left,  improve=1.1329820, (0 missing)
##       BELONG   < 0.95015  to the right, improve=1.0975610, (0 missing)
##       MOTIVAT  < -1.26765 to the left,  improve=0.7697761, (0 missing)
##   Surrogate splits:
##       IMMIG   splits as  LR-,          agree=0.829, adj=0.067, (0 split)
##       ESCS    < -0.45935 to the right, agree=0.829, adj=0.067, (0 split)
##       ANXTEST < -0.23845 to the left,  agree=0.829, adj=0.067, (0 split)
##
## Node number 122: 21 observations,    complexity param=0.0004019293
##   predicted class=High  expected loss=0.3809524  P(node) =0.00631769
##     class counts:     8    13
##    probabilities: 0.381 0.619
##   left son=244 (13 obs) right son=245 (8 obs)
##   Primary splits:
##       PVSCIE   < 488.418  to the right, improve=1.6932230, (0 missing)
##       ANXTEST  < -0.29335 to the left,  improve=1.1904760, (0 missing)
##       TEACHSUP < -0.5139  to the right, improve=0.7936508, (0 missing)
##       MOTIVAT  < 0.3972   to the right, improve=0.7619048, (0 missing)
##       ESCS     < 0.62475  to the right, improve=0.4432234, (0 missing)
##   Surrogate splits:
##       ESCS    < 0.88015  to the right, agree=0.714, adj=0.25, (0 split)
```

```
##       ANXTEST < -0.8525  to the left,  agree=0.714, adj=0.25, (0 split)
##
## Node number 123: 135 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.1333333  P(node) =0.04061372
##     class counts:    18   117
##    probabilities: 0.133 0.867
##   left son=246 (92 obs) right son=247 (43 obs)
##   Primary splits:
##       BELONG   < 0.8529   to the left,  improve=1.5291200, (0 missing)
##       ESCS     < 0.18125  to the left,  improve=1.4625730, (0 missing)
##       PVSCIE   < 689.6565 to the right, improve=1.2870540, (0 missing)
##       TEACHSUP < 0.9171   to the right, improve=1.0859920, (0 missing)
##       MOTIVAT  < -0.1074  to the left,  improve=0.8561265, (0 missing)
##   Surrogate splits:
##       TEACHSUP < -0.1541  to the right, agree=0.711, adj=0.093, (0 split)
##       MOTIVAT  < 1.0092   to the left,  agree=0.704, adj=0.070, (0 split)
##       IMMIG    splits as  LLR,         agree=0.689, adj=0.023, (0 split)
##       ESCS     < 1.4904   to the left,  agree=0.689, adj=0.023, (0 split)
##       PVSCIE   < 709.03   to the left,  agree=0.689, adj=0.023, (0 split)
##
## Node number 124: 21 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.3809524  P(node) =0.00631769
##     class counts:     8    13
##    probabilities: 0.381 0.619
##   left son=248 (13 obs) right son=249 (8 obs)
##   Primary splits:
##       ESCS     < 0.5688   to the left,  improve=1.6932230, (0 missing)
##       BELONG   < 1.5327   to the left,  improve=1.5393770, (0 missing)
##       TEACHSUP < 0.0123   to the left,  improve=1.5393770, (0 missing)
##       PVSCIE   < 494.6365 to the left,  improve=0.7936508, (0 missing)
##       MOTIVAT  < -0.9935  to the right, improve=0.2502165, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.48025 to the right, agree=0.714, adj=0.250, (0 split)
##       TEACHSUP < 0.3918   to the left,  agree=0.714, adj=0.250, (0 split)
##       PVSCIE   < 406.327  to the right, agree=0.667, adj=0.125, (0 split)
##
## Node number 125: 48 observations
##   predicted class=High  expected loss=0.1041667  P(node) =0.01444043
##     class counts:     5    43
##    probabilities: 0.104 0.896
##
## Node number 142: 12 observations
##   predicted class=Low   expected loss=0.1666667  P(node) =0.003610108
##     class counts:    10     2
##    probabilities: 0.833 0.167
##
## Node number 143: 22 observations,    complexity param=0.001286174
##   predicted class=High  expected loss=0.4545455  P(node) =0.006618532
##     class counts:    10    12
##    probabilities: 0.455 0.545
##   left son=286 (8 obs) right son=287 (14 obs)
##   Primary splits:
##       ANXTEST  < 0.61015  to the right, improve=4.4448050, (0 missing)
##       TEACHSUP < -0.4242  to the left,  improve=0.7757576, (0 missing)
```

```
##       MOTIVAT  < 0.51415  to the right, improve=0.7305195, (0 missing)
##       ESCS     < 0.2516   to the left,  improve=0.5852814, (0 missing)
##       PVSCIE   < 448.9705 to the right, improve=0.4475524, (0 missing)
##   Surrogate splits:
##       BELONG   < 0.37735  to the right, agree=0.727, adj=0.250, (0 split)
##       TEACHSUP < -0.8643  to the left,  agree=0.727, adj=0.250, (0 split)
##       ESCS     < -0.2454  to the left,  agree=0.682, adj=0.125, (0 split)
##       PVSCIE   < 390.0985 to the left,  agree=0.682, adj=0.125, (0 split)
##
## Node number 144: 194 observations
##   predicted class=Low   expected loss=0.09793814  P(node) =0.05836342
##     class counts:   175    19
##    probabilities: 0.902 0.098
##
## Node number 145: 266 observations,    complexity param=0.001378043
##   predicted class=Low   expected loss=0.2255639  P(node) =0.08002407
##     class counts:   206    60
##    probabilities: 0.774 0.226
##   left son=290 (107 obs) right son=291 (159 obs)
##   Primary splits:
##       PVSCIE   < 537.851  to the right, improve=2.609636, (0 missing)
##       EMOSUPS  < -0.9815  to the left,  improve=2.442857, (0 missing)
##       BELONG   < -0.4223  to the left,  improve=2.061446, (0 missing)
##       MOTIVAT  < -1.6636  to the left,  improve=1.934468, (0 missing)
##       TEACHSUP < -0.2781  to the left,  improve=1.317184, (0 missing)
##   Surrogate splits:
##       ANXTEST < -1.18165 to the left,  agree=0.613, adj=0.037, (0 split)
##       ESCS    < 0.678    to the right, agree=0.609, adj=0.028, (0 split)
##
## Node number 148: 21 observations
##   predicted class=Low   expected loss=0  P(node) =0.00631769
##     class counts:    21     0
##    probabilities: 1.000 0.000
##
## Node number 149: 69 observations,    complexity param=0.002009646
##   predicted class=Low   expected loss=0.3623188  P(node) =0.02075812
##     class counts:    44    25
##    probabilities: 0.638 0.362
##   left son=298 (38 obs) right son=299 (31 obs)
##   Primary splits:
##       PVSCIE   < 532.737  to the right, improve=3.897640, (0 missing)
##       MOTIVAT  < -1.13685 to the right, improve=2.874624, (0 missing)
##       TEACHSUP < 0.1199   to the right, improve=1.443986, (0 missing)
##       ESCS     < 1.0495   to the right, improve=1.392300, (0 missing)
##       BELONG   < 0.3283   to the right, improve=1.306280, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.34305 to the right, agree=0.594, adj=0.097, (0 split)
##       ANXTEST  < -0.94775 to the left,  agree=0.594, adj=0.097, (0 split)
##       EMOSUPS  < -0.11225 to the left,  agree=0.594, adj=0.097, (0 split)
##       TEACHSUP < -0.6325  to the right, agree=0.594, adj=0.097, (0 split)
##       ESCS     < -0.13285 to the right, agree=0.565, adj=0.032, (0 split)
##
## Node number 150: 7 observations
##   predicted class=Low   expected loss=0.1428571  P(node) =0.002105897
```

```
##     class counts:     6     1
##    probabilities: 0.857 0.143
##
## Node number 151: 25 observations
##   predicted class=High  expected loss=0.16  P(node) =0.007521059
##     class counts:     4    21
##    probabilities: 0.160 0.840
##
## Node number 154: 15 observations
##   predicted class=Low   expected loss=0.2  P(node) =0.004512635
##     class counts:    12     3
##    probabilities: 0.800 0.200
##
## Node number 155: 83 observations,    complexity param=0.002813505
##   predicted class=High  expected loss=0.4578313  P(node) =0.02496992
##     class counts:    38    45
##    probabilities: 0.458 0.542
##   left son=310 (51 obs) right son=311 (32 obs)
##   Primary splits:
##       ESCS    < 0.1299   to the right, improve=2.1999170, (0 missing)
##       BELONG  < -0.78995 to the left,  improve=1.4482980, (0 missing)
##       PVSCIE  < 341.2725 to the left,  improve=1.0055710, (0 missing)
##       EMOSUPS < 0.0257   to the left,  improve=0.8567673, (0 missing)
##       MOTIVAT < 1.266    to the left,  improve=0.7648193, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -1.41475 to the right, agree=0.651, adj=0.094, (0 split)
##       ANXTEST < -0.48195 to the left,  agree=0.651, adj=0.094, (0 split)
##       BELONG  < 0.1387   to the left,  agree=0.651, adj=0.094, (0 split)
##       PVSCIE  < 422.2505 to the right, agree=0.651, adj=0.094, (0 split)
##       IMMIG   splits as  LRL,          agree=0.639, adj=0.062, (0 split)
##
## Node number 164: 72 observations,    complexity param=0.0002679528
##   predicted class=Low   expected loss=0.2361111  P(node) =0.02166065
##     class counts:    55    17
##    probabilities: 0.764 0.236
##   left son=328 (23 obs) right son=329 (49 obs)
##   Primary splits:
##       ESCS      < 0.59635  to the left,  improve=2.5081580, (0 missing)
##       PVSCIE    < 394.802  to the right, improve=1.2439310, (0 missing)
##       ANXTEST   < 1.88045  to the left,  improve=0.9388889, (0 missing)
##       ST004D01T splits as  RL,           improve=0.8435621, (0 missing)
##       MOTIVAT   < -0.18285 to the left,  improve=0.6304040, (0 missing)
##   Surrogate splits:
##       BELONG  < -0.4951  to the left,  agree=0.708, adj=0.087, (0 split)
##       MOTIVAT < -1.99255 to the left,  agree=0.694, adj=0.043, (0 split)
##       PVSCIE  < 347.6095 to the left,  agree=0.694, adj=0.043, (0 split)
##
## Node number 165: 9 observations
##   predicted class=High  expected loss=0.4444444  P(node) =0.002707581
##     class counts:     4     5
##    probabilities: 0.444 0.556
##
## Node number 168: 39 observations
##   predicted class=Low   expected loss=0.07692308  P(node) =0.01173285
```

```
##     class counts:    36     3
##    probabilities: 0.923 0.077
##
## Node number 169: 94 observations,    complexity param=0.002679528
##   predicted class=Low   expected loss=0.393617  P(node) =0.02827918
##     class counts:    57    37
##    probabilities: 0.606 0.394
##   left son=338 (19 obs) right son=339 (75 obs)
##   Primary splits:
##       MOTIVAT   < -1.3925  to the left,  improve=3.960060, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve=3.235884, (0 missing)
##       ST004D01T splits as  RL,           improve=2.634313, (0 missing)
##       PVSCIE    < 358.8045 to the right, improve=2.221178, (0 missing)
##       ANXTEST   < -0.11695 to the right, improve=1.770380, (0 missing)
##
## Node number 172: 22 observations,    complexity param=0.0008038585
##   predicted class=Low   expected loss=0.2727273  P(node) =0.006618532
##     class counts:    16     6
##    probabilities: 0.727 0.273
##   left son=344 (15 obs) right son=345 (7 obs)
##   Primary splits:
##       TEACHSUP < 0.9171   to the left,  improve=1.8320350, (0 missing)
##       ANXTEST  < -0.93105 to the right, improve=1.2987010, (0 missing)
##       MOTIVAT  < -0.6881  to the right, improve=0.7956488, (0 missing)
##       BELONG   < 0.128    to the left,  improve=0.5939394, (0 missing)
##       ESCS     < -0.06255 to the right, improve=0.4987013, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -1.372   to the right, agree=0.773, adj=0.286, (0 split)
##
## Node number 173: 113 observations,    complexity param=0.004019293
##   predicted class=High  expected loss=0.4159292  P(node) =0.03399519
##     class counts:    47    66
##    probabilities: 0.416 0.584
##   left son=346 (21 obs) right son=347 (92 obs)
##   Primary splits:
##       MOTIVAT   < -0.2611  to the right, improve=2.128328, (0 missing)
##       ANXTEST   < -1.21965 to the right, improve=1.945181, (0 missing)
##       PVSCIE    < 496.014  to the right, improve=1.650591, (0 missing)
##       ST004D01T splits as  RL,           improve=1.411129, (0 missing)
##       ESCS      < -0.25035 to the right, improve=1.188261, (0 missing)
##   Surrogate splits:
##       ANXTEST < 0.29795  to the right, agree=0.823, adj=0.048, (0 split)
##
## Node number 174: 42 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.4047619  P(node) =0.01263538
##     class counts:    17    25
##    probabilities: 0.405 0.595
##   left son=348 (10 obs) right son=349 (32 obs)
##   Primary splits:
##       ANXTEST  < -0.1859  to the right, improve=2.2880950, (0 missing)
##       MOTIVAT  < 0.94915  to the right, improve=1.2380950, (0 missing)
##       PVSCIE   < 460.2525 to the left,  improve=0.9586835, (0 missing)
##       ESCS     < 1.416    to the left,  improve=0.8875070, (0 missing)
##       TEACHSUP < -0.64435 to the right, improve=0.7633478, (0 missing)
```

```
##
## Node number 175: 52 observations
##   predicted class=High  expected loss=0.1923077  P(node) =0.0156438
##     class counts:    10    42
##    probabilities: 0.192 0.808
##
## Node number 210: 18 observations
##   predicted class=Low   expected loss=0.2222222  P(node) =0.005415162
##     class counts:    14     4
##    probabilities: 0.778 0.222
##
## Node number 211: 72 observations,    complexity param=0.002009646
##   predicted class=High  expected loss=0.375  P(node) =0.02166065
##     class counts:    27    45
##    probabilities: 0.375 0.625
##   left son=422 (61 obs) right son=423 (11 obs)
##   Primary splits:
##       EMOSUPS  < 0.2487   to the left,  improve=2.0957530, (0 missing)
##       TEACHSUP < 0.52955  to the left,  improve=1.7339620, (0 missing)
##       PVSCIE   < 435.7865 to the left,  improve=1.1758060, (0 missing)
##       ANXTEST  < -0.2947  to the left,  improve=1.1250000, (0 missing)
##       ESCS     < -0.27735 to the right, improve=0.8977833, (0 missing)
##   Surrogate splits:
##       PVSCIE < 683.252  to the left,  agree=0.889, adj=0.273, (0 split)
##       ESCS   < 1.74715  to the left,  agree=0.875, adj=0.182, (0 split)
##       IMMIG  splits as  LRL,          agree=0.861, adj=0.091, (0 split)
##
## Node number 220: 7 observations
##   predicted class=Low   expected loss=0.4285714  P(node) =0.002105897
##     class counts:     4     3
##    probabilities: 0.571 0.429
##
## Node number 221: 63 observations
##   predicted class=High  expected loss=0.2063492  P(node) =0.01895307
##     class counts:    13    50
##    probabilities: 0.206 0.794
##
## Node number 240: 8 observations
##   predicted class=Low   expected loss=0.125  P(node) =0.002406739
##     class counts:     7     1
##    probabilities: 0.875 0.125
##
## Node number 241: 19 observations
##   predicted class=High  expected loss=0.4736842  P(node) =0.005716005
##     class counts:     9    10
##    probabilities: 0.474 0.526
##
## Node number 242: 67 observations,    complexity param=0.001071811
##   predicted class=High  expected loss=0.3283582  P(node) =0.02015644
##     class counts:    22    45
##    probabilities: 0.328 0.672
##   left son=484 (21 obs) right son=485 (46 obs)
##   Primary splits:
##       PVSCIE   < 524.714  to the left,  improve=2.336918, (0 missing)
```

```
##       ESCS     < 0.4625   to the left,  improve=2.203402, (0 missing)
##       TEACHSUP < 0.33195  to the left,  improve=1.197284, (0 missing)
##       MOTIVAT  < 0.48905  to the left,  improve=1.163005, (0 missing)
##       BELONG   < 0.95015  to the right, improve=1.073312, (0 missing)
##   Surrogate splits:
##       ESCS     < -0.1248  to the left,  agree=0.731, adj=0.143, (0 split)
##       ANXTEST  < -0.4501  to the right, agree=0.731, adj=0.143, (0 split)
##       EMOSUPS  < 0.76665  to the left,  agree=0.716, adj=0.095, (0 split)
##       IMMIG    splits as  RL-,         agree=0.701, adj=0.048, (0 split)
##       TEACHSUP < -0.81225 to the left,  agree=0.701, adj=0.048, (0 split)
##
## Node number 243: 15 observations
##   predicted class=High  expected loss=0.06666667  P(node) =0.004512635
##     class counts:     1    14
##    probabilities: 0.067 0.933
##
## Node number 244: 13 observations
##   predicted class=Low   expected loss=0.4615385  P(node) =0.003910951
##     class counts:     7     6
##    probabilities: 0.538 0.462
##
## Node number 245: 8 observations
##   predicted class=High  expected loss=0.125  P(node) =0.002406739
##     class counts:     1     7
##    probabilities: 0.125 0.875
##
## Node number 246: 92 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.1847826  P(node) =0.0276775
##     class counts:    17    75
##    probabilities: 0.185 0.815
##   left son=492 (68 obs) right son=493 (24 obs)
##   Primary splits:
##       TEACHSUP < 0.64005  to the right, improve=1.3301360, (0 missing)
##       ESCS     < 0.18125  to the left,  improve=1.1509750, (0 missing)
##       PVSCIE   < 625.834  to the right, improve=1.0393430, (0 missing)
##       BELONG   < 0.7306   to the right, improve=0.4402829, (0 missing)
##       MOTIVAT  < -0.91835 to the left,  improve=0.3550725, (0 missing)
##
## Node number 247: 43 observations
##   predicted class=High  expected loss=0.02325581  P(node) =0.01293622
##     class counts:     1    42
##    probabilities: 0.023 0.977
##
## Node number 248: 13 observations
##   predicted class=Low   expected loss=0.4615385  P(node) =0.003910951
##     class counts:     7     6
##    probabilities: 0.538 0.462
##
## Node number 249: 8 observations
##   predicted class=High  expected loss=0.125  P(node) =0.002406739
##     class counts:     1     7
##    probabilities: 0.125 0.875
##
## Node number 286: 8 observations
```

```
##   predicted class=Low   expected loss=0.125  P(node) =0.002406739
##     class counts:     7     1
##    probabilities: 0.875 0.125
##
## Node number 287: 14 observations
##   predicted class=High  expected loss=0.2142857  P(node) =0.004211793
##     class counts:     3    11
##    probabilities: 0.214 0.786
##
## Node number 290: 107 observations
##   predicted class=Low   expected loss=0.1401869  P(node) =0.03219013
##     class counts:    92    15
##    probabilities: 0.860 0.140
##
## Node number 291: 159 observations,    complexity param=0.001378043
##   predicted class=Low   expected loss=0.2830189  P(node) =0.04783394
##     class counts:   114    45
##    probabilities: 0.717 0.283
##   left son=582 (23 obs) right son=583 (136 obs)
##   Primary splits:
##       MOTIVAT  < -1.6636  to the left,  improve=2.067304, (0 missing)
##       EMOSUPS  < -0.9815  to the left,  improve=2.039413, (0 missing)
##       TEACHSUP < -0.39205 to the left,  improve=1.954618, (0 missing)
##       BELONG   < -0.5119  to the left,  improve=1.622918, (0 missing)
##       PVSCIE   < 528.9235 to the left,  improve=1.417191, (0 missing)
##   Surrogate splits:
##       EMOSUPS < -2.1351  to the left,  agree=0.874, adj=0.130, (0 split)
##       ESCS    < -1.08675 to the left,  agree=0.868, adj=0.087, (0 split)
##
## Node number 298: 38 observations
##   predicted class=Low   expected loss=0.2105263  P(node) =0.01143201
##     class counts:    30     8
##    probabilities: 0.789 0.211
##
## Node number 299: 31 observations,    complexity param=0.002009646
##   predicted class=High  expected loss=0.4516129  P(node) =0.009326113
##     class counts:    14    17
##    probabilities: 0.452 0.548
##   left son=598 (21 obs) right son=599 (10 obs)
##   Primary splits:
##       MOTIVAT  < -0.99965 to the right, improve=1.8691240, (0 missing)
##       PVSCIE   < 484.86   to the left,  improve=1.8674440, (0 missing)
##       TEACHSUP < 0.1283   to the right, improve=0.6483170, (0 missing)
##       ESCS     < 0.4377   to the left,  improve=0.5478212, (0 missing)
##       EMOSUPS  < 0.0641   to the left,  improve=0.4976959, (0 missing)
##   Surrogate splits:
##       ESCS    < 1.0027   to the left,  agree=0.742, adj=0.2, (0 split)
##       BELONG  < 0.37985  to the left,  agree=0.742, adj=0.2, (0 split)
##       EMOSUPS < -1.3585  to the right, agree=0.710, adj=0.1, (0 split)
##
## Node number 310: 51 observations,    complexity param=0.002813505
##   predicted class=Low   expected loss=0.4509804  P(node) =0.01534296
##     class counts:    28    23
##    probabilities: 0.549 0.451
```

```
##   left son=620 (28 obs) right son=621 (23 obs)
##   Primary splits:
##       PVSCIE  < 520.793  to the right, improve=2.084095, (0 missing)
##       EMOSUPS < -0.0086  to the left,  improve=1.461354, (0 missing)
##       BELONG  < -0.02655 to the right, improve=1.267722, (0 missing)
##       MOTIVAT < -0.8733  to the left,  improve=1.106876, (0 missing)
##       ESCS    < 1.10125  to the left,  improve=0.579902, (0 missing)
##   Surrogate splits:
##       BELONG  < -0.4113  to the right, agree=0.706, adj=0.348, (0 split)
##       MOTIVAT < -1.2928  to the right, agree=0.686, adj=0.304, (0 split)
##       ESCS    < 0.5687   to the right, agree=0.647, adj=0.217, (0 split)
##       ANXTEST < -0.61095 to the right, agree=0.647, adj=0.217, (0 split)
##       EMOSUPS < -0.7503  to the right, agree=0.627, adj=0.174, (0 split)
##
## Node number 311: 32 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.3125  P(node) =0.009626955
##     class counts:    10    22
##    probabilities: 0.312 0.688
##   left son=622 (10 obs) right son=623 (22 obs)
##   Primary splits:
##       BELONG  < -0.7857  to the left,  improve=2.4045450, (0 missing)
##       ANXTEST < -0.6399  to the right, improve=2.0166670, (0 missing)
##       PVSCIE  < 412.2705 to the left,  improve=1.0227270, (0 missing)
##       ESCS    < -0.5193  to the left,  improve=0.6764069, (0 missing)
##       MOTIVAT < -1.02325 to the right, improve=0.5725108, (0 missing)
##   Surrogate splits:
##       ESCS    < -0.9334  to the left,  agree=0.781, adj=0.3, (0 split)
##       MOTIVAT < -2.74135 to the left,  agree=0.750, adj=0.2, (0 split)
##
## Node number 328: 23 observations
##   predicted class=Low   expected loss=0.04347826  P(node) =0.006919374
##     class counts:    22     1
##    probabilities: 0.957 0.043
##
## Node number 329: 49 observations,    complexity param=0.0002679528
##   predicted class=Low   expected loss=0.3265306  P(node) =0.01474128
##     class counts:    33    16
##    probabilities: 0.673 0.327
##   left son=658 (33 obs) right son=659 (16 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=1.4298080, (0 missing)
##       ESCS      < 0.7263   to the right, improve=1.1565760, (0 missing)
##       TEACHSUP  < -0.2104  to the right, improve=1.0804320, (0 missing)
##       PVSCIE    < 394.802  to the right, improve=0.8490596, (0 missing)
##       MOTIVAT   < 0.2369   to the right, improve=0.5748299, (0 missing)
##   Surrogate splits:
##       ESCS    < 0.6939   to the right, agree=0.755, adj=0.250, (0 split)
##       IMMIG   splits as  L-R,          agree=0.735, adj=0.188, (0 split)
##       ANXTEST < 0.48455  to the right, agree=0.714, adj=0.125, (0 split)
##       BELONG  < -0.4064  to the right, agree=0.694, adj=0.063, (0 split)
##
## Node number 338: 19 observations
##   predicted class=Low   expected loss=0.1052632  P(node) =0.005716005
##     class counts:    17     2
```

```
##    probabilities: 0.895 0.105
##
## Node number 339: 75 observations,    complexity param=0.002679528
##   predicted class=Low   expected loss=0.4666667  P(node) =0.02256318
##     class counts:    40    35
##    probabilities: 0.533 0.467
##   left son=678 (49 obs) right son=679 (26 obs)
##   Primary splits:
##       TEACHSUP  < 0.85145  to the left,  improve=4.052329, (0 missing)
##       ANXTEST   < -0.11695 to the right, improve=2.926039, (0 missing)
##       PVSCIE    < 414.4825 to the right, improve=1.430696, (0 missing)
##       ST004D01T splits as  RL,           improve=1.372923, (0 missing)
##       BELONG    < -0.6313  to the left,  improve=1.333333, (0 missing)
##   Surrogate splits:
##       PVSCIE < 526.316  to the left,  agree=0.693, adj=0.115, (0 split)
##       ESCS   < -1.0709  to the right, agree=0.680, adj=0.077, (0 split)
##       BELONG < -1.51485 to the right, agree=0.680, adj=0.077, (0 split)
##       IMMIG  splits as  L-R,          agree=0.667, adj=0.038, (0 split)
##
## Node number 344: 15 observations
##   predicted class=Low   expected loss=0.1333333  P(node) =0.004512635
##     class counts:    13     2
##    probabilities: 0.867 0.133
##
## Node number 345: 7 observations
##   predicted class=High  expected loss=0.4285714  P(node) =0.002105897
##     class counts:     3     4
##    probabilities: 0.429 0.571
##
## Node number 346: 21 observations,    complexity param=0.001607717
##   predicted class=Low   expected loss=0.3809524  P(node) =0.00631769
##     class counts:    13     8
##    probabilities: 0.619 0.381
##   left son=692 (11 obs) right son=693 (10 obs)
##   Primary splits:
##       BELONG    < 0.0233   to the left,  improve=1.8320350, (0 missing)
##       ESCS      < 0.73075  to the right, improve=1.2502160, (0 missing)
##       TEACHSUP  < 0.47205  to the right, improve=1.2502160, (0 missing)
##       ST004D01T splits as  RL,           improve=0.7936508, (0 missing)
##       ANXTEST   < -0.0436  to the left,  improve=0.5411255, (0 missing)
##   Surrogate splits:
##       ESCS     < 0.0509   to the left,  agree=0.667, adj=0.3, (0 split)
##       TEACHSUP < 1.1842   to the left,  agree=0.667, adj=0.3, (0 split)
##       PVSCIE   < 407.313  to the right, agree=0.667, adj=0.3, (0 split)
##       MOTIVAT  < -0.02755 to the left,  agree=0.619, adj=0.2, (0 split)
##       ANXTEST  < 0.23115  to the left,  agree=0.571, adj=0.1, (0 split)
##
## Node number 347: 92 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.3695652  P(node) =0.0276775
##     class counts:    34    58
##    probabilities: 0.370 0.630
##   left son=694 (60 obs) right son=695 (32 obs)
##   Primary splits:
##       ANXTEST   < -0.6884  to the right, improve=2.2320650, (0 missing)
```

```
##       PVSCIE    < 510.2865 to the right, improve=2.0893090, (0 missing)
##       TEACHSUP  < 0.73195  to the left,  improve=1.7336190, (0 missing)
##       ST004D01T splits as  RL,           improve=1.0867080, (0 missing)
##       ESCS      < 0.3242   to the left,  improve=0.9877685, (0 missing)
##   Surrogate splits:
##       ESCS    < -0.96275 to the right, agree=0.685, adj=0.094, (0 split)
##       BELONG  < 0.36455  to the left,  agree=0.674, adj=0.062, (0 split)
##       MOTIVAT < -0.4429  to the left,  agree=0.663, adj=0.031, (0 split)
##
## Node number 348: 10 observations
##   predicted class=Low   expected loss=0.3  P(node) =0.003008424
##     class counts:     7     3
##    probabilities: 0.700 0.300
##
## Node number 349: 32 observations,    complexity param=0.0008038585
##   predicted class=High  expected loss=0.3125  P(node) =0.009626955
##     class counts:    10    22
##    probabilities: 0.312 0.688
##   left son=698 (24 obs) right son=699 (8 obs)
##   Primary splits:
##       ANXTEST < -0.33575 to the left,  improve=2.0833330, (0 missing)
##       MOTIVAT < 1.6252   to the right, improve=0.7147059, (0 missing)
##       ESCS    < 1.416    to the left,  improve=0.6764069, (0 missing)
##       BELONG  < -0.0098  to the right, improve=0.2925101, (0 missing)
##       PVSCIE  < 609.3535 to the right, improve=0.2414286, (0 missing)
##   Surrogate splits:
##       ESCS < 1.2611   to the right, agree=0.781, adj=0.125, (0 split)
##
## Node number 422: 61 observations,    complexity param=0.002009646
##   predicted class=High  expected loss=0.4262295  P(node) =0.01835138
##     class counts:    26    35
##    probabilities: 0.426 0.574
##   left son=844 (21 obs) right son=845 (40 obs)
##   Primary splits:
##       PVSCIE   < 546.972  to the right, improve=2.3813040, (0 missing)
##       ESCS     < -0.1542  to the right, improve=1.7184190, (0 missing)
##       ANXTEST  < -0.2947  to the left,  improve=1.2699280, (0 missing)
##       TEACHSUP < 0.52955  to the left,  improve=1.0969350, (0 missing)
##       MOTIVAT  < -1.42025 to the right, improve=0.8788006, (0 missing)
##   Surrogate splits:
##       ESCS    < 1.1243   to the right, agree=0.672, adj=0.048, (0 split)
##       ANXTEST < -1.7226  to the left,  agree=0.672, adj=0.048, (0 split)
##       EMOSUPS < -1.98855 to the left,  agree=0.672, adj=0.048, (0 split)
##       BELONG  < 0.51065  to the left,  agree=0.672, adj=0.048, (0 split)
##
## Node number 423: 11 observations
##   predicted class=High  expected loss=0.09090909  P(node) =0.003309266
##     class counts:     1    10
##    probabilities: 0.091 0.909
##
## Node number 484: 21 observations,    complexity param=0.001071811
##   predicted class=Low   expected loss=0.4761905  P(node) =0.00631769
##     class counts:    11    10
##    probabilities: 0.524 0.476
```

```
##   left son=968 (14 obs) right son=969 (7 obs)
##   Primary splits:
##       MOTIVAT  < 0.45205  to the left,  improve=1.1904760, (0 missing)
##       TEACHSUP < 0.12655  to the right, improve=1.1904760, (0 missing)
##       PVSCIE   < 459.151  to the right, improve=1.1904760, (0 missing)
##       ESCS     < 0.246    to the left,  improve=0.6428571, (0 missing)
##       ANXTEST  < -0.592   to the left,  improve=0.5852814, (0 missing)
##   Surrogate splits:
##       ESCS     < 0.4873   to the left,  agree=0.810, adj=0.429, (0 split)
##       TEACHSUP < -0.5741  to the right, agree=0.810, adj=0.429, (0 split)
##       BELONG   < 0.71715  to the left,  agree=0.762, adj=0.286, (0 split)
##       ANXTEST  < -0.48185 to the right, agree=0.714, adj=0.143, (0 split)
##       PVSCIE   < 471.3495 to the left,  agree=0.714, adj=0.143, (0 split)
##
## Node number 485: 46 observations,    complexity param=0.001071811
##   predicted class=High  expected loss=0.2391304  P(node) =0.01383875
##     class counts:    11    35
##    probabilities: 0.239 0.761
##   left son=970 (20 obs) right son=971 (26 obs)
##   Primary splits:
##       TEACHSUP < 0.33195  to the left,  improve=1.8314380, (0 missing)
##       PVSCIE   < 633.064  to the right, improve=1.7927430, (0 missing)
##       ESCS     < 0.58625  to the left,  improve=1.1520340, (0 missing)
##       MOTIVAT  < 0.7241   to the right, improve=0.6613527, (0 missing)
##       ANXTEST  < -0.60275 to the right, improve=0.6613527, (0 missing)
##   Surrogate splits:
##       PVSCIE  < 587.207  to the left,  agree=0.652, adj=0.20, (0 split)
##       BELONG  < 0.70715  to the left,  agree=0.609, adj=0.10, (0 split)
##       ESCS    < 0.58625  to the left,  agree=0.587, adj=0.05, (0 split)
##       ANXTEST < -0.7712  to the right, agree=0.587, adj=0.05, (0 split)
##
## Node number 492: 68 observations,    complexity param=0.0002679528
##   predicted class=High  expected loss=0.2352941  P(node) =0.02045728
##     class counts:    16    52
##    probabilities: 0.235 0.765
##   left son=984 (7 obs) right son=985 (61 obs)
##   Primary splits:
##       PVSCIE   < 625.834  to the right, improve=1.7633280, (0 missing)
##       ESCS     < 0.18125  to the left,  improve=1.2132940, (0 missing)
##       ANXTEST  < -0.01105 to the left,  improve=0.5471433, (0 missing)
##       MOTIVAT  < -0.2161  to the right, improve=0.4705882, (0 missing)
##       TEACHSUP < 1.1842   to the left,  improve=0.2372549, (0 missing)
##
## Node number 493: 24 observations
##   predicted class=High  expected loss=0.04166667  P(node) =0.007220217
##     class counts:     1    23
##    probabilities: 0.042 0.958
##
## Node number 582: 23 observations
##   predicted class=Low   expected loss=0.08695652  P(node) =0.006919374
##     class counts:    21     2
##    probabilities: 0.913 0.087
##
## Node number 583: 136 observations,    complexity param=0.001378043
```

```
##   predicted class=Low   expected loss=0.3161765  P(node) =0.04091456
##     class counts:    93    43
##    probabilities: 0.684 0.316
##   left son=1166 (60 obs) right son=1167 (76 obs)
##   Primary splits:
##       TEACHSUP < -0.2809  to the left,  improve=2.898297, (0 missing)
##       EMOSUPS  < -1.1003  to the left,  improve=2.362810, (0 missing)
##       BELONG   < -0.5119  to the left,  improve=1.473736, (0 missing)
##       ESCS     < -0.8713  to the right, improve=1.104537, (0 missing)
##       PVSCIE   < 348.0555 to the right, improve=1.104537, (0 missing)
##   Surrogate splits:
##       EMOSUPS < -1.38745 to the left,  agree=0.625, adj=0.150, (0 split)
##       ESCS    < -0.44765 to the left,  agree=0.588, adj=0.067, (0 split)
##       BELONG  < -0.5541  to the left,  agree=0.588, adj=0.067, (0 split)
##       PVSCIE  < 467.137  to the left,  agree=0.581, adj=0.050, (0 split)
##       IMMIG   splits as  RLR,          agree=0.566, adj=0.017, (0 split)
##
## Node number 598: 21 observations,    complexity param=0.002009646
##   predicted class=Low   expected loss=0.4285714  P(node) =0.00631769
##     class counts:    12     9
##    probabilities: 0.571 0.429
##   left son=1196 (13 obs) right son=1197 (8 obs)
##   Primary splits:
##       PVSCIE  < 498.979  to the left,  improve=2.6703300, (0 missing)
##       EMOSUPS < 0.0257   to the left,  improve=1.7142860, (0 missing)
##       ESCS    < -0.02895 to the left,  improve=0.8241758, (0 missing)
##       ANXTEST < -0.4501  to the left,  improve=0.5079365, (0 missing)
##       MOTIVAT < -0.54225 to the left,  improve=0.4285714, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -0.2227  to the left,  agree=0.762, adj=0.375, (0 split)
##       EMOSUPS  < 0.0641   to the left,  agree=0.762, adj=0.375, (0 split)
##       ANXTEST  < 0.03915  to the left,  agree=0.714, adj=0.250, (0 split)
##       TEACHSUP < -0.14565 to the left,  agree=0.667, adj=0.125, (0 split)
##
## Node number 599: 10 observations
##   predicted class=High  expected loss=0.2  P(node) =0.003008424
##     class counts:     2     8
##    probabilities: 0.200 0.800
##
## Node number 620: 28 observations
##   predicted class=Low   expected loss=0.3214286  P(node) =0.008423586
##     class counts:    19     9
##    probabilities: 0.679 0.321
##
## Node number 621: 23 observations,    complexity param=0.002411576
##   predicted class=High  expected loss=0.3913043  P(node) =0.006919374
##     class counts:     9    14
##    probabilities: 0.391 0.609
##   left son=1242 (11 obs) right son=1243 (12 obs)
##   Primary splits:
##       PVSCIE  < 436.132  to the left,  improve=2.5322790, (0 missing)
##       MOTIVAT < -0.39935 to the left,  improve=2.3216010, (0 missing)
##       ESCS    < 0.9072   to the left,  improve=1.2949830, (0 missing)
##       EMOSUPS < 0.0655   to the left,  improve=0.4898551, (0 missing)
```

```
##       BELONG  < -0.46005 to the left,  improve=0.2949833, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -1.2695  to the left,  agree=0.696, adj=0.364, (0 split)
##       ESCS    < 0.4848   to the left,  agree=0.652, adj=0.273, (0 split)
##       ANXTEST < -2.1484  to the left,  agree=0.609, adj=0.182, (0 split)
##       EMOSUPS < 0.47395  to the right, agree=0.609, adj=0.182, (0 split)
##       BELONG  < -0.0261  to the right, agree=0.609, adj=0.182, (0 split)
##
## Node number 622: 10 observations
##   predicted class=Low   expected loss=0.4  P(node) =0.003008424
##     class counts:     6     4
##    probabilities: 0.600 0.400
##
## Node number 623: 22 observations
##   predicted class=High  expected loss=0.1818182  P(node) =0.006618532
##     class counts:     4    18
##    probabilities: 0.182 0.818
##
## Node number 658: 33 observations,    complexity param=0.0002679528
##   predicted class=Low   expected loss=0.2424242  P(node) =0.009927798
##     class counts:    25     8
##    probabilities: 0.758 0.242
##   left son=1316 (26 obs) right son=1317 (7 obs)
##   Primary splits:
##       ESCS     < 0.8339   to the right, improve=1.9234100, (0 missing)
##       TEACHSUP < 0.5187   to the right, improve=1.1750580, (0 missing)
##       MOTIVAT  < 0.1663   to the right, improve=0.6545455, (0 missing)
##       PVSCIE   < 394.802  to the right, improve=0.4848485, (0 missing)
##       ANXTEST  < 1.8329   to the left,  improve=0.3712121, (0 missing)
##
## Node number 659: 16 observations
##   predicted class=Low   expected loss=0.5  P(node) =0.004813478
##     class counts:     8     8
##    probabilities: 0.500 0.500
##
## Node number 678: 49 observations,    complexity param=0.001607717
##   predicted class=Low   expected loss=0.3469388  P(node) =0.01474128
##     class counts:    32    17
##    probabilities: 0.653 0.347
##   left son=1356 (39 obs) right son=1357 (10 obs)
##   Primary splits:
##       PVSCIE    < 413.539  to the right, improve=1.6092100, (0 missing)
##       ANXTEST   < -0.11695 to the right, improve=1.4592540, (0 missing)
##       TEACHSUP  < -0.7071  to the right, improve=1.1179570, (0 missing)
##       ST004D01T splits as  RL,           improve=0.9970641, (0 missing)
##       ESCS      < 0.89115  to the right, improve=0.8850852, (0 missing)
##   Surrogate splits:
##       ANXTEST < -0.7148  to the right, agree=0.816, adj=0.1, (0 split)
##
## Node number 679: 26 observations,    complexity param=0.0008038585
##   predicted class=High  expected loss=0.3076923  P(node) =0.007821901
##     class counts:     8    18
##    probabilities: 0.308 0.692
##   left son=1358 (11 obs) right son=1359 (15 obs)
```

```
##   Primary splits:
##       BELONG  < -0.7684  to the left,  improve=2.1557110, (0 missing)
##       ESCS    < 0.1556   to the right, improve=1.4019230, (0 missing)
##       ANXTEST < 0.0011   to the right, improve=1.3325620, (0 missing)
##       MOTIVAT < -0.4261  to the right, improve=0.7713675, (0 missing)
##       PVSCIE  < 439.946  to the left,  improve=0.5148316, (0 missing)
##   Surrogate splits:
##       ESCS      < 0.5945   to the right, agree=0.731, adj=0.364, (0 split)
##       ST004D01T splits as  RL,           agree=0.654, adj=0.182, (0 split)
##       MOTIVAT   < -0.48925 to the right, agree=0.654, adj=0.182, (0 split)
##       PVSCIE    < 484.8845 to the right, agree=0.654, adj=0.182, (0 split)
##
## Node number 692: 11 observations
##   predicted class=Low   expected loss=0.1818182  P(node) =0.003309266
##     class counts:     9     2
##    probabilities: 0.818 0.182
##
## Node number 693: 10 observations
##   predicted class=High  expected loss=0.4  P(node) =0.003008424
##     class counts:     4     6
##    probabilities: 0.400 0.600
##
## Node number 694: 60 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.45  P(node) =0.01805054
##     class counts:    27    33
##    probabilities: 0.450 0.550
##   left son=1388 (36 obs) right son=1389 (24 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=2.0055560, (0 missing)
##       ESCS      < 0.2915   to the left,  improve=1.9962960, (0 missing)
##       PVSCIE    < 497.6215 to the right, improve=1.7357140, (0 missing)
##       MOTIVAT   < -0.8452  to the right, improve=0.9902468, (0 missing)
##       TEACHSUP  < 0.37385  to the left,  improve=0.9902468, (0 missing)
##   Surrogate splits:
##       ESCS     < 0.7884   to the left,  agree=0.667, adj=0.167, (0 split)
##       BELONG   < -0.2909  to the right, agree=0.667, adj=0.167, (0 split)
##       ANXTEST  < -0.65125 to the right, agree=0.650, adj=0.125, (0 split)
##       PVSCIE   < 380.5805 to the right, agree=0.650, adj=0.125, (0 split)
##       TEACHSUP < -1.58675 to the right, agree=0.633, adj=0.083, (0 split)
##
## Node number 695: 32 observations
##   predicted class=High  expected loss=0.21875  P(node) =0.009626955
##     class counts:     7    25
##    probabilities: 0.219 0.781
##
## Node number 698: 24 observations,    complexity param=0.0008038585
##   predicted class=High  expected loss=0.4166667  P(node) =0.007220217
##     class counts:    10    14
##    probabilities: 0.417 0.583
##   left son=1396 (8 obs) right son=1397 (16 obs)
##   Primary splits:
##       ESCS     < 1.416    to the left,  improve=1.0416670, (0 missing)
##       MOTIVAT  < 1.6252   to the right, improve=0.8414918, (0 missing)
##       TEACHSUP < 0.4624   to the right, improve=0.5555556, (0 missing)
```

```
##       ANXTEST  < -1.27925 to the left,  improve=0.4733894, (0 missing)
##       PVSCIE   < 511.9705 to the right, improve=0.3389356, (0 missing)
##   Surrogate splits:
##       BELONG  < 0.3142   to the right, agree=0.750, adj=0.250, (0 split)
##       ANXTEST < -0.9244  to the right, agree=0.708, adj=0.125, (0 split)
##
## Node number 699: 8 observations
##   predicted class=High  expected loss=0  P(node) =0.002406739
##     class counts:     0     8
##    probabilities: 0.000 1.000
##
## Node number 844: 21 observations,    complexity param=0.001607717
##   predicted class=Low   expected loss=0.3809524  P(node) =0.00631769
##     class counts:    13     8
##    probabilities: 0.619 0.381
##   left son=1688 (7 obs) right son=1689 (14 obs)
##   Primary splits:
##       ESCS     < 0.8983   to the right, improve=3.04761900, (0 missing)
##       MOTIVAT  < -0.8216  to the left,  improve=1.69322300, (0 missing)
##       PVSCIE   < 601.3495 to the left,  improve=1.69322300, (0 missing)
##       ANXTEST  < -0.5265  to the left,  improve=0.76190480, (0 missing)
##       TEACHSUP < 0.15225  to the right, improve=0.07142857, (0 missing)
##   Surrogate splits:
##       EMOSUPS < 0.0257   to the right, agree=0.762, adj=0.286, (0 split)
##       PVSCIE  < 585.7765 to the left,  agree=0.714, adj=0.143, (0 split)
##
## Node number 845: 40 observations,    complexity param=0.0008038585
##   predicted class=High  expected loss=0.325  P(node) =0.01203369
##     class counts:    13    27
##    probabilities: 0.325 0.675
##   left son=1690 (15 obs) right son=1691 (25 obs)
##   Primary splits:
##       PVSCIE   < 467.95   to the left,  improve=2.083333, (0 missing)
##       ESCS     < -0.27735 to the right, improve=1.062545, (0 missing)
##       MOTIVAT  < -1.2507  to the right, improve=1.062545, (0 missing)
##       TEACHSUP < 1.1842   to the left,  improve=1.062545, (0 missing)
##       ANXTEST  < -0.3479  to the left,  improve=0.800000, (0 missing)
##   Surrogate splits:
##       BELONG   < 0.67485  to the right, agree=0.675, adj=0.133, (0 split)
##       IMMIG    splits as  R-L,          agree=0.650, adj=0.067, (0 split)
##       ESCS     < 1.19765  to the right, agree=0.650, adj=0.067, (0 split)
##       TEACHSUP < 0.9171   to the right, agree=0.650, adj=0.067, (0 split)
##
## Node number 968: 14 observations
##   predicted class=Low   expected loss=0.3571429  P(node) =0.004211793
##     class counts:     9     5
##    probabilities: 0.643 0.357
##
## Node number 969: 7 observations
##   predicted class=High  expected loss=0.2857143  P(node) =0.002105897
##     class counts:     2     5
##    probabilities: 0.286 0.714
##
## Node number 970: 20 observations,    complexity param=0.001071811
```

```
##   predicted class=High  expected loss=0.4  P(node) =0.006016847
##     class counts:     8    12
##    probabilities: 0.400 0.600
##   left son=1940 (9 obs) right son=1941 (11 obs)
##   Primary splits:
##       ESCS     < 1.04225  to the left,  improve=2.327273, (0 missing)
##       PVSCIE   < 577.6485 to the right, improve=2.016667, (0 missing)
##       ANXTEST  < -0.72645 to the right, improve=1.350000, (0 missing)
##       MOTIVAT  < -0.47905 to the left,  improve=0.632967, (0 missing)
##       TEACHSUP < -0.0424  to the right, improve=0.632967, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -0.1124  to the left,  agree=0.85, adj=0.667, (0 split)
##       TEACHSUP < 0.0557   to the right, agree=0.75, adj=0.444, (0 split)
##       PVSCIE   < 619.22   to the right, agree=0.65, adj=0.222, (0 split)
##       ANXTEST  < -1.2841  to the left,  agree=0.60, adj=0.111, (0 split)
##       BELONG   < 0.60335  to the left,  agree=0.60, adj=0.111, (0 split)
##
## Node number 971: 26 observations
##   predicted class=High  expected loss=0.1153846  P(node) =0.007821901
##     class counts:     3    23
##    probabilities: 0.115 0.885
##
## Node number 984: 7 observations
##   predicted class=Low   expected loss=0.4285714  P(node) =0.002105897
##     class counts:     4     3
##    probabilities: 0.571 0.429
##
## Node number 985: 61 observations
##   predicted class=High  expected loss=0.1967213  P(node) =0.01835138
##     class counts:    12    49
##    probabilities: 0.197 0.803
##
## Node number 1166: 60 observations
##   predicted class=Low   expected loss=0.2  P(node) =0.01805054
##     class counts:    48    12
##    probabilities: 0.800 0.200
##
## Node number 1167: 76 observations,    complexity param=0.001378043
##   predicted class=Low   expected loss=0.4078947  P(node) =0.02286402
##     class counts:    45    31
##    probabilities: 0.592 0.408
##   left son=2334 (43 obs) right son=2335 (33 obs)
##   Primary splits:
##       ESCS     < 0.22855  to the left,  improve=2.207355, (0 missing)
##       BELONG   < -1.0011  to the right, improve=2.092879, (0 missing)
##       EMOSUPS  < -0.37845 to the left,  improve=1.723860, (0 missing)
##       TEACHSUP < -0.21565 to the right, improve=1.447586, (0 missing)
##       ANXTEST  < -0.2287  to the left,  improve=1.342694, (0 missing)
##   Surrogate splits:
##       EMOSUPS  < -0.37845 to the left,  agree=0.711, adj=0.333, (0 split)
##       MOTIVAT  < -0.4606  to the left,  agree=0.671, adj=0.242, (0 split)
##       TEACHSUP < 0.0862   to the left,  agree=0.658, adj=0.212, (0 split)
##       ANXTEST  < -0.43725 to the left,  agree=0.632, adj=0.152, (0 split)
##       PVSCIE   < 463.5755 to the left,  agree=0.605, adj=0.091, (0 split)
```

```
##
## Node number 1196: 13 observations
##   predicted class=Low   expected loss=0.2307692  P(node) =0.003910951
##     class counts:    10     3
##    probabilities: 0.769 0.231
##
## Node number 1197: 8 observations
##   predicted class=High  expected loss=0.25  P(node) =0.002406739
##     class counts:     2     6
##    probabilities: 0.250 0.750
##
## Node number 1242: 11 observations
##   predicted class=Low   expected loss=0.3636364  P(node) =0.003309266
##     class counts:     7     4
##    probabilities: 0.636 0.364
##
## Node number 1243: 12 observations
##   predicted class=High  expected loss=0.1666667  P(node) =0.003610108
##     class counts:     2    10
##    probabilities: 0.167 0.833
##
## Node number 1316: 26 observations
##   predicted class=Low   expected loss=0.1538462  P(node) =0.007821901
##     class counts:    22     4
##    probabilities: 0.846 0.154
##
## Node number 1317: 7 observations
##   predicted class=High  expected loss=0.4285714  P(node) =0.002105897
##     class counts:     3     4
##    probabilities: 0.429 0.571
##
## Node number 1356: 39 observations,    complexity param=0.0008038585
##   predicted class=Low   expected loss=0.2820513  P(node) =0.01173285
##     class counts:    28    11
##    probabilities: 0.718 0.282
##   left son=2712 (32 obs) right son=2713 (7 obs)
##   Primary splits:
##       ESCS    < 1.2571   to the left,  improve=1.4288000, (0 missing)
##       BELONG  < -0.60435 to the left,  improve=0.6282051, (0 missing)
##       PVSCIE  < 524.9085 to the right, improve=0.4964847, (0 missing)
##       MOTIVAT < -0.79735 to the right, improve=0.3741821, (0 missing)
##       ANXTEST < 0.06995  to the left,  improve=0.3741821, (0 missing)
##
## Node number 1357: 10 observations
##   predicted class=High  expected loss=0.4  P(node) =0.003008424
##     class counts:     4     6
##    probabilities: 0.400 0.600
##
## Node number 1358: 11 observations
##   predicted class=Low   expected loss=0.4545455  P(node) =0.003309266
##     class counts:     6     5
##    probabilities: 0.545 0.455
##
## Node number 1359: 15 observations
```

```
##   predicted class=High  expected loss=0.1333333  P(node) =0.004512635
##     class counts:     2    13
##    probabilities: 0.133 0.867
##
## Node number 1388: 36 observations,    complexity param=0.001607717
##   predicted class=Low   expected loss=0.4444444  P(node) =0.01083032
##     class counts:    20    16
##    probabilities: 0.556 0.444
##   left son=2776 (15 obs) right son=2777 (21 obs)
##   Primary splits:
##       BELONG   < 0.05125  to the right, improve=1.6253970, (0 missing)
##       ESCS     < 0.30035  to the left,  improve=1.3319570, (0 missing)
##       TEACHSUP < 0.78175  to the left,  improve=0.8027778, (0 missing)
##       PVSCIE   < 500.231  to the right, improve=0.7388167, (0 missing)
##       MOTIVAT  < -1.0586  to the right, improve=0.6944444, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -0.55775 to the right, agree=0.694, adj=0.267, (0 split)
##       PVSCIE  < 546.3355 to the right, agree=0.694, adj=0.267, (0 split)
##       ANXTEST < -0.01105 to the right, agree=0.667, adj=0.200, (0 split)
##
## Node number 1389: 24 observations
##   predicted class=High  expected loss=0.2916667  P(node) =0.007220217
##     class counts:     7    17
##    probabilities: 0.292 0.708
##
## Node number 1396: 8 observations
##   predicted class=Low   expected loss=0.375  P(node) =0.002406739
##     class counts:     5     3
##    probabilities: 0.625 0.375
##
## Node number 1397: 16 observations
##   predicted class=High  expected loss=0.3125  P(node) =0.004813478
##     class counts:     5    11
##    probabilities: 0.312 0.688
##
## Node number 1688: 7 observations
##   predicted class=Low   expected loss=0  P(node) =0.002105897
##     class counts:     7     0
##    probabilities: 1.000 0.000
##
## Node number 1689: 14 observations
##   predicted class=High  expected loss=0.4285714  P(node) =0.004211793
##     class counts:     6     8
##    probabilities: 0.429 0.571
##
## Node number 1690: 15 observations
##   predicted class=Low   expected loss=0.4666667  P(node) =0.004512635
##     class counts:     8     7
##    probabilities: 0.533 0.467
##
## Node number 1691: 25 observations
##   predicted class=High  expected loss=0.2  P(node) =0.007521059
##     class counts:     5    20
##    probabilities: 0.200 0.800
```

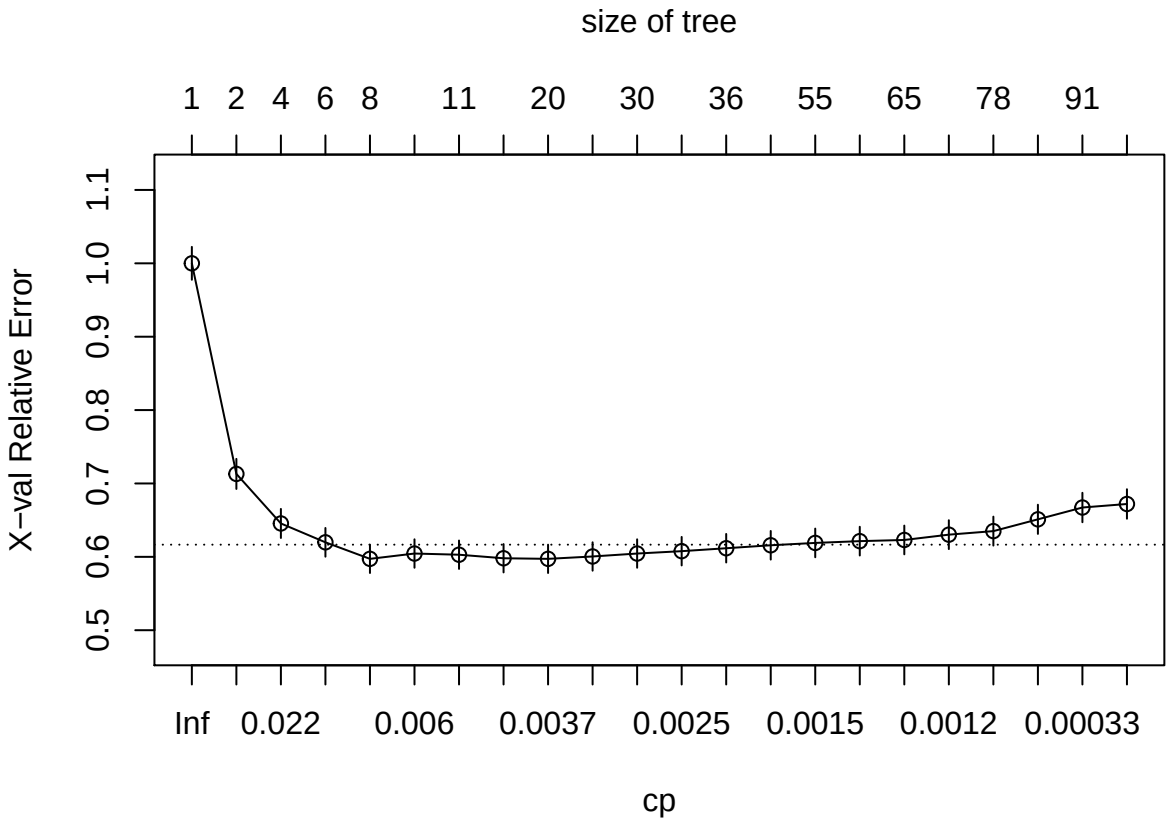
```
##
## Node number 1940: 9 observations
##   predicted class=Low   expected loss=0.3333333  P(node) =0.002707581
##     class counts:     6     3
##    probabilities: 0.667 0.333
##
## Node number 1941: 11 observations
##   predicted class=High  expected loss=0.1818182  P(node) =0.003309266
##     class counts:     2     9
##    probabilities: 0.182 0.818
##
## Node number 2334: 43 observations,    complexity param=0.001071811
##   predicted class=Low   expected loss=0.3023256  P(node) =0.01293622
##     class counts:    30    13
##    probabilities: 0.698 0.302
##   left son=4668 (9 obs) right son=4669 (34 obs)
##   Primary splits:
##       ESCS     < 0.0186   to the right, improve=2.0807110, (0 missing)
##       TEACHSUP < 0.06425  to the right, improve=1.6024980, (0 missing)
##       PVSCIE   < 443.786  to the right, improve=1.2506460, (0 missing)
##       ANXTEST  < -0.3234  to the left,  improve=0.7681063, (0 missing)
##       BELONG   < -0.06865 to the right, improve=0.6181063, (0 missing)
##   Surrogate splits:
##       PVSCIE < 519.0185 to the right, agree=0.814, adj=0.111, (0 split)
##
## Node number 2335: 33 observations,    complexity param=0.001378043
##   predicted class=High  expected loss=0.4545455  P(node) =0.009927798
##     class counts:    15    18
##    probabilities: 0.455 0.545
##   left son=4670 (26 obs) right son=4671 (7 obs)
##   Primary splits:
##       MOTIVAT < -0.93255 to the right, improve=3.6713290, (0 missing)
##       ESCS    < 0.67465  to the right, improve=1.2533420, (0 missing)
##       EMOSUPS < -0.29005 to the left,  improve=1.2533420, (0 missing)
##       PVSCIE  < 515.9135 to the right, improve=1.1988010, (0 missing)
##       ANXTEST < -0.6163  to the right, improve=0.8080808, (0 missing)
##   Surrogate splits:
##       ESCS    < 0.27415  to the right, agree=0.848, adj=0.286, (0 split)
##       ANXTEST < -0.2053  to the left,  agree=0.848, adj=0.286, (0 split)
##
## Node number 2712: 32 observations
##   predicted class=Low   expected loss=0.21875  P(node) =0.009626955
##     class counts:    25     7
##    probabilities: 0.781 0.219
##
## Node number 2713: 7 observations
##   predicted class=High  expected loss=0.4285714  P(node) =0.002105897
##     class counts:     3     4
##    probabilities: 0.429 0.571
##
## Node number 2776: 15 observations
##   predicted class=Low   expected loss=0.2666667  P(node) =0.004512635
##     class counts:    11     4
##    probabilities: 0.733 0.267
```

```
##
## Node number 2777: 21 observations,    complexity param=0.001607717
##   predicted class=High  expected loss=0.4285714  P(node) =0.00631769
##     class counts:     9    12
##    probabilities: 0.429 0.571
##   left son=5554 (11 obs) right son=5555 (10 obs)
##   Primary splits:
##       PVSCIE  < 500.231  to the right, improve=1.9948050, (0 missing)
##       ESCS    < 0.55365  to the left,  improve=1.7142860, (0 missing)
##       ANXTEST < -0.49475 to the left,  improve=0.9972527, (0 missing)
##       BELONG  < -0.3034  to the left,  improve=0.9972527, (0 missing)
##       MOTIVAT < -1.0586  to the right, improve=0.8241758, (0 missing)
##   Surrogate splits:
##       ANXTEST  < -0.1859  to the left,  agree=0.810, adj=0.6, (0 split)
##       ESCS     < -0.66135 to the right, agree=0.714, adj=0.4, (0 split)
##       MOTIVAT  < -1.4339  to the right, agree=0.619, adj=0.2, (0 split)
##       TEACHSUP < -0.8852  to the right, agree=0.619, adj=0.2, (0 split)
##       BELONG   < -0.3034  to the left,  agree=0.571, adj=0.1, (0 split)
##
## Node number 4668: 9 observations
##   predicted class=Low   expected loss=0  P(node) =0.002707581
##     class counts:     9     0
##    probabilities: 1.000 0.000
##
## Node number 4669: 34 observations,    complexity param=0.001071811
##   predicted class=Low   expected loss=0.3823529  P(node) =0.01022864
##     class counts:    21    13
##    probabilities: 0.618 0.382
##   left son=9338 (13 obs) right son=9339 (21 obs)
##   Primary splits:
##       TEACHSUP < 0.06425  to the right, improve=2.1980180, (0 missing)
##       PVSCIE   < 443.786  to the right, improve=1.7016810, (0 missing)
##       BELONG   < -0.06865 to the right, improve=1.3857470, (0 missing)
##       ESCS     < -0.1471  to the left,  improve=1.2319000, (0 missing)
##       MOTIVAT  < -0.9002  to the left,  improve=0.3816305, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -0.58715 to the right, agree=0.706, adj=0.231, (0 split)
##       BELONG  < -0.05625 to the right, agree=0.706, adj=0.231, (0 split)
##       PVSCIE  < 402.0435 to the left,  agree=0.706, adj=0.231, (0 split)
##       ANXTEST < -1.9864  to the left,  agree=0.676, adj=0.154, (0 split)
##       EMOSUPS < -1.7406  to the left,  agree=0.676, adj=0.154, (0 split)
##
## Node number 4670: 26 observations,    complexity param=0.001378043
##   predicted class=Low   expected loss=0.4230769  P(node) =0.007821901
##     class counts:    15    11
##    probabilities: 0.577 0.423
##   left son=9340 (11 obs) right son=9341 (15 obs)
##   Primary splits:
##       EMOSUPS  < -0.29005 to the left,  improve=4.2074590, (0 missing)
##       MOTIVAT  < 0.07135  to the left,  improve=1.6334840, (0 missing)
##       ESCS     < 1.13605  to the left,  improve=1.6246390, (0 missing)
##       TEACHSUP < 0.3614   to the right, improve=0.8620047, (0 missing)
##       PVSCIE   < 474.58   to the right, improve=0.5710956, (0 missing)
##   Surrogate splits:
```

```
##       TEACHSUP < -0.0421  to the left,  agree=0.692, adj=0.273, (0 split)
##       PVSCIE   < 474.58   to the right, agree=0.692, adj=0.273, (0 split)
##       MOTIVAT  < -0.84015 to the left,  agree=0.654, adj=0.182, (0 split)
##       ANXTEST  < -1.0306  to the left,  agree=0.615, adj=0.091, (0 split)
##       BELONG   < -0.42225 to the left,  agree=0.615, adj=0.091, (0 split)
##
## Node number 4671: 7 observations
##   predicted class=High  expected loss=0  P(node) =0.002105897
##     class counts:     0     7
##    probabilities: 0.000 1.000
##
## Node number 5554: 11 observations
##   predicted class=Low   expected loss=0.3636364  P(node) =0.003309266
##     class counts:     7     4
##    probabilities: 0.636 0.364
##
## Node number 5555: 10 observations
##   predicted class=High  expected loss=0.2  P(node) =0.003008424
##     class counts:     2     8
##    probabilities: 0.200 0.800
##
## Node number 9338: 13 observations
##   predicted class=Low   expected loss=0.1538462  P(node) =0.003910951
##     class counts:    11     2
##    probabilities: 0.846 0.154
##
## Node number 9339: 21 observations,    complexity param=0.001071811
##   predicted class=High  expected loss=0.4761905  P(node) =0.00631769
##     class counts:    10    11
##    probabilities: 0.476 0.524
##   left son=18678 (13 obs) right son=18679 (8 obs)
##   Primary splits:
##       MOTIVAT < -0.9002  to the left,  improve=1.3223440, (0 missing)
##       ESCS    < -0.25045 to the left,  improve=0.7619048, (0 missing)
##       PVSCIE  < 439.2855 to the right, improve=0.7619048, (0 missing)
##       ANXTEST < -0.5549  to the right, improve=0.5723443, (0 missing)
##       BELONG  < -0.30465 to the right, improve=0.1904762, (0 missing)
##   Surrogate splits:
##       ESCS  < -0.25045 to the left,  agree=0.857, adj=0.625, (0 split)
##       IMMIG splits as  L-R,          agree=0.714, adj=0.250, (0 split)
##
## Node number 9340: 11 observations
##   predicted class=Low   expected loss=0.09090909  P(node) =0.003309266
##     class counts:    10     1
##    probabilities: 0.909 0.091
##
## Node number 9341: 15 observations
##   predicted class=High  expected loss=0.3333333  P(node) =0.004512635
##     class counts:     5    10
##    probabilities: 0.333 0.667
##
## Node number 18678: 13 observations
##   predicted class=Low   expected loss=0.3846154  P(node) =0.003910951
##     class counts:     8     5
```

```
##    probabilities: 0.615 0.385
##
## Node number 18679: 8 observations
##   predicted class=High  expected loss=0.25  P(node) =0.002406739
##     class counts:     2     6
##    probabilities: 0.250 0.750
```

```
# show the cp values and find the small cross-validated error
plotcp(model1)
```




```
model1$cptable[which.min(model1$cptable[,"xerror"]),"CP"]
```

```
## [1] 0.006430868
```

```
prune1 <- prune(model1, cp = 0.006430868)
Model1 <- summary(prune1)
```

```
## Call:
## rpart(formula = wb ~ ., data = training, na.action = na.omit,
##     method = "class", control = rpart.control(cp = 0))
##   n= 3324
##
##            CP nsplit rel error    xerror       xstd
## 1 0.324758842      0 1.0000000 1.0000000 0.02242802
## 2 0.022508039      1 0.6752412 0.7130225 0.02049928
## 3 0.021302251      3 0.6302251 0.6454984 0.01983779
## 4 0.019694534      5 0.5876206 0.6197749 0.01956148
## 5 0.006430868      7 0.5482315 0.5972669 0.01930801
```

```
## 6 0.006430868      9 0.5353698 0.6045016 0.01939070
##
## Variable importance
##    BELONG   EMOSUPS   ANXTEST ST004D01T   MOTIVAT    PVSCIE      ESCS  TEACHSUP
##        61        23         8         3         2         1         1         1
##
## Node number 1: 3324 observations,    complexity param=0.3247588
##   predicted class=Low   expected loss=0.3742479  P(node) =1
##     class counts:  2080  1244
##    probabilities: 0.626 0.374
##   left son=2 (2314 obs) right son=3 (1010 obs)
##   Primary splits:
##       BELONG    < 0.48525  to the left,  improve=307.9098, (0 missing)
##       EMOSUPS   < 0.76665  to the left,  improve=266.5294, (0 missing)
##       ANXTEST   < -0.16225 to the right, improve=146.7226, (0 missing)
##       ST004D01T splits as  RL,           improve=145.1907, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=107.0852, (0 missing)
##   Surrogate splits:
##       ANXTEST < -1.0247  to the right, agree=0.715, adj=0.060, (0 split)
##       ESCS    < 1.8952   to the left,  agree=0.697, adj=0.002, (0 split)
##       PVSCIE  < 796.82   to the left,  agree=0.696, adj=0.001, (0 split)
##
## Node number 2: 2314 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.2320657  P(node) =0.6961492
##     class counts:  1777   537
##    probabilities: 0.768 0.232
##   left son=4 (1715 obs) right son=5 (599 obs)
##   Primary splits:
##       EMOSUPS   < 0.76665  to the left,  improve=97.34052, (0 missing)
##       ST004D01T splits as  RL,           improve=66.29667, (0 missing)
##       BELONG    < -2.3737  to the right, improve=51.49335, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=43.43130, (0 missing)
##       ANXTEST   < -0.6491  to the right, improve=43.29168, (0 missing)
##   Surrogate splits:
##       MOTIVAT < 1.60675  to the left,  agree=0.752, adj=0.042, (0 split)
##       BELONG  < -2.792   to the right, agree=0.751, adj=0.038, (0 split)
##       ESCS    < 1.3735   to the left,  agree=0.747, adj=0.023, (0 split)
##
## Node number 3: 1010 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.3  P(node) =0.3038508
##     class counts:   303   707
##    probabilities: 0.300 0.700
##   left son=6 (378 obs) right son=7 (632 obs)
##   Primary splits:
##       EMOSUPS   < 0.516    to the left,  improve=38.63989, (0 missing)
##       ANXTEST   < 0.52575  to the right, improve=33.40490, (0 missing)
##       BELONG    < 0.8473   to the left,  improve=29.88052, (0 missing)
##       ST004D01T splits as  RL,           improve=27.04718, (0 missing)
##       TEACHSUP  < 0.2479   to the left,  improve=14.79492, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.5708  to the left,  agree=0.648, adj=0.058, (0 split)
##       TEACHSUP < -1.04835 to the left,  agree=0.641, adj=0.040, (0 split)
##       ESCS     < -1.00565 to the left,  agree=0.637, adj=0.029, (0 split)
##       ANXTEST  < 1.88045  to the right, agree=0.630, adj=0.011, (0 split)
```

```
##       BELONG   < 0.5179   to the left,  agree=0.630, adj=0.011, (0 split)
##
## Node number 4: 1715 observations
##   predicted class=Low   expected loss=0.1463557  P(node) =0.5159446
##     class counts:  1464   251
##    probabilities: 0.854 0.146
##
## Node number 5: 599 observations,    complexity param=0.02250804
##   predicted class=Low   expected loss=0.4774624  P(node) =0.1802046
##     class counts:   313   286
##    probabilities: 0.523 0.477
##   left son=10 (531 obs) right son=11 (68 obs)
##   Primary splits:
##       BELONG    < -1.76375 to the right, improve=28.937130, (0 missing)
##       ANXTEST   < -0.09165 to the right, improve=24.139420, (0 missing)
##       ST004D01T splits as  RL,           improve=22.988270, (0 missing)
##       TEACHSUP  < 1.00125  to the left,  improve=12.301810, (0 missing)
##       MOTIVAT   < 0.53905  to the left,  improve= 7.913912, (0 missing)
##   Surrogate splits:
##       EMOSUPS < 0.982    to the right, agree=0.888, adj=0.015, (0 split)
##
## Node number 6: 378 observations,    complexity param=0.02130225
##   predicted class=High  expected loss=0.478836  P(node) =0.1137184
##     class counts:   181   197
##    probabilities: 0.479 0.521
##   left son=12 (151 obs) right son=13 (227 obs)
##   Primary splits:
##       ST004D01T splits as  RL,           improve=19.449480, (0 missing)
##       ANXTEST   < 0.5469   to the right, improve=12.242440, (0 missing)
##       BELONG    < 0.85785  to the left,  improve=10.551110, (0 missing)
##       PVSCIE    < 383.0415 to the right, improve= 8.046224, (0 missing)
##       TEACHSUP  < 0.635    to the left,  improve= 3.677357, (0 missing)
##   Surrogate splits:
##       ANXTEST  < -0.24555 to the right, agree=0.704, adj=0.258, (0 split)
##       MOTIVAT  < 0.4543   to the right, agree=0.635, adj=0.086, (0 split)
##       TEACHSUP < -1.154   to the left,  agree=0.622, adj=0.053, (0 split)
##       ESCS     < 1.36325  to the right, agree=0.611, adj=0.026, (0 split)
##       EMOSUPS  < -1.5696  to the left,  agree=0.611, adj=0.026, (0 split)
##
## Node number 7: 632 observations
##   predicted class=High  expected loss=0.193038  P(node) =0.1901324
##     class counts:   122   510
##    probabilities: 0.193 0.807
##
## Node number 10: 531 observations,    complexity param=0.01969453
##   predicted class=Low   expected loss=0.4218456  P(node) =0.1597473
##     class counts:   307   224
##    probabilities: 0.578 0.422
##   left son=20 (155 obs) right son=21 (376 obs)
##   Primary splits:
##       ANXTEST   < 0.444    to the right, improve=17.950590, (0 missing)
##       BELONG    < -0.41595 to the left,  improve=16.110850, (0 missing)
##       ST004D01T splits as  RL,           improve=12.721750, (0 missing)
##       TEACHSUP  < 0.3595   to the left,  improve= 7.256387, (0 missing)
```

```
##       PVSCIE    < 587.5145 to the right, improve= 3.811584, (0 missing)
##   Surrogate splits:
##       PVSCIE   < 395.287  to the left,  agree=0.725, adj=0.058, (0 split)
##       IMMIG    splits as  RLL,          agree=0.721, adj=0.045, (0 split)
##       TEACHSUP < -1.07145 to the left,  agree=0.714, adj=0.019, (0 split)
##       BELONG   < -1.1089  to the left,  agree=0.710, adj=0.006, (0 split)
##
## Node number 11: 68 observations
##   predicted class=High  expected loss=0.08823529  P(node) =0.02045728
##     class counts:     6    62
##    probabilities: 0.088 0.912
##
## Node number 12: 151 observations,    complexity param=0.006430868
##   predicted class=Low   expected loss=0.3245033  P(node) =0.0454272
##     class counts:   102    49
##    probabilities: 0.675 0.325
##   left son=24 (135 obs) right son=25 (16 obs)
##   Primary splits:
##       PVSCIE  < 388.6835 to the right, improve=6.480157, (0 missing)
##       BELONG  < 0.9802   to the left,  improve=4.075495, (0 missing)
##       ANXTEST < 1.1631   to the right, improve=2.704382, (0 missing)
##       ESCS    < 1.4161   to the left,  improve=2.528087, (0 missing)
##       EMOSUPS < -2.63285 to the right, improve=2.230422, (0 missing)
##
## Node number 13: 227 observations
##   predicted class=High  expected loss=0.3480176  P(node) =0.06829122
##     class counts:    79   148
##    probabilities: 0.348 0.652
##
## Node number 20: 155 observations
##   predicted class=Low   expected loss=0.2193548  P(node) =0.04663057
##     class counts:   121    34
##    probabilities: 0.781 0.219
##
## Node number 21: 376 observations,    complexity param=0.01969453
##   predicted class=High  expected loss=0.4946809  P(node) =0.1131167
##     class counts:   186   190
##    probabilities: 0.495 0.505
##   left son=42 (147 obs) right son=43 (229 obs)
##   Primary splits:
##       BELONG    < -0.41595 to the left,  improve=12.108840, (0 missing)
##       PVSCIE    < 581.4345 to the right, improve= 6.342762, (0 missing)
##       ST004D01T splits as  RL,           improve= 6.148936, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve= 5.519050, (0 missing)
##       ANXTEST   < -1.6695  to the right, improve= 5.465778, (0 missing)
##   Surrogate splits:
##       MOTIVAT  < -1.3486  to the left,  agree=0.633, adj=0.061, (0 split)
##       PVSCIE   < 652.192  to the right, agree=0.625, adj=0.041, (0 split)
##       IMMIG    splits as  R-L,          agree=0.617, adj=0.020, (0 split)
##       ANXTEST  < 0.3838   to the right, agree=0.617, adj=0.020, (0 split)
##       TEACHSUP < -1.23805 to the left,  agree=0.612, adj=0.007, (0 split)
##
## Node number 24: 135 observations
##   predicted class=Low   expected loss=0.2740741  P(node) =0.04061372
```

```
##     class counts:    98    37
##    probabilities: 0.726 0.274
##
## Node number 25: 16 observations
##   predicted class=High  expected loss=0.25  P(node) =0.004813478
##     class counts:     4    12
##    probabilities: 0.250 0.750
##
## Node number 42: 147 observations,    complexity param=0.006430868
##   predicted class=Low   expected loss=0.3469388  P(node) =0.04422383
##     class counts:    96    51
##    probabilities: 0.653 0.347
##   left son=84 (133 obs) right son=85 (14 obs)
##   Primary splits:
##       ANXTEST   < -1.6695  to the right, improve=5.958110, (0 missing)
##       PVSCIE    < 568.6475 to the right, improve=4.959184, (0 missing)
##       ST004D01T splits as  RL,           improve=3.363751, (0 missing)
##       TEACHSUP  < 0.8673   to the left,  improve=2.991192, (0 missing)
##       MOTIVAT   < -1.3925  to the left,  improve=2.881152, (0 missing)
##   Surrogate splits:
##       MOTIVAT < -2.58215 to the right, agree=0.912, adj=0.071, (0 split)
##
## Node number 43: 229 observations
##   predicted class=High  expected loss=0.3930131  P(node) =0.0688929
##     class counts:    90   139
##    probabilities: 0.393 0.607
##
## Node number 84: 133 observations
##   predicted class=Low   expected loss=0.3007519  P(node) =0.04001203
##     class counts:    93    40
##    probabilities: 0.699 0.301
##
## Node number 85: 14 observations
##   predicted class=High  expected loss=0.2142857  P(node) =0.004211793
##     class counts:     3    11
##    probabilities: 0.214 0.786
```

```
#variables are used in the tree , choosing cp based on the low xerror
Pred1 <- predict(prune1,training,type="class")
acc1<- confusionMatrix(Pred1,training$wb)
acc1
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  Low High
##       Low  1776  362
##       High  304  882
##
##                Accuracy : 0.7996
##                  95% CI : (0.7856, 0.8131)
##     No Information Rate : 0.6258
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.5682
```

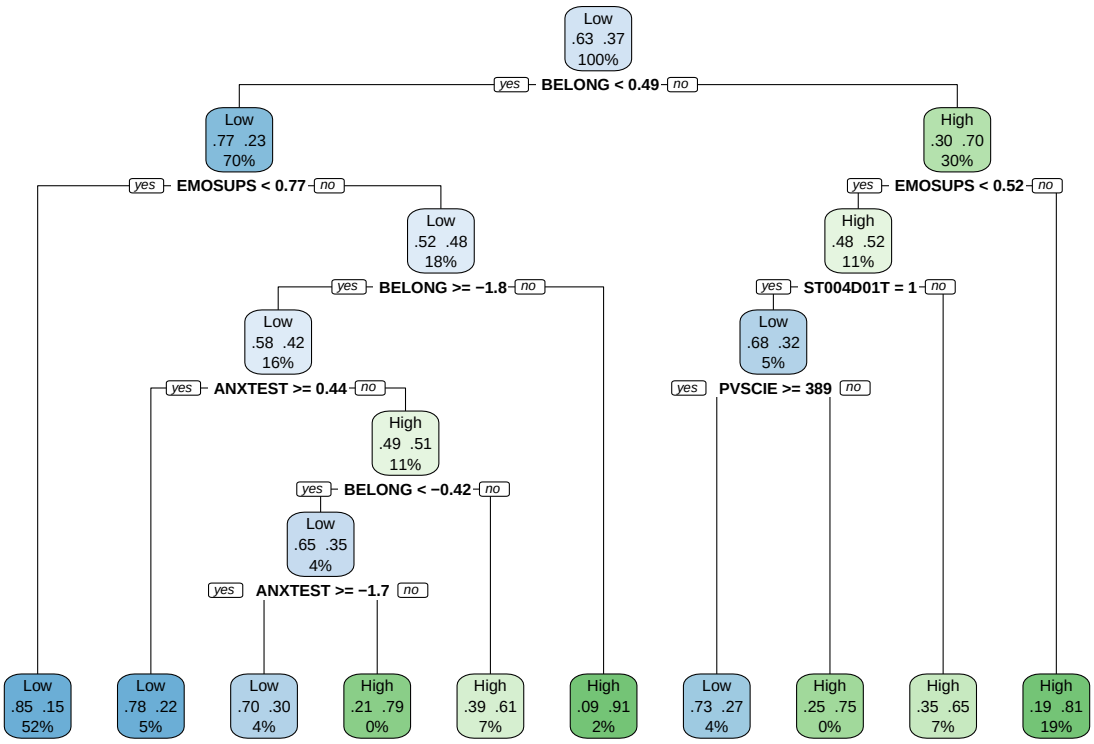
```
##
##  Mcnemar's Test P-Value : 0.0272
##
##             Sensitivity : 0.8538
##             Specificity : 0.7090
##          Pos Pred Value : 0.8307
##          Neg Pred Value : 0.7437
##              Prevalence : 0.6258
##          Detection Rate : 0.5343
##    Detection Prevalence : 0.6432
##       Balanced Accuracy : 0.7814
##
##        'Positive' Class : Low
##
```

```
# testing
PredT1 <- predict(prune1,testing,type="class")
accT1 <- confusionMatrix(PredT1,testing$wb)
accT1
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction Low High
##       Low  434   81
##       High  98  218
##
##                Accuracy : 0.7846
##                  95% CI : (0.7551, 0.8121)
##     No Information Rate : 0.6402
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.5382
##
##  Mcnemar's Test P-Value : 0.2317
##
##             Sensitivity : 0.8158
##             Specificity : 0.7291
##          Pos Pred Value : 0.8427
##          Neg Pred Value : 0.6899
##              Prevalence : 0.6402
##          Detection Rate : 0.5223
##    Detection Prevalence : 0.6197
##       Balanced Accuracy : 0.7724
##
##        'Positive' Class : Low
##
```

Plot and important variables for the tunned model

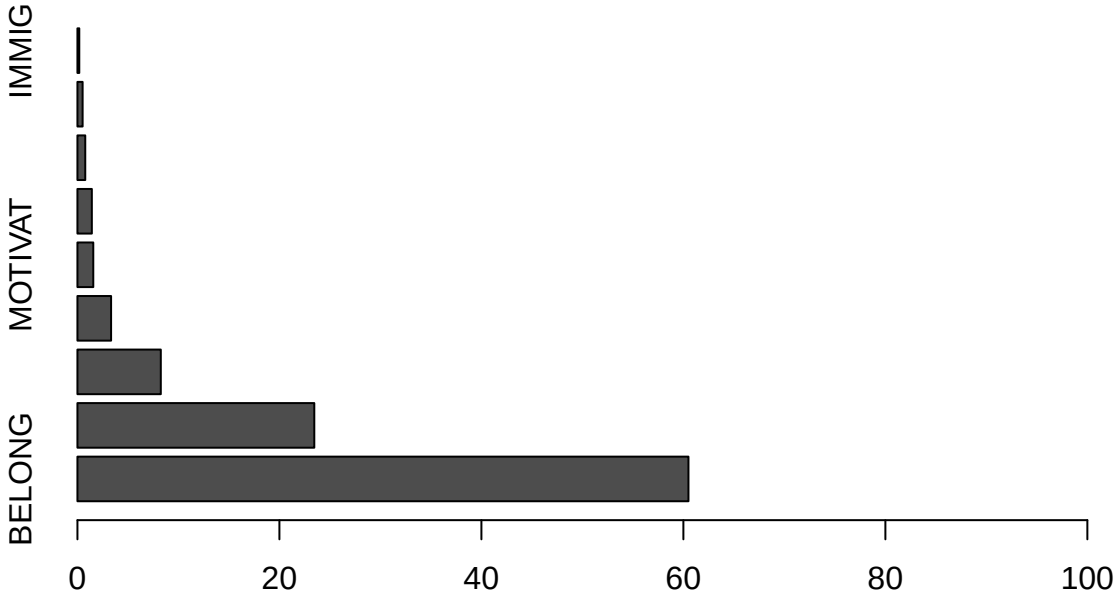
```
rpart.plot(prune1,extra = 104,yesno=2)
```




```
Model1 $variable.importance
```

```
##     BELONG    EMOSUPS    ANXTEST  ST004D01T    MOTIVAT     PVSCIE       ESCS
## 353.218065 136.921174  48.184613  19.449484   9.152904   8.321549   4.524452
##   TEACHSUP       IMMIG
##   2.993569   1.057791
```

```
#importance variables were scaled to 100
barplot(t((Model1$variable.importance/sum(Model1$variable.importance)*100)),horiz=TRUE,xlim = c(0,100))
```



Model2: Decision tree for training and testing data

- Pruned model: the smallest xerror+1*SD rule to tune the tree=0.61657491
- 0.61657491 corresponds to cp=0.0064308682
- We did not have to run Model 2, because the cp is the same as in Model 1

Tune hyperparamter: minsplit

- After tuning the minsplit from 10 to 60, we chose the default (i.e., 20), because there was no so much improvement as minsplit increased

```
split <- c(10,20,30,40,50,60)
grid <- function(x){

set.seed(1234);model3_1 <-rpart(wb~.,data=training,method = "class",na.action = na.omit,minsplit=x,cp=0

Pred3_1 <- predict(model3_1,training,type="class")
acc3_1<- confusionMatrix(Pred3_1,training$wb)



PredT3_1 <- predict(model3_1,testing,type="class")
accT3_1 <- confusionMatrix(PredT3_1 ,testing$wb)


accuracy <- cbind(round(acc3_1$overall,4),round(accT3_1$overall,4))
colnames(accuracy) <- c("train","test")

sens <- cbind(round(acc3_1$byClass,4),round(accT3_1$byClass,4))
colnames(sens) <- c("train","test")

results <- list(accuracy,sens)
return(results)
}

res_split <- list(NULL,NULL,NULL,NULL)

for (i in 1:length(split)){

  res_split[[i]]<- grid(x=split[i])
}
```