

Caregiver burden data preparation

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```
## Loading required package: ExPosition
## Loading required package: prettyGraphs
## Loading required package: knitr
## Warning: package 'knitr' was built under R version 3.3.2
```

This file will be deprecated after Friday May 19th.

This file was only for us to get our data up and running with some simple recoding and references. Once the final data sets are generated from here, do not use this file, instead use the respective RMarkdown files for your project.

Overview

Our analyses focus on caregiver burden as the *outcome* from a variety of predictors, such as demographics, disorder type, cognitive function, and neuropsychological profiles.

Load data and construct data set

The observations we work with require (1) at least summary scores from Zarit's (caregiver) burden interview (ZBI; CITE) and (2) must not classify as normal or missing in final diagnosis (FINDX). Conditional to the ZBI and FINDX, we include participants who qualify as:

- Dementia (community and institution; `cgcc==1` | `cgcc==3`),
- Alzheimer's (`adcc==1`),
- Parkinson's disease (`parkin==1`), and
- Stroke (`prstroke==1`).

Not included for now (because there are so few amongst this set):

- Amyotrophic lateral sclerosis (`als==1`),
- Epilepsy (`epilepsy==1`), and
- Multiple sclerosis (`ms==1`).

Other conditions to consider later (as pseudo-controls):

- Depression (`depressn==1`),
- Learning Disability (`learning==1`),
- Psychiatric Illness (`psychiat==1`), and/or
- Migraines (`migraine==1`).

The following lines of code will read in the data and include only the subjects outlined in the above conditions.

```
## data exist one directory above and in a separate
## folder (in part to avoid committing it to Github for
## now!)
CSHA.1991.full <- read.csv("../IPN2017_Case_Comp/Dataset.csv")

## Conditionals to extract specific participants start
## with primary outcome of interest: caregiver burden
CSHA.1991.zarit <- CSHA.1991.full[CSHA.1991.full$zarscore <
  99, ]
dim(CSHA.1991.zarit)

## [1] 1086 1724

### Now get all data for above conditions
conditions.of.interest <- c((CSHA.1991.zarit$cgcc == 1 |
  CSHA.1991.zarit$cgcc == 3 | CSHA.1991.zarit$adcc ==
  1 | CSHA.1991.zarit$parkin == 1 | CSHA.1991.zarit$prstroke ==
  1) & (CSHA.1991.zarit$finaldx != 0 & CSHA.1991.zarit$finaldx !=
  9))
CSHA.1991.zarit_disorders <- CSHA.1991.zarit[conditions.of.interest,
]
dim(CSHA.1991.zarit_disorders)
```

```
## [1] 851 1724
```

We now have a subset of observations we should make a pseudo-design matrix of the conditionals above. We want to denote which of the aforementioned categories each individual belongs to:

```
cols.for.design <- c("CASEID", "cgcc", "adcc", "parkin",
  "prstroke", "finaldx")
CSHA.1991.zarit_disorders_design <- CSHA.1991.zarit_disorders[,
  cols.for.design]

dim(CSHA.1991.zarit_disorders_design)
```

```
## [1] 851 6
```

```
head(CSHA.1991.zarit_disorders_design)
```

```
##      CASEID cgcc adcc parkin prstroke finaldx
## 1  200004    3    1     2         8         2
## 2  200005    3    0     2         1         3
## 4  200008    1    0     2         2         3
## 11 200032    3    0     2         2         3
## 26 200086    3    0     8         8         3
## 35 200113    3    0     1         9         5
```

We can recode some of the values in these columns to something more sensible with a design matrix. The code below to perform the recoding is hidden from the output.

```
head(CSHA.1991.zarit_disorders_design)
```

```
##      CASEID DEMENTIA ALZ PD STROKE FIN.DX
## 200004 200004  INS.CASE CASE NO      DNK  PROB.ALZ
## 200005 200005  INS.CASE N/A NO      YES  POSS.ALZ
## 200008 200008  COMM.CASE N/A NO      NO   POSS.ALZ
## 200032 200032  INS.CASE N/A NO      NO   POSS.ALZ
## 200086 200086  INS.CASE N/A DNK      DNK  POSS.ALZ
```

```
## 200113 200113 INS.CASE N/A YES MISSING OTHER.DEM
```

```
head(CSHA.design)
```

```
##      DEMENTIA.INS.CASE DEMENTIA.COMM.CASE ALZ.CASE ALZ.N/A ALZ.MISSING
## 200004                1                0        1        0        0
## 200005                1                0        0        1        0
## 200008                0                1        0        1        0
## 200032                1                0        0        1        0
## 200086                1                0        0        1        0
## 200113                1                0        0        1        0
##      PD.NO PD.DNK PD.YES PD.MISSING STROKE.DNK STROKE.YES STROKE.NO
## 200004    1    0    0        0        1        0        0
## 200005    1    0    0        0        0        1        0
## 200008    1    0    0        0        0        0        1
## 200032    1    0    0        0        0        0        1
## 200086    0    1    0        0        1        0        0
## 200113    0    0    1        0        0        0        0
##      STROKE.MISSING FIN.DX.PROB.ALZ FIN.DX.POSS.ALZ FIN.DX.OTHER.DEM
## 200004            0                1                0        0
## 200005            0                0                1        0
## 200008            0                0                1        0
## 200032            0                0                1        0
## 200086            0                0                1        0
## 200113            1                0                0        1
##      FIN.DX.VDEM FIN.DX.UNCLASS.DEM
## 200004            0                0
## 200005            0                0
## 200008            0                0
## 200032            0                0
## 200086            0                0
## 200113            0                0
```

```
colSums(CSHA.design)
```

```
## DEMENTIA.INS.CASE DEMENTIA.COMM.CASE      ALZ.CASE
##           539           312           314
##      ALZ.N/A      ALZ.MISSING      PD.NO
##           473           64           612
##      PD.DNK      PD.YES      PD.MISSING
##           27           47           165
##      STROKE.DNK      STROKE.YES      STROKE.NO
##           45           233           432
##      STROKE.MISSING FIN.DX.PROB.ALZ FIN.DX.POSS.ALZ
##           141           346           215
##      FIN.DX.OTHER.DEM      FIN.DX.VDEM FIN.DX.UNCLASS.DEM
##           53           168           69
```

We now have a pseudo-design matrix to identify observation disorder classifications. Now we want to extract just particular sets of columns as predictors and outcomes from our subset.

```
## predictors demographics
demographics <- c("studysex", "agestrat", "studyage", "clinage",
  "studied", "eduyear", "edulevel", "region", "race",
  "ethnic1", "ethnic2", "wbocc", "working", "institut")
### caregiver demographics
```

```

cg.demographics <- c("relat", "cgsex", "cgage", "cgeth1",
  "cgeth2", "cgedyrs", "cgedlev")
### cognition
cognition <- c("langabil", "mmms", "score3ms")
### behavioral disturbance
beh.disturb <- c("apathy", "wander", "violenc", "disinhi",
  "otherbe")

### full neuropsych neuropsych batteries
neuropsych <- c("neurdone", "languagn", "doi", "occup",
  "materlan", "difficul", "othrcomn", "psyid", "clinic",
  "training", "experien", "coopern", "facility", "fatigabi",
  "inattn", "affectn", "articul", "tension", "appearn",
  "reaction", "effort", "express", "memoryn", "restless",
  "insight", "gaitn", "agitat", "persever", "impulsiv",
  "socialn", "tangent", "comprehe", "confusi", "latency",
  "rulev", "tolerate", "visionn", "hearingn", "physical",
  "gaitdiso", "tremdiso", "dyskdiso", "psycdiso", "slowdiso",
  "hearaid", "glasses", "wheel", "wechsler", "buschfr1",
  "buschcr1", "buschtr1", "buschfr2", "buschcr2", "buschtr2",
  "buschfr3", "buschcr3", "buschtr3", "buschfr", "buschcr",
  "buschtr", "delaytim", "reya1", "reya2", "reya3", "reya4",
  "reya5", "reya6", "reyb1", "trueposi", "truenega", "correct",
  "benmirro", "digitspa", "lag1", "lag2", "waisimil",
  "waisjudg", "tokenes", "verbal", "animal", "buschke",
  "visualn", "tokencol", "waisbloc", "digit", "popsiz",
  "nshorter", "nlongter", "nverbal", "njudgeme", "naphasia",
  "napraxia", "nagnosia", "nconstru", "ndisturb", "delirium",
  "majordep", "diagdeme", "profile", "corticr", "corticl",
  "subcort", "cnocoglo", "ccogloss", "cad", "cvasdem",
  "cother", "cunclass", "daily", "ndiag", "severity",
  "shrtlosn", "longlosn", "clanguag", "cdofint", "cintid",
  "c235", "c236", "c236a", "c237", "c238", "c239", "c240",
  "c241", "c242", "c243", "c244", "c245", "c246", "c247",
  "c248", "c249", "c250", "c251", "c252", "c253", "c253am",
  "c253ay", "c253bm", "c253by", "c254", "c255", "c256",
  "c257", "c258", "c259", "c260", "c261", "c262", "c263",
  "c264", "c265", "c266", "c267", "c268", "c269", "c270",
  "c271", "c272", "c273", "c274", "c275", "c276", "c277",
  "c278", "c279", "c280", "c281", "c282", "c283", "c284",
  "c285", "c286", "c286a", "c287", "c287a", "c288", "c289",
  "c290", "c291", "c292", "c293", "c294", "c295", "c296",
  "c297", "c298", "c299", "c300", "c301", "c302", "c303",
  "c304", "c305", "c306", "c307", "c308", "c309", "c310",
  "c311", "c312", "c313", "c314", "c315", "c316", "c317",
  "c318", "c319", "c320", "c321", "c322", "c323", "c324",
  "c325", "c326", "c327", "c328", "c329", "c330", "c331",
  "c332", "c333")

#### neuropsych: behavioral ratings
np.beh_rate <- c("coopern", "facility", "fatigabi", "inattn",
  "affectn", "articul", "tension", "appearn", "reaction",

```

```

    "effort", "express", "memoryn", "restless", "insight",
    "gaitn", "agitat", "persever", "impulsiv", "socialn",
    "tangent", "comprehe", "confusi", "latency", "rulev",
    "tolerate", "visionn", "hearingn", "physical", "hearaid",
    "glasses", "wheel")
#### neuropsych: movement disorders
np.move_disorder <- c("gaitdiso", "tremdiso", "dyskdiso",
    "psycdiso", "slowdiso")
#### neuropsych: memory, fluency, etc...
np.battery <- c("wechsler", "buschfr1", "buschcr1", "buschtr1",
    "buschfr2", "buschcr2", "buschtr2", "buschfr3", "buschcr3",
    "buschtr3", "buschfr", "buschcr", "buschtr", "delaytim",
    "reya1", "reya2", "reya3", "reya4", "reya5", "reya6",
    "reyb1", "trueposi", "truenega", "correct", "benmirro",
    "digitspa", "lag1", "lag2", "waisimil", "waisjudg",
    "tokentes", "verbal", "animal", "buschke", "visualn",
    "tokencol", "waisbloc", "digit")
#### neuropsych: impairments & diagnoses
np.impair_diagnoses <- c("nshorter", "nlongter", "nverbal",
    "njudgeme", "naphasia", "napraxia", "nagnosia", "nconstru",
    "ndisturb", "delirium", "majordep", "diagdeme", "profile",
    "corticr", "corticl", "subcort", "cnocoglo", "ccogloss",
    "cad", "cvasdem", "cother", "cunclass", "daily", "ndiag",
    "severity", "shrtlosn", "longlosn")
#### neuropsych: personality
np.personality <- c("c238", "c239", "c240", "c241", "c242",
    "c243", "c244", "c245", "c246")
#### neuropsych: memory
np.memory <- c("c247", "c248", "c249", "c250", "c251", "c252",
    "c253", "c253am", "c253ay")
#### neuropsych: general function
np.gen_func <- c("c253bm", "c253by", "c254", "c255", "c256",
    "c257", "c258", "c259", "c260", "c261", "c262")
#### neuropsych: every day activities
np.everyday <- c("c263", "c264", "c265", "c266", "c267",
    "c268", "c269")
#### neuropsych: delerium
np.delerium <- c("c270", "c271", "c272", "c273", "c274")
#### neuropsych: depression
np.depress <- c("c275", "c276", "c277", "c278", "c279")
#### neuropsych: sleep
np.sleep <- c("c280", "c281", "c282", "c283", "c284", "c285")
#### neuropsych: paranoia
np.paranoia <- c("c286", "c286a", "c287", "c287a")
#### neuropsych: cardiovascular
np.cv <- c("c288", "c289", "c290", "c291")
#### neuropsych: summary
np.gen_sum <- c("c292", "c293", "c294")
#### neuropsych: past medical history
np.history <- c("c295", "c296", "c297", "c298", "c299",
    "c300", "c301", "c302", "c303", "c304", "c305", "c306",
    "c307", "c308", "c309", "c310")

```

```

## variables that exist somewhere between predictors and
## additional variables of interest dementia
dementia <- c("shortterm", "longterm", "abstract", "judgemen",
  "aphasia", "apraxia", "agnosia", "construc", "change",
  "work", "social", "relation")
### alzheimer's
alz <- c("addement", "adcognit", "adworsen", "adconsci",
  "onsetage", "absence")

## possible predictors/mediators/variables of interest or
## confounds. Family history
famhistory <- c("twin", "samesex", "identic", "familyhs",
  "alz1", "alz2", "alz3", "sen1", "sen2", "sen3", "par1",
  "par2", "par3")
### languages spoken
languages <- c("english", "french", "italian", "german",
  "spanish", "iceland", "ukrain", "chinese", "japanese",
  "danish", "arabic", "urdu", "otherlan")
### health issues
health.drugs <- c("thycond", "attack", "oheart", "leukemia",
  "cancer", "proxdiab", "hbpyr", "drug", "height", "sweight")
### regular substance use -- COMBINE SMOKING & DRINKING &
### CAFFEIENE/SUGAR
substances <- c("coffee", "tea", "drinks", "smoke", "pipe",
  "cigars", "beer", "wine", "spirits")
### head injuries
head.inj <- c("consloss", "consage")
### depression
depress <- c("sad", "interest", "appetite", "lossweig",
  "asleep", "awaken", "allday", "tiredall", "move", "worthles",
  "suicide", "most", "impress")

## outcomes caregiver questions/situation
cg.unpaid <- c("askhelp", "notime", "feelstre", "feelemba",
  "feelangr", "affects", "afraid", "dependen", "strained",
  "suffered", "privacy", "soclife", "friends", "expect",
  "expenses", "unable", "lostctrl", "leave", "uncertai",
  "doing", "better", "burdened", "zarscore", "health1") #, 'health2')
### caregiver 'felt'
cg.felt <- c("bother", "poorapp", "shake", "good", "mind",
  "depressd", "eveffort", "hopeful", "failure", "fearful",
  "restls", "happy", "talkless", "lonely", "unfriend",
  "enjoylif", "cryspell", "feltsad", "dislike", "getgoing",
  "cesscore")

targeted.predictors <- CSHA.1991.zarit_disorders[, c("CASEID",
  demographics, cg.demographics, cognition, beh.disturb,
  np.battery, "dbdscore", "adlrate")]

```

```

full.predictors <- CSHA.1991.zarit_disorders[, c("CASEID",
  demographics, famhistory, cg.demographics, languages,
  health.drugs, substances, head.inj, cognition, beh.disturb,
  depress, dementia, alz, neuropsych, "dbdscore", "adlrate")]

full.outcomes <- CSHA.1991.zarit_disorders[, c("CASEID",
  cg.unpaid, cg.felt)]

dim(targeted.predictors)

## [1] 851 70
dim(full.predictors)

## [1] 851 332
dim(full.outcomes) # we may want to reduce it a bit.

## [1] 851 46
#"studyage", "clinage"
# "eduyear", "edulevel"
# "region"
# "wbocc"
# "cgsex"
# "cgage"
# "cgedyrs", "cgedlev"
# "mmms"
# beh.disturb
# np.battery

final.predictor_demographics <- c("studysex", "studyage", "clinage", "eduyear", "edulevel", "region", "wbocc", "mmms", "cgedyrs", "cgedlev", "cgsex", "cgage", "beh.disturb", "np.battery")

final.predictor.set <- c(final.predictor_demographics, beh.disturb, np.battery)

final.predictors <- targeted.predictors[, final.predictor.set]
rownames(final.predictors) <- targeted.predictors[, "CASEID"]

## maybe not
#"langabil"

## start recoding
#final.predictors[, "sex"]

final.predictors$studysex <- ifelse(final.predictors$studysex==1, "MALE", "FEMALE")
  final.predictors$studysex <- as.factor(final.predictors$studysex)

final.predictors$eduyear <- ifelse(final.predictors$eduyear>=77, NA, final.predictors$eduyear)

final.predictors$edulevel <- ifelse(final.predictors$edulevel>=77, NA, final.predictors$edulevel)

final.predictors$edulevel[final.predictors$edulevel==1 | final.predictors$edulevel==2 | final.predictors$edulevel==3 | final.predictors$edulevel==4] <- "HS"
  final.predictors$edulevel[final.predictors$edulevel==5] <- "HS"

```

```

final.predictors$edulevel[final.predictors$edulevel==6 | final.predictors$edulevel==7 | final.predictors$edulevel==8] <- "BACHELORS"
final.predictors$edulevel[final.predictors$edulevel==9] <- "BACHELORS"
final.predictors$edulevel[final.predictors$edulevel==10] <- "MASTERS"
final.predictors$edulevel[final.predictors$edulevel==11] <- "PHD"
final.predictors$edulevel[final.predictors$edulevel==12] <- "OTHER"

final.predictors$edulevel <- as.factor(final.predictors$edulevel)

final.predictors$region[final.predictors$region==9] <- NA
final.predictors$region[final.predictors$region==1] <- "RURAL"
final.predictors$region[final.predictors$region==2] <- "URBAN"

final.predictors$region <- as.factor(final.predictors$region)

final.predictors$wbocc[final.predictors$wbocc>=8] <- NA
final.predictors$wbocc[final.predictors$wbocc==1] <- "LABORER"
final.predictors$wbocc[final.predictors$wbocc==2] <- "SERVICE"
final.predictors$wbocc[final.predictors$wbocc==3] <- "NOT LABOR FORCE"
final.predictors$wbocc[final.predictors$wbocc==4] <- "CRAFT"
final.predictors$wbocc[final.predictors$wbocc==5] <- "MANAGER/OFFICIAL"
final.predictors$wbocc[final.predictors$wbocc==6] <- "PROFESSIONAL"

final.predictors$wbocc <- as.factor(final.predictors$wbocc)

final.predictors$cgsex <- ifelse(final.predictors$cgsex==1,"MALE","FEMALE")

final.predictors$cgsex <- as.factor(final.predictors$cgsex)

final.predictors$cgage <- ifelse(final.predictors$cgage==999,NA,final.predictors$cgage)

final.predictors$cgedyrs <- ifelse(final.predictors$cgedyrs>=88,NA,final.predictors$cgedyrs)

final.predictors$cgedlev <- ifelse(final.predictors$cgedlev>=77,NA,final.predictors$cgedlev)

final.predictors$cgedlev[final.predictors$cgedlev==1 | final.predictors$cgedlev==2 | final.predictors$cgedlev==3 | final.predictors$cgedlev==4] <- "HS"
final.predictors$cgedlev[final.predictors$cgedlev==5] <- "HS"
final.predictors$cgedlev[final.predictors$cgedlev==6 | final.predictors$cgedlev==7 | final.predictors$cgedlev==8] <- "BACHELORS"
final.predictors$cgedlev[final.predictors$cgedlev==9] <- "BACHELORS"
final.predictors$cgedlev[final.predictors$cgedlev==10] <- "MASTERS"
final.predictors$cgedlev[final.predictors$cgedlev==11] <- "PHD"
final.predictors$cgedlev[final.predictors$cgedlev==12] <- "OTHER"

final.predictors$cgedlev <- as.factor(final.predictors$cgedlev)

final.predictors$apathy <- ifelse(final.predictors$apathy >= 5, NA, final.predictors$apathy)
final.predictors$apathy[final.predictors$apathy==1] <- "YES"
final.predictors$apathy[final.predictors$apathy==2] <- "MAYBE"

```



```

final.predictors$apathy[final.predictors$apathy==3] <- "NO"
final.predictors$apathy[final.predictors$apathy==4] <- "NOT_RELEVANT"
final.predictors$apathy <- as.factor(final.predictors$apathy)

final.predictors$wander <- ifelse(final.predictors$wander >= 5, NA, final.predictors$wander)
final.predictors$wander[final.predictors$wander==1] <- "YES"
final.predictors$wander[final.predictors$wander==2] <- "MAYBE"
final.predictors$wander[final.predictors$wander==3] <- "NO"
final.predictors$wander[final.predictors$wander==4] <- "NOT_RELEVANT"
final.predictors$wander <- as.factor(final.predictors$wander)

final.predictors$violenc <- ifelse(final.predictors$violenc >= 5, NA, final.predictors$violenc)
final.predictors$violenc[final.predictors$violenc==1] <- "YES"
final.predictors$violenc[final.predictors$violenc==2] <- "MAYBE"
final.predictors$violenc[final.predictors$violenc==3] <- "NO"
final.predictors$violenc[final.predictors$violenc==4] <- "NOT_RELEVANT"
final.predictors$violenc <- as.factor(final.predictors$violenc)

final.predictors$disinhi <- ifelse(final.predictors$disinhi >= 5, NA, final.predictors$disinhi)
final.predictors$disinhi[final.predictors$disinhi==1] <- "YES"
final.predictors$disinhi[final.predictors$disinhi==2] <- "MAYBE"
final.predictors$disinhi[final.predictors$disinhi==3] <- "NO"
final.predictors$disinhi[final.predictors$disinhi==4] <- "NOT_RELEVANT"
final.predictors$disinhi <- as.factor(final.predictors$disinhi)

final.predictors$otherbe <- ifelse(final.predictors$otherbe >= 5, NA, final.predictors$otherbe)
final.predictors$otherbe[final.predictors$otherbe==1] <- "YES"
final.predictors$otherbe[final.predictors$otherbe==2] <- "MAYBE"
final.predictors$otherbe[final.predictors$otherbe==3] <- "NO"
final.predictors$otherbe[final.predictors$otherbe==4] <- "NOT_RELEVANT"
final.predictors$otherbe <- as.factor(final.predictors$otherbe)

```

pretty clear by here that edulevel, edueyear, region, wbocc all have too high a missing level and mus

For our project we should begin with just the two sets of variables identified as `final.predictors` and `outcomes`. At this point we have some re-coding to do to convert missing and NA codes, and to convert YES/NO responses or scales to a more coherent format.

```

## Recoding Missing Values with NA Predictor Variables
## (full set)

```

```

## Variables with missing == 7 | 8 | 9
vars.missing.x <- c("region", "race", "wbocc", "working",
  "institut", "cgsex", "langabil", "apathy", "wander",
  "violenc", "disinhi", "otherbe", "neurdone", "languagn",
  "occup", "difficul", "othrcomn", "clinic", "training",
  "experien", "coopern", "facility", "fatigabi", "inattn",
  "affectn", "articul", "tension", "appearn", "reaction",
  "effort", "express", "memoryn", "restless", "insight",
  "gaitn", "agitat", "persever", "impulsiv", "socialn",
  "tangent", "comprehe", "confusi", "latency", "rulev",
  "tolerate", "visionn", "hearingn", "physical", "gaitdiso",
  "tremdiso", "dyskdiso", "psycdiso", "slowdiso", "hearaid",
  "glasses", "wheel", "wechsler", "tokencol", "popsiz",

```

```

"nshorter", "nlongter", "nverbal", "njudgeme", "naphasia",
"napraxia", "nagnosia", "nconstru", "ndisturb", "delirium",
"majordep", "diagdeme", "profile", "corticr", "corticl",
"subcort", "daily", "severity", "shrtlosn", "longlosn",
"clanguag", "c235", "c236a", "c238", "c239", "c240",
"c241", "c242", "c243", "c244", "c246", "c247", "c248",
"c249", "c250", "c251", "c253", "c254", "c255", "c256",
"c257", "c258", "c259", "c261", "c262", "c263", "c264",
"c265", "c266", "c267", "c269", "c270", "c271", "c272",
"c273", "c275", "c276", "c277", "c279", "c280", "c281",
"c282", "c283", "c285", "c286", "c287", "c288", "c289",
"c290", "c292", "c295", "c296", "c297", "c298", "c299",
"c300", "c301", "c302", "c303", "c304", "c305", "c306",
"c307", "c308", "c309", "c310", dementia, alz, "twin",
"samesex", "identic", "familyhs", languages, "thycond",
"attack", "oheart", "leukemia", "cancer", "proxdiab",
"drug", substances, "consloss", depress, "adlrate")

## Variables with missing == 66 | 77 | 88 | 98 | 99
vars.missing.xx <- c("studied", "eduyear", "edulevel", "ethnic1",
"ethnic2", "relat", "cgeth1", "cgeth2", "cgedyrs", "cgedlev",
"materlan", "buschfr1", "buschcr1", "buschtr1", "buschfr2",
"buschcr2", "buschtr2", "buschfr3", "buschcr3", "buschtr3",
"buschfr", "buschcr", "buschtr", "delaytim", "reya1",
"reya2", "reya3", "reya4", "reya5", "reya6", "reyb1",
"trueposi", "truenega", "correct", "benmirro", "digitspa",
"lag1", "lag2", "waisimil", "waisjudg", "tokenes",
"verbal", "animal", "buschke", "visualn", "waisbloc",
"cnocoglo", "ccogloss", "cad", "cvasdem", "cother",
"cunclass", "c253am", "c253bm", "c311", "c312", "c313",
"c314", "c316", "c318", "c319", "c320", "c321", "c322",
"c323", "c324", "c325", "c326", "c327", "c328", "c329",
"c330", "c331", "c332", "c333", "alz1", "alz2", "alz3",
"sen1", "sen2", "sen3", "par1", "par2", "par3", "dbdscore")

## Variables with missing == 777 | 888 | 996| 997| 998 |
## 999 <- some of these varaibles have legit scores of
## 666 hence the separate coding
vars.missing.xxx <- c("cgage", "mmms", "score3ms", "psyid",
"ndiag", "cintid", "digit", "c245", "c252", "c253ay",
"c253by", "c260", "c268", "c274", "c278", "c284", "c286a",
"c287a", "c291", "c293", "c294", "c315", "c317", "height",
"consage")

## Variables with missing = 999999
vars.missing.xxxxxx <- c("doi", "cdofint")

## Variables with 0 coded as 'skipped' or 'miscoded' or
## 'not applicable'
vars.skipped.0 <- c("ethnic2", "cgeth2", "insight", "napraxia",
"ndisturb", "delirium", "majordep", "c315", "c316",
"c317", "samesex", "identic", "sen1", "consloss", "consage")

```

```

## Variables with 6 coded as missing
## (visual/hearing/motor/blind)
vars.missing.6 <- c(beh.disturb, "tokencol", "nshorter",
  "nverbal", "naphasia", "napraxia", "nagnosia", "nconstru",
  "ndisturb", "severity", "shrtlosn", "longlosn", "impress")
vars.missing.5 <- c(beh.disturb, "impress")
vars.missing.4 <- c(beh.disturb)
## Variables with 666 coded as missing(visual/hearing)
vars.missing.666 <- c("digit", "c253ay", "c253by")

## random variables with very special coding
vars.missing.9.only <- c("c236", "c237") ## 7 & 8 are actual values

## vars with missing code above 80 (decimal coding)
vars.missing80plus <- c("hbpyr", "sweight")

#####
full.predictors.NAs <- full.predictors

full.predictors.NAs[, vars.missing.x] <- apply(full.predictors.NAs[,
  vars.missing.x], 2, function(x) {
  x[(x == 7 | x == 8 | x == 9)] <- NA
  x
})
full.predictors.NAs[, vars.missing.xx] <- apply(full.predictors.NAs[,
  vars.missing.xx], 2, function(x) {
  x[(x == 77 | x == 88 | x == 99 | x == 66 | x == 98)] <- NA
  x
})
full.predictors.NAs[, vars.missing.xxx] <- apply(full.predictors.NAs[,
  vars.missing.xxx], 2, function(x) {
  x[(x == 777 | x == 888 | x == 999 | x == 996 | x ==
    997 | x == 998)] <- NA
  x
})
full.predictors.NAs[, vars.missing.xxxxxx] <- apply(full.predictors.NAs[,
  vars.missing.xxxxxx], 2, function(x) {
  x[(x == 999999)] <- NA
  x
})
full.predictors.NAs[, vars.skipped.0] <- apply(full.predictors.NAs[,
  vars.skipped.0], 2, function(x) {
  x[(x == 0)] <- NA
  x
})
full.predictors.NAs[, vars.missing.6] <- apply(full.predictors.NAs[,
  vars.missing.6], 2, function(x) {
  x[(x == 6)] <- NA
  x
})
full.predictors.NAs[, vars.missing.5] <- apply(full.predictors.NAs[,
  vars.missing.5], 2, function(x) {
  x[(x == 5)] <- NA

```

```

x
})
full.predictors.NAs[, vars.missing.4] <- apply(full.predictors.NAs[,
  vars.missing.4], 2, function(x) {
  x[(x == 4)] <- NA
  x
})
full.predictors.NAs[, vars.missing.666] <- apply(full.predictors.NAs[,
  vars.missing.666], 2, function(x) {
  x[(x == 666)] <- NA
  x
})
full.predictors.NAs[, vars.missing.9.only] <- apply(full.predictors.NAs[,
  vars.missing.9.only], 2, function(x) {
  x[(x == 9)] <- NA
  x
})
full.predictors.NAs[, vars.missing80plus] <- apply(full.predictors.NAs[,
  vars.missing80plus], 2, function(x) {
  x[(x > 80)] <- NA
  x
})

targeted.predictors.NAs <- full.predictors.NAs[, c("CASEID",
  demographics, cg.demographics, cognition, beh.disturb,
  np.battery, "dbdscore", "adlrate")]
# summary(targeted.predictors.NAs)
summary(full.predictors.NAs)

```

```

##      CASEID      studysex      agestrat      studyage
##  Min.   :200004   Min.     :1.000   Min.     :1.000   Min.     : 65.00
##  1st Qu.:208208   1st Qu.:1.000   1st Qu.:2.000   1st Qu.: 78.00
##  Median :216682   Median :2.000   Median :2.000   Median : 84.00
##  Mean   :216827   Mean    :1.691   Mean    :2.343   Mean    : 83.29
##  3rd Qu.:225861   3rd Qu.:2.000   3rd Qu.:3.000   3rd Qu.: 88.00
##  Max.   :234027   Max.     :2.000   Max.     :3.000   Max.     :104.00
##
##      clinage      studied      eduyear      edulevel
##  Min.    : 65.00   Min.     : 0.000   Min.     : 0.000   Min.     : 1.000
##  1st Qu.: 79.00   1st Qu.: 6.000   1st Qu.: 5.000   1st Qu.: 2.000
##  Median : 85.00   Median : 8.000   Median : 8.000   Median : 3.000
##  Mean    : 84.19   Mean     : 8.487   Mean     : 7.941   Mean     : 3.823
##  3rd Qu.: 89.00   3rd Qu.:11.000   3rd Qu.:10.000   3rd Qu.: 5.000
##  Max.    :104.00   Max.     :20.000   Max.     :20.000   Max.     :12.000
##
##      NA's      :124      NA's      :582      NA's      :574
##      region      race      ethnic1      ethnic2
##  Min.    :1.000   Min.     :2.000   Min.     : 1.000   Min.     : 3.000
##  1st Qu.:2.000   1st Qu.:3.000   1st Qu.: 1.000   1st Qu.: 4.000
##  Median :2.000   Median :3.000   Median : 2.000   Median : 5.000
##  Mean    :1.993   Mean     :2.996   Mean     : 3.702   Mean     : 6.896
##  3rd Qu.:2.000   3rd Qu.:3.000   3rd Qu.: 4.000   3rd Qu.: 7.000
##  Max.    :2.000   Max.     :3.000   Max.     :21.000   Max.     :21.000
##  NA's    :565     NA's     :570     NA's     :569     NA's     :803
##      wbocc      working      institut      twin

```

##	Min.	:1.000	Min.	:1.000	Min.	:1.00	Min.	:1.000
##	1st Qu.:	2.000	1st Qu.:	2.000	1st Qu.:	2.00	1st Qu.:	2.000
##	Median	:3.000	Median	:2.000	Median	:3.00	Median	:2.000
##	Mean	:3.239	Mean	:1.996	Mean	:2.96	Mean	:1.973
##	3rd Qu.:	5.000	3rd Qu.:	2.000	3rd Qu.:	4.00	3rd Qu.:	2.000
##	Max.	:6.000	Max.	:2.000	Max.	:4.00	Max.	:2.000
##	NA's	:571	NA's	:566			NA's	:82
##	samesex		identic		familyhs		alz1	
##	Min.	:1.0	Min.	:1.000	Min.	:1.000	Min.	:1.00
##	1st Qu.:	1.0	1st Qu.:	1.000	1st Qu.:	1.000	1st Qu.:	2.00
##	Median	:1.0	Median	:2.000	Median	:1.000	Median	:4.00
##	Mean	:1.4	Mean	:1.647	Mean	:1.295	Mean	:3.21
##	3rd Qu.:	2.0	3rd Qu.:	2.000	3rd Qu.:	2.000	3rd Qu.:	4.00
##	Max.	:2.0	Max.	:2.000	Max.	:2.000	Max.	:5.00
##	NA's	:831	NA's	:834	NA's	:251	NA's	:770
##	alz2		alz3		sen1		sen2	
##	Min.	:1.000	Min.	:3.00	Min.	:1.000	Min.	:3.0
##	1st Qu.:	2.500	1st Qu.:	3.25	1st Qu.:	2.000	1st Qu.:	3.0
##	Median	:4.000	Median	:3.50	Median	:2.000	Median	:3.5
##	Mean	:3.143	Mean	:3.50	Mean	:2.872	Mean	:3.5
##	3rd Qu.:	4.000	3rd Qu.:	3.75	3rd Qu.:	4.000	3rd Qu.:	4.0
##	Max.	:4.000	Max.	:4.00	Max.	:10.000	Max.	:4.0
##	NA's	:844	NA's	:849	NA's	:765	NA's	:839
##	sen3		par1		par2		par3	
##	Min.	:3.0	Min.	:1.000	Min.	:3.00	Min.	:3
##	1st Qu.:	4.0	1st Qu.:	2.250	1st Qu.:	3.25	1st Qu.:	3
##	Median	:4.0	Median	:3.000	Median	:3.50	Median	:3
##	Mean	:3.8	Mean	:3.079	Mean	:3.50	Mean	:3
##	3rd Qu.:	4.0	3rd Qu.:	4.000	3rd Qu.:	3.75	3rd Qu.:	3
##	Max.	:4.0	Max.	:7.000	Max.	:4.00	Max.	:3
##	NA's	:846	NA's	:813	NA's	:849	NA's	:850
##	relat		cgsex		cgage		cgeth1	
##	Min.	:1.000	Min.	:1.000	Min.	:26.00	Min.	:1.000
##	1st Qu.:	3.000	1st Qu.:	1.000	1st Qu.:	51.00	1st Qu.:	1.000
##	Median	:3.000	Median	:2.000	Median	:60.00	Median	:2.000
##	Mean	:4.745	Mean	:1.729	Mean	:60.05	Mean	:4.457
##	3rd Qu.:	4.000	3rd Qu.:	2.000	3rd Qu.:	69.00	3rd Qu.:	4.000
##	Max.	:26.000	Max.	:2.000	Max.	:93.00	Max.	:45.000
##					NA's	:9		
##	cgeth2		cgedyrs		cgedlev		english	
##	Min.	:1.000	Min.	:0.00	Min.	:1.000	Min.	:1.000
##	1st Qu.:	4.000	1st Qu.:	9.00	1st Qu.:	4.000	1st Qu.:	1.000
##	Median	:5.000	Median	:12.00	Median	:5.000	Median	:1.000
##	Mean	:7.575	Mean	:11.82	Mean	:5.723	Mean	:1.168
##	3rd Qu.:	7.000	3rd Qu.:	14.00	3rd Qu.:	7.000	3rd Qu.:	1.000
##	Max.	:43.000	Max.	:25.00	Max.	:12.000	Max.	:2.000
##	NA's	:618	NA's	:10	NA's	:2	NA's	:565
##	french		italian		german		spanish	
##	Min.	:1.000	Min.	:1.000	Min.	:1.000	Min.	:2
##	1st Qu.:	1.000	1st Qu.:	2.000	1st Qu.:	2.000	1st Qu.:	2
##	Median	:2.000	Median	:2.000	Median	:2.000	Median	:2
##	Mean	:1.738	Mean	:1.986	Mean	:1.934	Mean	:2
##	3rd Qu.:	2.000	3rd Qu.:	2.000	3rd Qu.:	2.000	3rd Qu.:	2
##	Max.	:2.000	Max.	:2.000	Max.	:2.000	Max.	:2

##	NA's :565	NA's :565	NA's :565	NA's :565
##	iceland	ukrain	chinese	japanese
##	Min. :2	Min. :1.000	Min. :2	Min. :1.000
##	1st Qu.:2	1st Qu.:2.000	1st Qu.:2	1st Qu.:2.000
##	Median :2	Median :2.000	Median :2	Median :2.000
##	Mean :2	Mean :1.937	Mean :2	Mean :1.996
##	3rd Qu.:2	3rd Qu.:2.000	3rd Qu.:2	3rd Qu.:2.000
##	Max. :2	Max. :2.000	Max. :2	Max. :2.000
##	NA's :565	NA's :565	NA's :565	NA's :565
##	danish	arabic	urdu	otherlan
##	Min. :1.000	Min. :2	Min. :2	Min. :1.00
##	1st Qu.:2.000	1st Qu.:2	1st Qu.:2	1st Qu.:2.00
##	Median :2.000	Median :2	Median :2	Median :2.00
##	Mean :1.996	Mean :2	Mean :2	Mean :1.92
##	3rd Qu.:2.000	3rd Qu.:2	3rd Qu.:2	3rd Qu.:2.00
##	Max. :2.000	Max. :2	Max. :2	Max. :2.00
##	NA's :565	NA's :565	NA's :565	NA's :565
##	thycond	attack	oheart	leukemia
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:2.000	1st Qu.:2.000	1st Qu.:1.000	1st Qu.:2.000
##	Median :2.000	Median :2.000	Median :2.000	Median :2.000
##	Mean :1.886	Mean :1.851	Mean :1.743	Mean :1.992
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :2.000	Max. :2.000	Max. :2.000	Max. :2.000
##	NA's :209	NA's :201	NA's :224	NA's :196
##	cancer	proxdiab	hbpyr	drug
##	Min. :1.000	Min. :1.000	Min. : 0.00	Min. :1.000
##	1st Qu.:2.000	1st Qu.:2.000	1st Qu.: 0.00	1st Qu.:1.000
##	Median :2.000	Median :2.000	Median : 0.00	Median :1.000
##	Mean :1.829	Mean :1.842	Mean : 3.29	Mean :1.125
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.: 0.00	3rd Qu.:1.000
##	Max. :2.000	Max. :2.000	Max. :50.00	Max. :2.000
##	NA's :221	NA's :182	NA's :257	NA's :379
##	height	sweight	coffee	tea
##	Min. :122.0	Min. :24.00	Min. :1.000	Min. :1.000
##	1st Qu.:152.0	1st Qu.:47.30	1st Qu.:1.000	1st Qu.:1.000
##	Median :160.0	Median :56.00	Median :1.000	Median :1.000
##	Mean :160.4	Mean :56.27	Mean :1.398	Mean :1.198
##	3rd Qu.:168.0	3rd Qu.:64.00	3rd Qu.:2.000	3rd Qu.:1.000
##	Max. :191.0	Max. :80.00	Max. :2.000	Max. :2.000
##	NA's :212	NA's :144	NA's :93	NA's :89
##	drinks	smoke	pipe	cigars
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:2.000	1st Qu.:1.000	1st Qu.:2.000	1st Qu.:2.000
##	Median :2.000	Median :2.000	Median :2.000	Median :2.000
##	Mean :1.869	Mean :1.618	Mean :1.926	Mean :1.967
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :2.000	Max. :2.000	Max. :2.000	Max. :2.000
##	NA's :102	NA's :82	NA's :77	NA's :83
##	beer	wine	spirits	consloss
##	Min. :1.000	Min. :1.0	Min. :1.000	Min. :1.000
##	1st Qu.:2.000	1st Qu.:2.0	1st Qu.:2.000	1st Qu.:1.000
##	Median :2.000	Median :2.0	Median :2.000	Median :1.000
##	Mean :1.837	Mean :1.9	Mean :1.784	Mean :1.407

##	3rd Qu.:2.000	3rd Qu.:2.0	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :2.000	Max. :2.0	Max. :2.000	Max. :2.000
##	NA's :85	NA's :79	NA's :86	NA's :738
##	consage	langabil	mmms	score3ms
##	Min. : 7.00	Min. :1.000	Min. : 4.00	Min. : 4.00
##	1st Qu.:35.00	1st Qu.:4.000	1st Qu.:49.00	1st Qu.:49.00
##	Median :60.00	Median :5.000	Median :61.00	Median :61.00
##	Mean :55.23	Mean :4.511	Mean :57.41	Mean :57.41
##	3rd Qu.:75.00	3rd Qu.:5.000	3rd Qu.:69.00	3rd Qu.:69.00
##	Max. :94.00	Max. :5.000	Max. :77.00	Max. :77.00
##	NA's :782	NA's :565	NA's :565	NA's :565
##	apathy	wander	violenc	disinhi
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:3.000	1st Qu.:3.000	1st Qu.:3.000
##	Median :3.000	Median :3.000	Median :3.000	Median :3.000
##	Mean :2.415	Mean :2.731	Mean :2.808	Mean :2.698
##	3rd Qu.:3.000	3rd Qu.:3.000	3rd Qu.:3.000	3rd Qu.:3.000
##	Max. :3.000	Max. :3.000	Max. :3.000	Max. :3.000
##	NA's :108	NA's :152	NA's :115	NA's :119
##	otherbe	sad	interest	appetite
##	Min. :1.000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:3.000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :3.000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :2.854	Mean :0.2908	Mean :0.2465	Mean :0.1053
##	3rd Qu.:3.000	3rd Qu.:1.0000	3rd Qu.:0.0000	3rd Qu.:0.0000
##	Max. :3.000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :113	NA's :177	NA's :198	NA's :167
##	lossweig	asleep	awaken	allday
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.000
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :0.000
##	Mean :0.1315	Mean :0.1868	Mean :0.1794	Mean :0.142
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:0.000
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :1.000
##	NA's :174	NA's :155	NA's :171	NA's :168
##	tiredall	move	worthles	suicide
##	Min. :0.0000	Min. :0.00000	Min. :0.0000	Min. :0.00000
##	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.:0.0000	1st Qu.:0.00000
##	Median :0.0000	Median :0.00000	Median :0.0000	Median :0.00000
##	Mean :0.1851	Mean :0.05786	Mean :0.1003	Mean :0.04977
##	3rd Qu.:0.0000	3rd Qu.:0.00000	3rd Qu.:0.0000	3rd Qu.:0.00000
##	Max. :1.0000	Max. :1.00000	Max. :1.0000	Max. :1.00000
##	NA's :192	NA's :177	NA's :203	NA's :208
##	most	impress	shorterm	longterm
##	Min. :0.0000	Min. :1.000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:3.000	1st Qu.:1.0000	1st Qu.:1.0000
##	Median :0.0000	Median :3.000	Median :1.0000	Median :1.0000
##	Mean :0.1513	Mean :2.682	Mean :0.9887	Mean :0.8231
##	3rd Qu.:0.0000	3rd Qu.:3.000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :4.000	Max. :1.0000	Max. :1.0000
##	NA's :223	NA's :118	NA's :54	NA's :88
##	abstract	judgemen	aphasia	apraxia
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:1.0000	1st Qu.:1.0000	1st Qu.:0.0000	1st Qu.:0.0000

##	Median :1.0000	Median :1.0000	Median :1.0000	Median :1.0000
##	Mean :0.9229	Mean :0.7969	Mean :0.5466	Mean :0.5633
##	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :99	NA's :142	NA's :121	NA's :187
##	agnosia	construc	change	work
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:1.0000	1st Qu.:1.0000	1st Qu.:1.0000
##	Median :0.0000	Median :1.0000	Median :1.0000	Median :1.0000
##	Mean :0.4114	Mean :0.7504	Mean :0.7561	Mean :0.7591
##	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :253	NA's :234	NA's :76	NA's :141
##	social	relation	addelement	adcognit
##	Min. :0.0000	Min. :0.0000	Min. :0.000	Min. :0.0000
##	1st Qu.:1.0000	1st Qu.:1.0000	1st Qu.:1.000	1st Qu.:1.0000
##	Median :1.0000	Median :1.0000	Median :1.000	Median :1.0000
##	Mean :0.8882	Mean :0.8294	Mean :0.945	Mean :0.9513
##	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.000	Max. :1.0000
##	NA's :82	NA's :95	NA's :215	NA's :215
##	adworsen	adconsci	onsetage	absence
##	Min. :0.000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:1.000	1st Qu.:1.0000	1st Qu.:1.0000	1st Qu.:0.0000
##	Median :1.000	Median :1.0000	Median :1.0000	Median :1.0000
##	Mean :0.892	Mean :0.9065	Mean :0.9401	Mean :0.6056
##	3rd Qu.:1.000	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :1.000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :240	NA's :220	NA's :217	NA's :240
##	neurdone	languagn	doi	occup
##	Min. :0.0000	Min. :1.000	Min. :910126	Min. :1.000
##	1st Qu.:0.0000	1st Qu.:1.000	1st Qu.:910627	1st Qu.:2.000
##	Median :0.0000	Median :1.000	Median :910910	Median :3.000
##	Mean :0.3596	Mean :1.189	Mean :912372	Mean :3.526
##	3rd Qu.:1.0000	3rd Qu.:1.000	3rd Qu.:911120	3rd Qu.:5.000
##	Max. :1.0000	Max. :2.000	Max. :920414	Max. :6.000
##			NA's :546	NA's :549
##	materlan	difficul	othrcomn	psyid
##	Min. : 1.000	Min. :1.000	Min. :1.000	Min. : 1.00
##	1st Qu.: 1.000	1st Qu.:2.000	1st Qu.:1.000	1st Qu.: 10.00
##	Median : 1.000	Median :2.000	Median :1.000	Median : 13.00
##	Mean : 2.309	Mean :1.953	Mean :1.364	Mean : 54.70
##	3rd Qu.: 2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.: 46.25
##	Max. :17.000	Max. :2.000	Max. :2.000	Max. :406.00
##	NA's :544	NA's :552	NA's :634	NA's :549
##	clinic	training	experien	coopern
##	Min. :1.000	Min. :1.000	Min. :1	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1	1st Qu.:1.000
##	Median :1.000	Median :1.000	Median :1	Median :2.000
##	Mean :1.583	Mean :1.105	Mean :1	Mean :2.206
##	3rd Qu.:2.000	3rd Qu.:1.000	3rd Qu.:1	3rd Qu.:3.000
##	Max. :3.000	Max. :2.000	Max. :1	Max. :4.000
##	NA's :554	NA's :555	NA's :554	NA's :603
##	facility	fatigabi	inattn	affectn

##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000
##	Median :1.000	Median :2.000	Median :2.000	Median :1.000
##	Mean :1.191	Mean :2.033	Mean :1.927	Mean :1.573
##	3rd Qu.:1.000	3rd Qu.:3.000	3rd Qu.:3.000	3rd Qu.:2.000
##	Max. :4.000	Max. :5.000	Max. :5.000	Max. :5.000
##	NA's :573	NA's :547	NA's :549	NA's :549
##	articul	tension	appearn	reaction
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000
##	Median :1.000	Median :2.000	Median :1.000	Median :2.000
##	Mean :1.559	Mean :1.688	Mean :1.451	Mean :1.915
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:3.000
##	Max. :5.000	Max. :5.000	Max. :5.000	Max. :5.000
##	NA's :545	NA's :547	NA's :545	NA's :546
##	effort	express	memoryn	restless
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:2.000	1st Qu.:1.000
##	Median :2.000	Median :2.000	Median :2.000	Median :1.000
##	Mean :2.114	Mean :1.734	Mean :2.426	Mean :1.541
##	3rd Qu.:3.000	3rd Qu.:2.000	3rd Qu.:3.000	3rd Qu.:2.000
##	Max. :5.000	Max. :4.000	Max. :5.000	Max. :5.000
##	NA's :545	NA's :550	NA's :548	NA's :546
##	insight	gaitn	agitat	persever
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000
##	Median :2.000	Median :2.000	Median :1.000	Median :1.000
##	Mean :2.031	Mean :2.413	Mean :1.406	Mean :1.721
##	3rd Qu.:3.000	3rd Qu.:3.000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :5.000	Max. :5.000	Max. :5.000	Max. :5.000
##	NA's :557	NA's :609	NA's :600	NA's :546
##	impulsiv	socialn	tangent	comprehe
##	Min. :1.000	Min. :1.00	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.00	1st Qu.:1.000	1st Qu.:1.000
##	Median :1.000	Median :1.00	Median :1.000	Median :2.000
##	Mean :1.243	Mean :1.23	Mean :1.607	Mean :2.188
##	3rd Qu.:1.000	3rd Qu.:1.00	3rd Qu.:2.000	3rd Qu.:3.000
##	Max. :4.000	Max. :5.00	Max. :5.000	Max. :5.000
##	NA's :546	NA's :546	NA's :546	NA's :547
##	confusi	latency	rulev	tolerate
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000
##	Median :1.000	Median :1.000	Median :1.000	Median :2.000
##	Mean :1.681	Mean :1.661	Mean :1.503	Mean :1.921
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :5.000	Max. :5.000	Max. :5.000	Max. :5.000
##	NA's :550	NA's :547	NA's :551	NA's :558
##	visionn	hearingn	physical	gaitdiso
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:1.000
##	Median :1.000	Median :1.000	Median :1.000	Median :1.000
##	Mean :1.668	Mean :1.881	Mean :1.602	Mean :1.457
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :5.000	Max. :5.000	Max. :5.000	Max. :2.000

##	NA's :547	NA's :549	NA's :592	NA's :687
##	tremdiso	dyskdiso	psycdiso	slowdiso
##	Min. :1.000	Min. :1.00	Min. :1.0	Min. :1.000
##	1st Qu.:1.000	1st Qu.:2.00	1st Qu.:2.0	1st Qu.:2.000
##	Median :2.000	Median :2.00	Median :2.0	Median :2.000
##	Mean :1.713	Mean :1.91	Mean :1.9	Mean :1.754
##	3rd Qu.:2.000	3rd Qu.:2.00	3rd Qu.:2.0	3rd Qu.:2.000
##	Max. :2.000	Max. :2.00	Max. :2.0	Max. :2.000
##	NA's :663	NA's :673	NA's :671	NA's :668
##	hearaid	glasses	wheel	wechsler
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :0.000
##	1st Qu.:2.000	1st Qu.:1.000	1st Qu.:2.000	1st Qu.:1.000
##	Median :2.000	Median :1.000	Median :2.000	Median :2.000
##	Mean :1.865	Mean :1.222	Mean :1.816	Mean :2.575
##	3rd Qu.:2.000	3rd Qu.:1.000	3rd Qu.:2.000	3rd Qu.:4.000
##	Max. :2.000	Max. :2.000	Max. :2.000	Max. :6.000
##	NA's :555	NA's :558	NA's :552	NA's :545
##	buschfr1	buschcr1	buschtr1	buschfr2
##	Min. : 0.000	Min. : 0.00	Min. : 0.000	Min. : 0.000
##	1st Qu.: 1.000	1st Qu.: 4.00	1st Qu.: 7.750	1st Qu.: 2.000
##	Median : 3.000	Median : 6.00	Median :10.000	Median : 3.500
##	Mean : 3.325	Mean : 5.76	Mean : 9.094	Mean : 3.759
##	3rd Qu.: 5.000	3rd Qu.: 7.00	3rd Qu.:11.000	3rd Qu.: 5.000
##	Max. :11.000	Max. :10.00	Max. :12.000	Max. :11.000
##	NA's :562	NA's :563	NA's :563	NA's :565
##	buschcr2	buschtr2	buschfr3	buschcr3
##	Min. : 0.000	Min. : 0.000	Min. : 0.000	Min. : 0.000
##	1st Qu.: 4.000	1st Qu.: 9.000	1st Qu.: 2.000	1st Qu.: 4.000
##	Median : 6.000	Median :11.000	Median : 4.000	Median : 6.000
##	Mean : 6.014	Mean : 9.779	Mean : 4.181	Mean : 5.768
##	3rd Qu.: 8.000	3rd Qu.:12.000	3rd Qu.: 6.000	3rd Qu.: 7.000
##	Max. :12.000	Max. :12.000	Max. :11.000	Max. :12.000
##	NA's :566	NA's :566	NA's :570	NA's :571
##	buschtr3	buschfr	buschcr	buschtr
##	Min. : 0.000	Min. : 0.000	Min. : 0.000	Min. : 0.000
##	1st Qu.: 9.000	1st Qu.: 1.000	1st Qu.: 3.000	1st Qu.: 8.000
##	Median :11.000	Median : 4.000	Median : 5.000	Median :10.000
##	Mean : 9.954	Mean : 3.935	Mean : 5.357	Mean : 9.307
##	3rd Qu.:12.000	3rd Qu.: 7.000	3rd Qu.: 7.000	3rd Qu.:12.000
##	Max. :12.000	Max. :12.000	Max. :12.000	Max. :12.000
##	NA's :571	NA's :573	NA's :574	NA's :574
##	delaytim	reya1	reya2	reya3
##	Min. : 4.0	Min. :0.00	Min. :0.000	Min. : 0.000
##	1st Qu.:14.0	1st Qu.:1.00	1st Qu.:3.000	1st Qu.: 3.000
##	Median :15.0	Median :2.00	Median :4.000	Median : 4.000
##	Mean :15.8	Mean :2.22	Mean :3.477	Mean : 4.077
##	3rd Qu.:16.0	3rd Qu.:3.00	3rd Qu.:4.000	3rd Qu.: 5.000
##	Max. :55.0	Max. :6.00	Max. :9.000	Max. :10.000
##	NA's :657	NA's :588	NA's :589	NA's :592
##	reya4	reya5	reya6	reya1
##	Min. : 0.000	Min. : 0.000	Min. :0.000	Min. :0.000
##	1st Qu.: 3.000	1st Qu.: 3.000	1st Qu.:0.000	1st Qu.:1.000
##	Median : 4.000	Median : 5.000	Median :1.000	Median :2.000
##	Mean : 4.396	Mean : 4.587	Mean :1.506	Mean :2.184

##	3rd Qu.: 5.000	3rd Qu.: 6.000	3rd Qu.:3.000	3rd Qu.:3.000
##	Max. :12.000	Max. :11.000	Max. :9.000	Max. :9.000
##	NA's :601	NA's :604	NA's :610	NA's :607
##	trueposi	truenega	correct	benmirro
##	Min. : 0.00	Min. : 0.000	Min. : 1.000	Min. :0.000
##	1st Qu.:10.00	1st Qu.: 6.000	1st Qu.: 5.000	1st Qu.:1.000
##	Median :12.00	Median :11.000	Median : 7.000	Median :1.000
##	Mean :11.75	Mean : 9.569	Mean : 7.221	Mean :1.723
##	3rd Qu.:14.00	3rd Qu.:14.000	3rd Qu.: 9.000	3rd Qu.:3.000
##	Max. :15.00	Max. :15.000	Max. :14.000	Max. :8.000
##	NA's :603	NA's :603	NA's :597	NA's :598
##	digitspa	lag1	lag2	waisimil
##	Min. :0.000	Min. : 0.000	Min. :0.000	Min. : 0.000
##	1st Qu.:4.000	1st Qu.: 0.000	1st Qu.:0.000	1st Qu.: 1.000
##	Median :5.000	Median : 1.000	Median :1.000	Median : 2.000
##	Mean :5.197	Mean : 1.618	Mean :1.454	Mean : 2.937
##	3rd Qu.:6.000	3rd Qu.: 2.000	3rd Qu.:2.500	3rd Qu.: 5.000
##	Max. :8.000	Max. :10.000	Max. :4.000	Max. :12.000
##	NA's :556	NA's :775	NA's :840	NA's :549
##	waisjudg	tokenes	verbal	animal
##	Min. : 0.000	Min. : 2.00	Min. : 0.00	Min. : 0
##	1st Qu.: 3.000	1st Qu.:24.00	1st Qu.: 9.00	1st Qu.: 6
##	Median : 6.000	Median :32.00	Median :13.00	Median : 8
##	Mean : 5.883	Mean :30.54	Mean :14.42	Mean : 8
##	3rd Qu.: 8.000	3rd Qu.:38.00	3rd Qu.:19.00	3rd Qu.:10
##	Max. :15.000	Max. :44.00	Max. :47.00	Max. :18
##	NA's :551	NA's :567	NA's :567	NA's :564
##	buschke	visualn	tokencol	waisbloc
##	Min. : 0.00	Min. : 0.0	Min. :1.000	Min. : 0.000
##	1st Qu.:10.25	1st Qu.:11.0	1st Qu.:5.000	1st Qu.: 1.000
##	Median :11.00	Median :12.0	Median :5.000	Median : 2.000
##	Mean :10.93	Mean :11.4	Mean :4.924	Mean : 3.957
##	3rd Qu.:12.00	3rd Qu.:12.0	3rd Qu.:5.000	3rd Qu.: 6.000
##	Max. :12.00	Max. :12.0	Max. :5.000	Max. :24.000
##	NA's :561	NA's :561	NA's :562	NA's :575
##	digit	popsiz	nshorter	nlongter
##	Min. : 0.00	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.: 5.00	1st Qu.:2.000	1st Qu.:3.000	1st Qu.:2.000
##	Median :10.00	Median :2.000	Median :4.000	Median :3.000
##	Mean :11.58	Mean :1.879	Mean :3.736	Mean :3.103
##	3rd Qu.:17.00	3rd Qu.:2.000	3rd Qu.:4.000	3rd Qu.:4.000
##	Max. :66.00	Max. :2.000	Max. :5.000	Max. :5.000
##	NA's :631	NA's :462	NA's :548	NA's :549
##	nverbal	njudgeme	naphasia	napraxia
##	Min. :1.000	Min. :1.00	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:1.00	1st Qu.:2.000	1st Qu.:1.000
##	Median :2.000	Median :2.00	Median :3.000	Median :1.000
##	Mean :2.358	Mean :1.94	Mean :2.699	Mean :1.635
##	3rd Qu.:3.000	3rd Qu.:3.00	3rd Qu.:3.000	3rd Qu.:2.000
##	Max. :5.000	Max. :5.00	Max. :5.000	Max. :5.000
##	NA's :549	NA's :551	NA's :555	NA's :596
##	nagnosia	nconstru	ndisturb	delirium
##	Min. :1.000	Min. :1.000	Min. :1.000	Min. :1.000
##	1st Qu.:1.000	1st Qu.:2.000	1st Qu.:3.000	1st Qu.:2.000

##	Median :1.000	Median :3.000	Median :3.000	Median :2.000	
##	Mean :1.239	Mean :2.664	Mean :3.219	Mean :1.997	
##	3rd Qu.:1.000	3rd Qu.:4.000	3rd Qu.:4.000	3rd Qu.:2.000	
##	Max. :5.000	Max. :5.000	Max. :5.000	Max. :2.000	
##	NA's :558	NA's :565	NA's :559	NA's :558	
##	majordep	diagdeme	profile	corticr	corticl
##	Min. :2	Min. :1.00	Min. :1.000	Min. :0.0	Min. :0.00
##	1st Qu.:2	1st Qu.:1.00	1st Qu.:3.000	1st Qu.:1.0	1st Qu.:0.00
##	Median :2	Median :1.00	Median :3.000	Median :2.0	Median :2.00
##	Mean :2	Mean :1.21	Mean :4.238	Mean :1.5	Mean :1.31
##	3rd Qu.:2	3rd Qu.:1.00	3rd Qu.:6.000	3rd Qu.:2.0	3rd Qu.:2.00
##	Max. :2	Max. :2.00	Max. :6.000	Max. :3.0	Max. :3.00
##	NA's :562	NA's :575	NA's :679	NA's :811	NA's :809
##	subcort	cnocoglo	ccogloss	cad	
##	Min. :1.000	Min. :12	Min. :11.00	Min. :11.00	
##	1st Qu.:1.000	1st Qu.:12	1st Qu.:12.00	1st Qu.:12.00	
##	Median :1.000	Median :12	Median :13.00	Median :13.00	
##	Mean :1.394	Mean :12	Mean :15.87	Mean :14.33	
##	3rd Qu.:2.000	3rd Qu.:12	3rd Qu.:21.50	3rd Qu.:13.00	
##	Max. :2.000	Max. :12	Max. :24.00	Max. :23.00	
##	NA's :818	NA's :850	NA's :812	NA's :692	
##	cvasdem	cother	cunclass	daily	
##	Min. :11.00	Min. :12.00	Min. :11.00	Min. :1.000	
##	1st Qu.:12.00	1st Qu.:12.00	1st Qu.:12.00	1st Qu.:2.000	
##	Median :12.00	Median :13.00	Median :12.00	Median :3.000	
##	Mean :13.93	Mean :14.44	Mean :13.11	Mean :2.533	
##	3rd Qu.:13.00	3rd Qu.:13.75	3rd Qu.:13.00	3rd Qu.:3.000	
##	Max. :23.00	Max. :22.00	Max. :22.00	Max. :4.000	
##	NA's :807	NA's :833	NA's :807	NA's :566	
##	ndiag	severity	shrtlosn	longlosn	
##	Min. :100	Min. :1.000	Min. :1	Min. :0.0000	
##	1st Qu.:401	1st Qu.:1.000	1st Qu.:1	1st Qu.:1.0000	
##	Median :701	Median :2.000	Median :1	Median :1.0000	
##	Mean :579	Mean :1.637	Mean :1	Mean :0.8472	
##	3rd Qu.:701	3rd Qu.:2.000	3rd Qu.:1	3rd Qu.:1.0000	
##	Max. :703	Max. :3.000	Max. :1	Max. :1.0000	
##		NA's :683	NA's :685	NA's :707	
##	clanguag	cdofint	cintid	c235	
##	Min. :1.000	Min. : 10591	Min. : 1.00	Min. :1.000	
##	1st Qu.:1.000	1st Qu.: 80891	1st Qu.: 8.00	1st Qu.:1.000	
##	Median :1.000	Median :160591	Median : 13.00	Median :1.000	
##	Mean :1.189	Mean :158885	Mean : 26.05	Mean :1.439	
##	3rd Qu.:1.000	3rd Qu.:240192	3rd Qu.: 26.00	3rd Qu.:2.000	
##	Max. :2.000	Max. :311091	Max. :204.00	Max. :2.000	
##		NA's :5	NA's :225	NA's :10	
##	c236	c236a	c237	c238	
##	Min. :1.000	Min. :0.0000	Min. :1.000	Min. :0.0000	
##	1st Qu.:3.000	1st Qu.:0.0000	1st Qu.:2.000	1st Qu.:0.0000	
##	Median :4.000	Median :0.0000	Median :3.000	Median :1.0000	
##	Mean :3.921	Mean :0.2615	Mean :2.886	Mean :0.6679	
##	3rd Qu.:4.000	3rd Qu.:1.0000	3rd Qu.:4.000	3rd Qu.:1.0000	
##	Max. :8.000	Max. :1.0000	Max. :8.000	Max. :1.0000	
##	NA's :14	NA's :461	NA's :11	NA's :11	
##	c239	c240	c241	c242	

##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000
##	Median	:0.0000	Median	:0.0000	Median	:1.0000	Median	:0.0000
##	Mean	:0.3558	Mean	:0.4606	Mean	:0.8177	Mean	:0.7365
##	3rd Qu.	:1.0000	3rd Qu.	:1.0000	3rd Qu.	:2.0000	3rd Qu.	:2.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:2.0000	Max.	:2.0000
##	NA's	:22	NA's	:26	NA's	:17	NA's	:39
##	c243		c244		c245		c246	
##	Min.	:0.0000	Min.	:0.0000	Min.	: 1.00	Min.	:0.0000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	: 18.00	1st Qu.	:0.0000
##	Median	:0.0000	Median	:0.0000	Median	: 36.00	Median	:0.0000
##	Mean	:0.2122	Mean	:0.8007	Mean	: 51.12	Mean	:0.2049
##	3rd Qu.	:0.0000	3rd Qu.	:2.0000	3rd Qu.	: 60.00	3rd Qu.	:0.0000
##	Max.	:1.0000	Max.	:2.0000	Max.	:696.00	Max.	:1.0000
##	NA's	:78	NA's	:23	NA's	:188	NA's	:197
##	c247		c248		c249		c250	
##	Min.	:0.000	Min.	:0.000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.	:1.000	1st Qu.	:1.000	1st Qu.	:0.0000	1st Qu.	:0.0000
##	Median	:2.000	Median	:2.000	Median	:1.0000	Median	:0.0000
##	Mean	:1.525	Mean	:1.448	Mean	:0.8774	Mean	:0.6504
##	3rd Qu.	:2.000	3rd Qu.	:2.000	3rd Qu.	:2.0000	3rd Qu.	:2.0000
##	Max.	:2.000	Max.	:2.000	Max.	:2.0000	Max.	:2.0000
##	NA's	:70	NA's	:29	NA's	:27	NA's	:156
##	c251		c252		c253		c253am	
##	Min.	:0.00	Min.	: 1.00	Min.	:0.0000	Min.	: 1.00
##	1st Qu.	:0.00	1st Qu.	: 18.00	1st Qu.	:0.0000	1st Qu.	: 4.00
##	Median	:1.00	Median	: 36.00	Median	:0.0000	Median	: 6.00
##	Mean	:1.02	Mean	: 44.72	Mean	:0.1651	Mean	: 6.61
##	3rd Qu.	:2.00	3rd Qu.	: 60.00	3rd Qu.	:0.0000	3rd Qu.	:10.00
##	Max.	:2.00	Max.	:696.00	Max.	:1.0000	Max.	:12.00
##	NA's	:342	NA's	:96	NA's	:124	NA's	:774
##	c253ay		c253bm		c253by		c254	
##	Min.	:43.00	Min.	: 1.000	Min.	:43.00	Min.	:0.0000
##	1st Qu.	:85.00	1st Qu.	: 4.000	1st Qu.	:84.25	1st Qu.	:1.0000
##	Median	:87.00	Median	: 7.000	Median	:88.00	Median	:1.0000
##	Mean	:86.09	Mean	: 6.907	Mean	:85.77	Mean	:0.8022
##	3rd Qu.	:89.00	3rd Qu.	:10.000	3rd Qu.	:90.00	3rd Qu.	:1.0000
##	Max.	:91.00	Max.	:12.000	Max.	:92.00	Max.	:1.0000
##	NA's	:608	NA's	:797	NA's	:689	NA's	:17
##	c255		c256		c257		c258	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:1.000
##	Median	:1.0000	Median	:0.0000	Median	:1.0000	Median	:1.000
##	Mean	:0.9044	Mean	:0.4726	Mean	:0.6548	Mean	:0.756
##	3rd Qu.	:2.0000	3rd Qu.	:1.0000	3rd Qu.	:1.0000	3rd Qu.	:1.000
##	Max.	:2.0000	Max.	:1.0000	Max.	:1.0000	Max.	:1.000
##	NA's	:87	NA's	:66	NA's	:179	NA's	:56
##	c259		c260		c261		c262	
##	Min.	:0.000	Min.	: 1.00	Min.	:0.000	Min.	:0.0000
##	1st Qu.	:1.000	1st Qu.	: 18.00	1st Qu.	:0.000	1st Qu.	:0.0000
##	Median	:1.000	Median	: 36.00	Median	:0.000	Median	:0.0000
##	Mean	:0.759	Mean	: 44.79	Mean	:0.169	Mean	:0.2786
##	3rd Qu.	:1.000	3rd Qu.	: 60.00	3rd Qu.	:0.000	3rd Qu.	:1.0000
##	Max.	:1.000	Max.	:696.00	Max.	:1.000	Max.	:1.0000

##	NA's :42	NA's :77	NA's :76	NA's :126
##	c263	c264	c265	c266
##	Min. :0.000	Min. :0.000	Min. :0.000	Min. :0.000
##	1st Qu.:0.000	1st Qu.:0.000	1st Qu.:0.000	1st Qu.:0.000
##	Median :2.000	Median :2.000	Median :0.000	Median :2.000
##	Mean :1.184	Mean :1.241	Mean :1.598	Mean :2.987
##	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:2.000	3rd Qu.:6.000
##	Max. :2.000	Max. :2.000	Max. :6.000	Max. :6.000
##	NA's :176	NA's :180	NA's :15	NA's :26
##	c267	c268	c269	c270
##	Min. :0.000	Min. : 1.00	Min. :0.0000	Min. :0.000
##	1st Qu.:0.000	1st Qu.: 12.00	1st Qu.:0.0000	1st Qu.:0.000
##	Median :2.000	Median : 24.00	Median :0.0000	Median :0.000
##	Mean :2.732	Mean : 37.65	Mean :0.2075	Mean :0.361
##	3rd Qu.:6.000	3rd Qu.: 48.00	3rd Qu.:0.0000	3rd Qu.:1.000
##	Max. :6.000	Max. :504.00	Max. :1.0000	Max. :1.000
##	NA's :34	NA's :199	NA's :210	NA's :31
##	c271	c272	c273	c274
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. : 1.00
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.: 12.00
##	Median :1.0000	Median :1.0000	Median :0.0000	Median : 24.00
##	Mean :0.5461	Mean :0.7074	Mean :0.3955	Mean : 35.07
##	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.: 48.00
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :696.00
##	NA's :569	NA's :581	NA's :631	NA's :555
##	c275	c276	c277	c278
##	Min. :0.0000	Min. :0.00000	Min. :0.0000	Min. : 1.00
##	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.:0.0000	1st Qu.: 12.00
##	Median :1.0000	Median :0.00000	Median :0.0000	Median : 30.00
##	Mean :0.5785	Mean :0.07519	Mean :0.4138	Mean : 52.15
##	3rd Qu.:1.0000	3rd Qu.:0.00000	3rd Qu.:1.0000	3rd Qu.: 60.00
##	Max. :1.0000	Max. :1.00000	Max. :1.0000	Max. :720.00
##	NA's :42	NA's :53	NA's :51	NA's :382
##	c279	c280	c281	c282
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :0.1932	Mean :0.2146	Mean :0.3024	Mean :0.1868
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:0.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :380	NA's :68	NA's :107	NA's :123
##	c283	c284	c285	c286
##	Min. :0.0000	Min. : 1.00	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.: 12.00	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.0000	Median : 24.00	Median :0.0000	Median :0.0000
##	Mean :0.1752	Mean : 49.55	Mean :0.1472	Mean :0.2337
##	3rd Qu.:0.0000	3rd Qu.: 48.00	3rd Qu.:0.0000	3rd Qu.:0.0000
##	Max. :1.0000	Max. :600.00	Max. :1.0000	Max. :1.0000
##	NA's :132	NA's :584	NA's :586	NA's :38
##	c286a	c287	c287a	c288
##	Min. : 1.00	Min. :0.0000	Min. : 1.00	Min. :0.0000
##	1st Qu.: 12.00	1st Qu.:0.0000	1st Qu.: 9.00	1st Qu.:0.0000
##	Median : 25.00	Median :0.0000	Median : 24.00	Median :0.0000
##	Mean : 51.79	Mean :0.2142	Mean : 42.97	Mean :0.2553

##	3rd Qu.: 60.00	3rd Qu.:0.0000	3rd Qu.: 48.00	3rd Qu.:1.0000
##	Max. :648.00	Max. :1.0000	Max. :696.00	Max. :1.0000
##	NA's :682	NA's :48	NA's :698	NA's :44
##	c289	c290	c291	c292
##	Min. :0.0000	Min. :0.0000	Min. : 1.00	Min. :0.000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.: 18.00	1st Qu.:0.000
##	Median :0.0000	Median :0.0000	Median : 36.00	Median :1.000
##	Mean :0.3852	Mean :0.2989	Mean : 65.66	Mean :1.041
##	3rd Qu.:1.0000	3rd Qu.:1.0000	3rd Qu.: 78.00	3rd Qu.:2.000
##	Max. :1.0000	Max. :1.0000	Max. :600.00	Max. :2.000
##	NA's :54	NA's :38	NA's :407	NA's :76
##	c293	c294	c295	c296
##	Min. : 1.00	Min. : 2.00	Min. :0.0000	Min. :0.0000
##	1st Qu.: 24.00	1st Qu.: 25.75	1st Qu.:0.0000	1st Qu.:0.0000
##	Median : 48.00	Median : 60.00	Median :0.0000	Median :0.0000
##	Mean : 72.18	Mean : 73.26	Mean :0.4119	Mean :0.1693
##	3rd Qu.: 96.00	3rd Qu.: 96.00	3rd Qu.:1.0000	3rd Qu.:0.0000
##	Max. :720.00	Max. :720.00	Max. :1.0000	Max. :2.0000
##	NA's :140	NA's :191	NA's :79	NA's :24
##	c297	c298	c299	c300
##	Min. :0.0000	Min. :0.00000	Min. :0.00000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.:0.00000	1st Qu.:0.0000
##	Median :0.0000	Median :0.00000	Median :0.00000	Median :0.0000
##	Mean :0.1384	Mean :0.05615	Mean :0.03171	Mean :0.1597
##	3rd Qu.:0.0000	3rd Qu.:0.00000	3rd Qu.:0.00000	3rd Qu.:0.0000
##	Max. :1.0000	Max. :1.00000	Max. :1.00000	Max. :1.0000
##	NA's :13	NA's :14	NA's :31	NA's :18
##	c301	c302	c303	c304
##	Min. :0.0000	Min. :0.0000	Min. :0.000	Min. :0.000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.000	1st Qu.:0.000
##	Median :0.0000	Median :0.0000	Median :0.000	Median :0.000
##	Mean :0.1421	Mean :0.1004	Mean :0.298	Mean :0.276
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:1.000	3rd Qu.:1.000
##	Max. :3.0000	Max. :3.0000	Max. :1.000	Max. :1.000
##	NA's :70	NA's :24	NA's :12	NA's :14
##	c305	c306	c307	c308
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :0.1188	Mean :0.0566	Mean :0.4689	Mean :0.2862
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :5.0000	Max. :1.0000
##	NA's :85	NA's :109	NA's :30	NA's :9
##	c309	c310	c311	c312
##	Min. :0.0000	Min. :0.0000	Min. : 0.000	Min. : 0.00
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.: 1.000	1st Qu.: 1.00
##	Median :0.0000	Median :1.0000	Median : 2.000	Median : 2.00
##	Mean :0.1954	Mean :0.6625	Mean : 3.233	Mean : 2.79
##	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.: 5.000	3rd Qu.: 4.00
##	Max. :6.0000	Max. :1.0000	Max. :18.000	Max. :12.00
##	NA's :32	NA's :771	NA's :13	NA's :43
##	c313	c314	c315	c316
##	Min. : 0.000	Min. : 1.000	Min. : 19.00	Min. : 1.00
##	1st Qu.: 1.000	1st Qu.: 1.250	1st Qu.: 66.00	1st Qu.:34.75

```
## Median : 2.000 Median : 3.000 Median : 78.00 Median :45.00
## Mean : 2.716 Mean : 3.436 Mean : 74.31 Mean :43.02
## 3rd Qu.: 4.000 3rd Qu.: 4.000 3rd Qu.: 85.00 3rd Qu.:55.00
## Max. :13.000 Max. :16.000 Max. :104.00 Max. :82.00
## NA's :42 NA's :65 NA's :190 NA's :267
## c317 c318 c319 c320
## Min. : 20.00 Min. :0.0000 Min. :0.000 Min. :0.00000
## 1st Qu.: 60.00 1st Qu.:0.0000 1st Qu.:0.000 1st Qu.:0.00000
## Median : 75.00 Median :0.0000 Median :0.000 Median :0.00000
## Mean : 70.75 Mean :0.2827 Mean :0.135 Mean :0.02983
## 3rd Qu.: 82.00 3rd Qu.:0.0000 3rd Qu.:0.000 3rd Qu.:0.00000
## Max. :109.00 Max. :4.0000 Max. :5.000 Max. :2.00000
## NA's :236 NA's :87 NA's :103 NA's :80
## c321 c322 c323 c324
## Min. :0.00000 Min. :0.00000 Min. :0.00000 Min. :0.00000
## 1st Qu.:0.00000 1st Qu.:0.00000 1st Qu.:0.00000 1st Qu.:0.00000
## Median :0.00000 Median :0.00000 Median :0.00000 Median :0.00000
## Mean :0.04581 Mean :0.03299 Mean :0.02179 Mean :0.03439
## 3rd Qu.:0.00000 3rd Qu.:0.00000 3rd Qu.:0.00000 3rd Qu.:0.00000
## Max. :5.00000 Max. :4.00000 Max. :1.00000 Max. :4.00000
## NA's :87 NA's :63 NA's :71 NA's :66
## c325 c326 c327 c328
## Min. :0.00000 Min. :0.0000 Min. :0.0000 Min. :0.0000
## 1st Qu.:0.00000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000
## Median :0.00000 Median :0.0000 Median :0.0000 Median :0.0000
## Mean :0.02699 Mean :0.2388 Mean :0.5423 Mean :0.2249
## 3rd Qu.:0.00000 3rd Qu.:0.0000 3rd Qu.:1.0000 3rd Qu.:0.0000
## Max. :2.00000 Max. :3.0000 Max. :5.0000 Max. :7.0000
## NA's :73 NA's :114 NA's :119 NA's :135
## c329 c330 c331 c332
## Min. :0.0000 Min. :0.0000 Min. : 0.0000 Min. :0.0000
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.: 0.0000 1st Qu.:0.0000
## Median :0.0000 Median :0.0000 Median : 0.0000 Median :0.0000
## Mean :0.1818 Mean :0.4884 Mean : 0.3333 Mean :0.1623
## 3rd Qu.:0.0000 3rd Qu.:1.0000 3rd Qu.: 0.0000 3rd Qu.:0.0000
## Max. :7.0000 Max. :8.0000 Max. :10.0000 Max. :5.0000
## NA's :136 NA's :292 NA's :308 NA's :130
## c333 dbdscore adlrate
## Min. :0.00000 Min. : 0.00 Min. :2.000
## 1st Qu.:0.00000 1st Qu.:10.00 1st Qu.:5.000
## Median :0.00000 Median :17.00 Median :6.000
## Mean :0.09623 Mean :18.98 Mean :5.356
## 3rd Qu.:0.00000 3rd Qu.:25.00 3rd Qu.:6.000
## Max. :5.00000 Max. :76.00 Max. :6.000
## NA's :134 NA's :95 NA's :5
```

```
### Recoding Outcome variables
```

```
## Variables with missing == 7 | 8 | 9
```

```
out.missing.x <- c("askhelp", "notime", "feelstre", "feelemba",
  "feelangr", "affects", "afraid", "dependen", "strained",
  "suffered", "privacy", "soclife", "friends", "expect",
  "expenses", "unable", "lostctrl", "leave", "uncertai",
  "doing", "better", "burdened", "bother", "poorapp",
```



```

"shake", "good", "mind", "depressd", "eveffort", "hopeful",
"failure", "fearful", "restls", "happy", "talkless",
"lonely", "unfriend", "enjoylif", "cryspell", "feltsad",
"dislike", "getgoing", "health1") #, 'health2')

## Variables with missing == 99
out.missing.xx <- c("zarscore", "cessscore")

###
full.outcomes.NAs <- full.outcomes

full.outcomes.NAs[, out.missing.x] <- apply(full.outcomes.NAs[,
  out.missing.x], 2, function(x) {
  x[(x == 7 | x == 8 | x == 9)] <- NA
  x
})
full.outcomes.NAs[, out.missing.xx] <- apply(full.outcomes.NAs[,
  out.missing.xx], 2, function(x) {
  x[(x == 99)] <- NA
  x
})

summary(full.outcomes.NAs)

```

```

##      CASEID      askhelp      notime      feelstre
## Min.   :200004   Min.   :0.0000   Min.   :0.0000   Min.   :0.00
## 1st Qu.:208208   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.00
## Median :216682   Median :0.0000   Median :0.0000   Median :1.00
## Mean   :216827   Mean   :0.5767   Mean   :0.7991   Mean   :1.09
## 3rd Qu.:225861   3rd Qu.:1.0000   3rd Qu.:2.0000   3rd Qu.:2.00
## Max.   :234027   Max.   :4.0000   Max.   :4.0000   Max.   :4.00
##                      NA's    :3
##      feelemba      feelangr      affects      afraid
## Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :0.0000   Median :0.0000
## Mean   :0.5424   Mean   :0.6087   Mean   :0.4712   Mean   :1.154
## 3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:2.0000
## Max.   :4.0000   Max.   :4.0000   Max.   :4.0000   Max.   :4.0000
## NA's    :1                      NA's    :2
##      dependen      strained      suffered      privacy
## Min.   :0.000   Min.   :0.00   Min.   :0.0   Min.   :0.000
## 1st Qu.:0.000   1st Qu.:0.00   1st Qu.:0.0   1st Qu.:0.000
## Median :3.000   Median :0.00   Median :0.0   Median :0.000
## Mean   :2.302   Mean   :0.98   Mean   :0.6   Mean   :0.376
## 3rd Qu.:4.000   3rd Qu.:2.00   3rd Qu.:1.0   3rd Qu.:0.000
## Max.   :4.000   Max.   :4.00   Max.   :4.0   Max.   :4.000
## NA's    :4                      NA's    :1
##      soclife      friends      expect      expenses
## Min.   :0.0000   Min.   :0.0000   Min.   :0.000   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :1.000   Median :0.0000
## Mean   :0.6099   Mean   :0.1492   Mean   :1.609   Mean   :0.3765
## 3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:4.000   3rd Qu.:0.0000

```

##	Max.	:4.0000	Max.	:4.0000	Max.	:4.000	Max.	:4.0000
##					NA's	:5	NA's	:1
##	unable		lostctrl		leave		uncertai	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:0.4028	Mean	:0.4158	Mean	:0.6324	Mean	:0.8551
##	3rd Qu.:	0.0000	3rd Qu.:	0.0000	3rd Qu.:	1.0000	3rd Qu.:	2.0000
##	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000
##	NA's	:2	NA's	:2	NA's	:5	NA's	:2
##	doing		better		burdened		zarscore	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	: 0.00
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	6.00
##	Median	:0.0000	Median	:0.0000	Median	:1.0000	Median	:13.00
##	Mean	:0.9894	Mean	:0.6012	Mean	:0.9882	Mean	:17.12
##	3rd Qu.:	2.0000	3rd Qu.:	1.0000	3rd Qu.:	2.0000	3rd Qu.:	25.00
##	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000	Max.	:79.00
##			NA's	:1				
##	health1		bother		poorapp		shake	
##	Min.	:1.000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	1.000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:2.000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:1.755	Mean	:0.3908	Mean	:0.1936	Mean	:0.3306
##	3rd Qu.:	2.000	3rd Qu.:	1.0000	3rd Qu.:	0.0000	3rd Qu.:	0.0000
##	Max.	:5.000	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000
##	NA's	:11	NA's	:4	NA's	:4	NA's	:4
##	good		mind		depressd		eveffort	
##	Min.	:0.000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	3.000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:3.000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:2.641	Mean	:0.4286	Mean	:0.4262	Mean	:0.5596
##	3rd Qu.:	3.000	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.0000
##	Max.	:3.000	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000
##	NA's	:7	NA's	:4	NA's	:4	NA's	:4
##	hopeful		failure		fearful		restls	
##	Min.	:0.000	Min.	:0.000	Min.	:0.000	Min.	:0.0000
##	1st Qu.:	2.000	1st Qu.:	0.000	1st Qu.:	0.000	1st Qu.:	0.0000
##	Median	:3.000	Median	:0.000	Median	:0.000	Median	:0.0000
##	Mean	:2.248	Mean	:0.154	Mean	:0.282	Mean	:0.7794
##	3rd Qu.:	3.000	3rd Qu.:	0.000	3rd Qu.:	0.000	3rd Qu.:	1.0000
##	Max.	:3.000	Max.	:3.000	Max.	:3.000	Max.	:3.0000
##	NA's	:12	NA's	:7	NA's	:7	NA's	:8
##	happy		talkless		lonely		unfriend	
##	Min.	:0.000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	2.000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:3.000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:2.421	Mean	:0.2645	Mean	:0.4171	Mean	:0.1031
##	3rd Qu.:	3.000	3rd Qu.:	0.0000	3rd Qu.:	1.0000	3rd Qu.:	0.0000
##	Max.	:3.000	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000
##	NA's	:7	NA's	:8	NA's	:7	NA's	:7
##	enjoylif		cryspell		feltsad		dislike	
##	Min.	:0.0	Min.	:0.0	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	2.0	1st Qu.:	0.0	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:3.0	Median	:0.0	Median	:0.0000	Median	:0.0000

```
## Mean :2.5 Mean :0.2 Mean :0.5314 Mean :0.0866
## 3rd Qu.:3.0 3rd Qu.:0.0 3rd Qu.:1.0000 3rd Qu.:0.0000
## Max. :3.0 Max. :3.0 Max. :3.0000 Max. :3.0000
## NA's :7 NA's :6 NA's :6 NA's :8
## getgoing cresscore
## Min. :0.0000 Min. : 0.000
## 1st Qu.:0.0000 1st Qu.: 1.000
## Median :0.0000 Median : 5.000
## Mean :0.5893 Mean : 7.912
## 3rd Qu.:1.0000 3rd Qu.:12.000
## Max. :3.0000 Max. :48.000
## NA's :6 NA's :10
```

Recoding notes and things to be mindful of:

- In general, 7 = refused; 8 = do not know; 9 = missing (all coded as NA in final dataset)
- For neuropsych, 66 = visual/hearing impairment
- all beh.disturb vars have additional coding scheme: not relevant = 4; dnk = 5; could not answer = 6; missing = 9
- coding for score3ms is slightly different for 777 and 888 (see codebook); but coded as NAs for now

We need to work from full.outcomes.NAs and full.predictors.NAs

```
outcome.missing.clean.10 <- check.drop.missingness(full.outcomes.NAs,col.freq=.1,row.freq=.1,itors=In

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."

predictors.missing.clean.10 <- check.drop.missingness(full.predictors.NAs,col.freq=.1,row.freq=.1,ite

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."

outcome.missing.clean.20 <- check.drop.missingness(full.outcomes.NAs,col.freq=.2,row.freq=.2,itors=In

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."

predictors.missing.clean.20 <- check.drop.missingness(full.predictors.NAs,col.freq=.2,row.freq=.2,ite

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."

outcome.missing.clean.25.25 <- check.drop.missingness(full.outcomes.NAs,col.freq=.25,row.freq=.25,ite

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."

predictors.missing.clean.25.25 <- check.drop.missingness(full.predictors.NAs,col.freq=.25,row.freq=.25,ite

## [1] "Iter: 1"
## [1] "Iter: 2"
## [1] "Missingness acceptable: Stopping."
```

```

dim(full.outcomes.NAs)

## [1] 851 46

#dim(outcome.missing.clean.10$data.out)
#dim(outcome.missing.clean.20$data.out)
dim(outcome.missing.clean.25.25$data.out)

## [1] 845 46

dim(full.predictors.NAs)

## [1] 851 332

#dim(predictors.missing.clean.10$data.out)
dim(predictors.missing.clean.20$data.out)

## [1] 797 124

dim(predictors.missing.clean.25.25$data.out)

## [1] 803 147

#colnames(predictors.missing.clean.10$data.out)
#colnames(predictors.missing.clean.20$data.out)
colnames(predictors.missing.clean.25.25$data.out)

## [1] "CASEID" "studysex" "agestrat" "studyage" "clinage" "studyed"
## [7] "institut" "twin" "relat" "cgsex" "cgage" "cgeth1"
## [13] "cgedyrs" "cgedlev" "thycond" "attack" "leukemia" "proxdiab"
## [19] "height" "sweight" "coffee" "tea" "drinks" "smoke"
## [25] "pipe" "cigars" "beer" "wine" "spirits" "apathy"
## [31] "wander" "violenc" "disinhi" "otherbe" "sad" "interest"
## [37] "appetite" "lossweig" "asleep" "awaken" "allday" "tiredall"
## [43] "move" "worthles" "suicide" "impress" "shorterm" "longterm"
## [49] "abstract" "judgemen" "aphasia" "apraxia" "change" "work"
## [55] "social" "relation" "neurdone" "languagn" "ndiag" "clanguag"
## [61] "cdofint" "c235" "c236" "c237" "c238" "c239"
## [67] "c240" "c241" "c242" "c243" "c244" "c245"
## [73] "c246" "c247" "c248" "c249" "c250" "c252"
## [79] "c253" "c254" "c255" "c256" "c257" "c258"
## [85] "c259" "c260" "c261" "c262" "c263" "c264"
## [91] "c265" "c266" "c267" "c268" "c269" "c270"
## [97] "c275" "c276" "c277" "c280" "c281" "c282"
## [103] "c283" "c286" "c287" "c288" "c289" "c290"
## [109] "c292" "c293" "c294" "c295" "c296" "c297"
## [115] "c298" "c299" "c300" "c301" "c302" "c303"
## [121] "c304" "c305" "c306" "c307" "c308" "c309"
## [127] "c311" "c312" "c313" "c314" "c315" "c318"
## [133] "c319" "c320" "c321" "c322" "c323" "c324"
## [139] "c325" "c326" "c327" "c328" "c329" "c332"
## [145] "c333" "dbdscore" "adlrate"

colnames(outcome.missing.clean.25.25$data.out)

## [1] "CASEID" "askhelp" "notime" "feelstre" "feelemba" "feelangr"
## [7] "affects" "afraid" "dependen" "strained" "suffered" "privacy"
## [13] "soclife" "friends" "expect" "expenses" "unable" "lostctrl"

```

```

## [19] "leave"      "uncertai" "doing"     "better"    "burdened" "zarscore"
## [25] "health1"    "bother"    "poorapp"    "shake"     "good"      "mind"
## [31] "depressd"   "eveffort"  "hopeful"    "failure"    "fearful"    "restls"
## [37] "happy"      "talkless"  "lonely"     "unfriend"   "enjoylif"   "cryspell"
## [43] "feltsad"    "dislike"   "getgoing"   "cesscore"

dim(predictors.missing.clean.25.25$data.out[,c("CASEID", "studysex", "clinage", "studyed", "cgsex", "cgap")])

## [1] 803 94

summary(as.factor(CSHA.1991.zarit[CSHA.1991.zarit[, "CASEID"] %in% predictors.missing.clean.25.25$data.out[, "CASEID"]]))

##      1      2      8      9
## 361 298  78  66

summary(as.factor(CSHA.1991.zarit[CSHA.1991.zarit[, "CASEID"] %in% outcome.missing.clean.25.25$data.out[, "CASEID"]]))

##      1      2      3      4      5      9
## 314 428  78  10      4  11

length(intersect(outcome.missing.clean.25.25$data.out[,c("CASEID")], predictors.missing.clean.25.25$data.out[,c("CASEID")]))

## [1] 798

## and then get all the previously listed variables from above...

### send/include fast.csci function.

## need to add in a recoded health1 to outcomes and a recoded painkill to predictors

final.participants <- as.character(intersect(outcome.missing.clean.25.25$data.out[,c("CASEID")], predictors.missing.clean.25.25$data.out[,c("CASEID")]))

## I need to add painkill.
fin.preds <- predictors.missing.clean.25.25$data.out[,c("CASEID", "studysex", "clinage", "studyed", "cgsex", "cgap")]
rownames(fin.preds) <- as.character(fin.preds[, "CASEID"])
fin.preds <- fin.preds[, -c(which(colnames(fin.preds) == "CASEID"))]
fin.preds <- fin.preds[final.participants,]

painkill <- CSHA.1991.zarit[,c("CASEID", "painkill")]
rownames(painkill) <- as.character(painkill[, "CASEID"])
#head(rownames(painkill))
#summary(as.factor(painkill[final.participants, "painkill"]))
fin.preds <- cbind(fin.preds[final.participants, ], as.factor(painkill[final.participants, "painkill"]))
#colnames(fin.preds)[ncol(fin.preds)]
colnames(fin.preds)[ncol(fin.preds)] <- "painkill"

dim(fin.preds)

## [1] 798 94

summary(fin.preds)

##      studysex      clinage      studied      cgsex
## Min.      :1.000  Min.      : 65.00  Min.      : 0.000  Min.      :1.000
## 1st Qu.:1.000  1st Qu.: 79.00  1st Qu.: 6.000  1st Qu.:1.000
## Median :2.000  Median : 85.00  Median : 8.000  Median :2.000
## Mean    :1.687  Mean    : 84.13  Mean    : 8.537  Mean    :1.737
## 3rd Qu.:2.000  3rd Qu.: 89.00  3rd Qu.:11.000  3rd Qu.:2.000

```

##	Max.	:2.000	Max.	:104.00	Max.	:20.000	Max.	:2.000
##					NA's	:102		
##	cgage		cgedyrs		cgedlev		apathy	
##	Min.	:26.00	Min.	: 0.00	Min.	: 1.000	Min.	:1.000
##	1st Qu.:	51.00	1st Qu.:	9.00	1st Qu.:	4.000	1st Qu.:	1.000
##	Median	:60.00	Median	:12.00	Median	: 5.000	Median	:3.000
##	Mean	:60.12	Mean	:11.82	Mean	: 5.737	Mean	:2.422
##	3rd Qu.:	70.00	3rd Qu.:	14.00	3rd Qu.:	7.000	3rd Qu.:	3.000
##	Max.	:93.00	Max.	:25.00	Max.	:12.000	Max.	:3.000
##	NA's	:7	NA's	:10	NA's	:2	NA's	:85
##	wander		violenc		disinhi		otherbe	
##	Min.	:1.000	Min.	:1.000	Min.	:1.000	Min.	:1.000
##	1st Qu.:	3.000	1st Qu.:	3.000	1st Qu.:	3.000	1st Qu.:	3.000
##	Median	:3.000	Median	:3.000	Median	:3.000	Median	:3.000
##	Mean	:2.735	Mean	:2.817	Mean	:2.699	Mean	:2.858
##	3rd Qu.:	3.000	3rd Qu.:	3.000	3rd Qu.:	3.000	3rd Qu.:	3.000
##	Max.	:3.000	Max.	:3.000	Max.	:3.000	Max.	:3.000
##	NA's	:126	NA's	:93	NA's	:96	NA's	:93
##	sad		interest		appetite		lossweig	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:0.2939	Mean	:0.2465	Mean	:0.1042	Mean	:0.1326
##	3rd Qu.:	1.0000	3rd Qu.:	0.0000	3rd Qu.:	0.0000	3rd Qu.:	0.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000
##	NA's	:148	NA's	:165	NA's	:136	NA's	:142
##	asleep		awaken		allday		tiredall	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:0.1884	Mean	:0.1745	Mean	:0.1418	Mean	:0.1844
##	3rd Qu.:	0.0000	3rd Qu.:	0.0000	3rd Qu.:	0.0000	3rd Qu.:	0.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000
##	NA's	:124	NA's	:139	NA's	:135	NA's	:158
##	move		worthles		suicide		impress	
##	Min.	:0.00000	Min.	:0.0000	Min.	:0.00000	Min.	:1.000
##	1st Qu.:	0.00000	1st Qu.:	0.0000	1st Qu.:	0.00000	1st Qu.:	3.000
##	Median	:0.00000	Median	:0.0000	Median	:0.00000	Median	:3.000
##	Mean	:0.05963	Mean	:0.1002	Mean	:0.04968	Mean	:2.679
##	3rd Qu.:	0.00000	3rd Qu.:	0.0000	3rd Qu.:	0.00000	3rd Qu.:	3.000
##	Max.	:1.00000	Max.	:1.0000	Max.	:1.00000	Max.	:4.000
##	NA's	:144	NA's	:169	NA's	:174	NA's	:95
##	shorterm		longterm		abstract		judgemen	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.000	Min.	:0.0000
##	1st Qu.:	1.0000	1st Qu.:	1.0000	1st Qu.:	1.000	1st Qu.:	1.0000
##	Median	:1.0000	Median	:1.0000	Median	:1.000	Median	:1.0000
##	Mean	:0.9881	Mean	:0.8174	Mean	:0.919	Mean	:0.7888
##	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.000	3rd Qu.:	1.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.000	Max.	:1.0000
##	NA's	:43	NA's	:75	NA's	:82	NA's	:121
##	aphasia		apraxia		change		work	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	1.0000	1st Qu.:	0.0000
##	Median	:1.0000	Median	:1.0000	Median	:1.0000	Median	:1.0000

##	Mean	:0.5298	Mean	:0.5487	Mean	:0.7551	Mean	:0.7481
##	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000
##	NA's	:109	NA's	:162	NA's	:67	NA's	:127
##	social		relation		dbdscore		adlrate	
##	Min.	:0.0000	Min.	:0.0000	Min.	: 0.00	Min.	:2.000
##	1st Qu.:	1.0000	1st Qu.:	1.0000	1st Qu.:	10.00	1st Qu.:	5.000
##	Median	:1.0000	Median	:1.0000	Median	:17.00	Median	:6.000
##	Mean	:0.8815	Mean	:0.8205	Mean	:19.04	Mean	:5.335
##	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	25.00	3rd Qu.:	6.000
##	Max.	:1.0000	Max.	:1.0000	Max.	:76.00	Max.	:6.000
##	NA's	:72	NA's	:85	NA's	:84	NA's	:3
##	c238		c239		c240		c241	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:1.0000	Median	:0.0000	Median	:0.0000	Median	:1.0000
##	Mean	:0.6767	Mean	:0.3604	Mean	:0.4695	Mean	:0.8331
##	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	2.0000
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000	Max.	:2.0000
##	NA's	:3	NA's	:10	NA's	:12	NA's	:7
##	c242		c243		c244		c245	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.000	Min.	: 1.00
##	1st Qu.:	0.0000	1st Qu.:	0.0000	1st Qu.:	0.000	1st Qu.:	18.00
##	Median	:0.0000	Median	:0.0000	Median	:0.000	Median	: 36.00
##	Mean	:0.7406	Mean	:0.2143	Mean	:0.817	Mean	: 51.07
##	3rd Qu.:	2.0000	3rd Qu.:	0.0000	3rd Qu.:	2.000	3rd Qu.:	60.00
##	Max.	:2.0000	Max.	:1.0000	Max.	:2.000	Max.	:696.00
##	NA's	:23	NA's	:56	NA's	:11	NA's	:166
##	c246		c247		c248		c249	
##	Min.	:0.0000	Min.	:0.000	Min.	:0.000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	1.000	1st Qu.:	1.000	1st Qu.:	0.0000
##	Median	:0.0000	Median	:2.000	Median	:2.000	Median	:1.0000
##	Mean	:0.2029	Mean	:1.523	Mean	:1.447	Mean	:0.8679
##	3rd Qu.:	0.0000	3rd Qu.:	2.000	3rd Qu.:	2.000	3rd Qu.:	2.0000
##	Max.	:1.0000	Max.	:2.000	Max.	:2.000	Max.	:2.0000
##	NA's	:172	NA's	:51	NA's	:13	NA's	:11
##	c250		c254		c255		c256	
##	Min.	:0.0000	Min.	:0.000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.:	0.0000	1st Qu.:	1.000	1st Qu.:	0.0000	1st Qu.:	0.0000
##	Median	:0.0000	Median	:1.000	Median	:1.0000	Median	:0.0000
##	Mean	:0.6383	Mean	:0.804	Mean	:0.9154	Mean	:0.4742
##	3rd Qu.:	2.0000	3rd Qu.:	1.000	3rd Qu.:	2.0000	3rd Qu.:	1.0000
##	Max.	:2.0000	Max.	:1.000	Max.	:2.0000	Max.	:1.0000
##	NA's	:129	NA's	:7	NA's	:65	NA's	:43
##	c257		c258		c259		c260	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	: 1.00
##	1st Qu.:	0.0000	1st Qu.:	1.0000	1st Qu.:	1.0000	1st Qu.:	18.00
##	Median	:1.0000	Median	:1.0000	Median	:1.0000	Median	: 36.00
##	Mean	:0.6523	Mean	:0.7559	Mean	:0.7571	Mean	: 44.66
##	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	1.0000	3rd Qu.:	60.00
##	Max.	:1.0000	Max.	:1.0000	Max.	:1.0000	Max.	:696.00
##	NA's	:148	NA's	:40	NA's	:28	NA's	:65
##	c261		c262		c263		c264	
##	Min.	:0.000	Min.	:0.0000	Min.	:0.000	Min.	:0.000

##	1st Qu.:0.000	1st Qu.:0.0000	1st Qu.:0.000	1st Qu.:0.000
##	Median :0.000	Median :0.0000	Median :2.000	Median :2.000
##	Mean :0.163	Mean :0.2843	Mean :1.173	Mean :1.232
##	3rd Qu.:0.000	3rd Qu.:1.0000	3rd Qu.:2.000	3rd Qu.:2.000
##	Max. :1.000	Max. :1.0000	Max. :2.000	Max. :2.000
##	NA's :62	NA's :105	NA's :151	NA's :155
##	c265	c266	c267	c268
##	Min. :0.000	Min. :0.000	Min. :0.00	Min. : 1.00
##	1st Qu.:0.000	1st Qu.:0.000	1st Qu.:0.00	1st Qu.: 12.00
##	Median :0.000	Median :2.000	Median :2.00	Median : 24.00
##	Mean :1.506	Mean :2.901	Mean :2.64	Mean : 37.33
##	3rd Qu.:2.000	3rd Qu.:6.000	3rd Qu.:6.00	3rd Qu.: 48.00
##	Max. :6.000	Max. :6.000	Max. :6.00	Max. :504.00
##	NA's :9	NA's :19	NA's :26	NA's :182
##	c269	c275	c276	c277
##	Min. :0.0000	Min. :0.0000	Min. :0.00000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.:0.0000
##	Median :0.0000	Median :1.0000	Median :0.00000	Median :0.0000
##	Mean :0.2072	Mean :0.5766	Mean :0.07612	Mean :0.4196
##	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:0.00000	3rd Qu.:1.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.00000	Max. :1.0000
##	NA's :190	NA's :28	NA's :36	NA's :33
##	c280	c281	c282	c283
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :0.2175	Mean :0.3069	Mean :0.1919	Mean :0.1766
##	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:0.0000	3rd Qu.:0.0000
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :53	NA's :91	NA's :105	NA's :113
##	c286	c287	c288	c289
##	Min. :0.000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :0.241	Mean :0.2151	Mean :0.2559	Mean :0.3865
##	3rd Qu.:0.000	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :1.000	Max. :1.0000	Max. :1.0000	Max. :1.0000
##	NA's :22	NA's :31	NA's :32	NA's :40
##	c290	c292	c293	c294
##	Min. :0.0000	Min. :0.000	Min. : 1.00	Min. : 2.00
##	1st Qu.:0.0000	1st Qu.:0.000	1st Qu.: 24.00	1st Qu.: 25.50
##	Median :0.0000	Median :1.000	Median : 48.00	Median : 60.00
##	Mean :0.2907	Mean :1.019	Mean : 72.48	Mean : 72.85
##	3rd Qu.:1.0000	3rd Qu.:2.000	3rd Qu.: 96.00	3rd Qu.: 96.00
##	Max. :1.0000	Max. :2.000	Max. :720.00	Max. :720.00
##	NA's :31	NA's :63	NA's :120	NA's :167
##	c301	c302	c303	c304
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.0000
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :0.0000
##	Mean :0.1448	Mean :0.1046	Mean :0.2997	Mean :0.2787
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:1.0000	3rd Qu.:1.0000
##	Max. :3.0000	Max. :3.0000	Max. :1.0000	Max. :1.0000
##	NA's :52	NA's :14	NA's :4	NA's :5


```
##          c305          c306          c307          c308
## Min.    :0.0000   Min.    :0.00000   Min.    :0.0000   Min.    :0.0000
## 1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000   Median :0.00000   Median :0.0000   Median :0.0000
## Mean    :0.1209   Mean    :0.05658   Mean    :0.4852   Mean    :0.2839
## 3rd Qu.:0.0000   3rd Qu.:0.00000   3rd Qu.:0.0000   3rd Qu.:1.0000
## Max.    :1.0000   Max.    :1.00000   Max.    :5.0000   Max.    :1.0000
## NA's    :70      NA's    :91      NA's    :19      NA's    :2
##          c309          c318          c319          c320
## Min.    :0.0000   Min.    :0.0000   Min.    :0.0000   Min.    :0.00000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.00000
## Median :0.0000   Median :0.0000   Median :0.0000   Median :0.00000
## Mean    :0.1961   Mean    :0.2884   Mean    :0.1377   Mean    :0.03096
## 3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:0.00000
## Max.    :6.0000   Max.    :4.0000   Max.    :5.0000   Max.    :2.00000
## NA's    :23      NA's    :63      NA's    :79      NA's    :55
##          c321          painkill
## Min.    :0.00000   1:359
## 1st Qu.:0.00000   2:296
## Median :0.00000   8: 77
## Mean    :0.04626   9: 66
## 3rd Qu.:0.00000
## Max.    :5.00000
## NA's    :63
```

```
fin.outs <- outcome.missing.clean.25.25$data.out
rownames(fin.outs) <- as.character(fin.outs[,"CASEID"])
fin.outs <- fin.outs[,-c(which(colnames(fin.outs) == "CASEID"))]
fin.outs <- fin.outs[final.participants,]
dim(fin.outs)
```

```
## [1] 798 45
```

```
summary(fin.outs)
```

```
##          askhelp          notime          feelstre          feelemba
## Min.    :0.0000   Min.    :0.0000   Min.    :0.000   Min.    :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :1.000   Median :0.0000
## Mean    :0.5874   Mean    :0.8296   Mean    :1.122   Mean    :0.5583
## 3rd Qu.:1.0000   3rd Qu.:2.0000   3rd Qu.:2.000   3rd Qu.:1.0000
## Max.    :4.0000   Max.    :4.0000   Max.    :4.000   Max.    :4.0000
## NA's    :3      NA's    :1
##          feelangr          affects          afraid          dependen
## Min.    :0.0000   Min.    :0.000   Min.    :0.000   Min.    :0.00
## 1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:0.000   1st Qu.:1.00
## Median :0.0000   Median :0.000   Median :0.000   Median :3.00
## Mean    :0.6266   Mean    :0.495   Mean    :1.183   Mean    :2.34
## 3rd Qu.:1.0000   3rd Qu.:0.000   3rd Qu.:2.000   3rd Qu.:4.00
## Max.    :4.0000   Max.    :4.000   Max.    :4.000   Max.    :4.00
## NA's    :2      NA's    :4
##          strained          suffered          privacy          soclife
## Min.    :0.0000   Min.    :0.0000   Min.    :0.0000   Min.    :0.0000
## 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000   Median :0.0000   Median :0.0000   Median :0.0000
```

##	Mean	:0.9825	Mean	:0.6198	Mean	:0.3972	Mean	:0.6353
##	3rd Qu.	:2.0000	3rd Qu.	:1.0000	3rd Qu.	:0.0000	3rd Qu.	:1.0000
##	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000
##			NA's	:1				
##	friends		expect		expenses		unable	
##	Min.	:0.0000	Min.	:0.000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.	:0.0000	1st Qu.	:0.000	1st Qu.	:0.0000	1st Qu.	:0.0000
##	Median	:0.0000	Median	:1.000	Median	:0.0000	Median	:0.0000
##	Mean	:0.1566	Mean	:1.647	Mean	:0.3915	Mean	:0.4209
##	3rd Qu.	:0.0000	3rd Qu.	:4.000	3rd Qu.	:0.0000	3rd Qu.	:0.0000
##	Max.	:4.0000	Max.	:4.000	Max.	:4.0000	Max.	:4.0000
##			NA's	:5	NA's	:1	NA's	:2
##	lostctrl		leave		uncertai		doing	
##	Min.	:0.000	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000
##	1st Qu.	:0.000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000
##	Median	:0.000	Median	:0.0000	Median	:0.0000	Median	:0.0000
##	Mean	:0.441	Mean	:0.6403	Mean	:0.8643	Mean	:0.9774
##	3rd Qu.	:0.000	3rd Qu.	:1.0000	3rd Qu.	:2.0000	3rd Qu.	:2.0000
##	Max.	:4.000	Max.	:4.0000	Max.	:4.0000	Max.	:4.0000
##	NA's	:2	NA's	:3	NA's	:2		
##	better		burdened		zarscore		health1	
##	Min.	:0.0000	Min.	:0.00	Min.	:0.00	Min.	:1.000
##	1st Qu.	:0.0000	1st Qu.	:0.00	1st Qu.	:6.00	1st Qu.	:1.000
##	Median	:0.0000	Median	:1.00	Median	:14.00	Median	:2.000
##	Mean	:0.6085	Mean	:1.01	Mean	:17.52	Mean	:1.746
##	3rd Qu.	:1.0000	3rd Qu.	:2.00	3rd Qu.	:26.00	3rd Qu.	:2.000
##	Max.	:4.0000	Max.	:4.00	Max.	:79.00	Max.	:5.000
##	NA's	:1					NA's	:11
##	bother		poorapp		shake		good	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:3.000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:3.000
##	Mean	:0.3972	Mean	:0.1917	Mean	:0.3246	Mean	:2.639
##	3rd Qu.	:1.0000	3rd Qu.	:0.0000	3rd Qu.	:0.0000	3rd Qu.	:3.000
##	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000	Max.	:3.000
##							NA's	:3
##	mind		depressd		eveffort		hopeful	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:2.000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:3.000
##	Mean	:0.4298	Mean	:0.4311	Mean	:0.5639	Mean	:2.254
##	3rd Qu.	:1.0000	3rd Qu.	:1.0000	3rd Qu.	:1.0000	3rd Qu.	:3.000
##	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000	Max.	:3.000
##							NA's	:6
##	failure		fearful		restls		happy	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.000
##	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:0.0000	1st Qu.	:2.000
##	Median	:0.0000	Median	:0.0000	Median	:0.0000	Median	:3.000
##	Mean	:0.1543	Mean	:0.2773	Mean	:0.7764	Mean	:2.424
##	3rd Qu.	:0.0000	3rd Qu.	:0.0000	3rd Qu.	:1.0000	3rd Qu.	:3.000
##	Max.	:3.0000	Max.	:3.0000	Max.	:3.0000	Max.	:3.000
##	NA's	:1	NA's	:1	NA's	:2	NA's	:1
##	talkless		lonely		unfriend		enjoylif	
##	Min.	:0.0000	Min.	:0.0000	Min.	:0.0000	Min.	:0.000

```
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:2.000
## Median :0.0000 Median :0.0000 Median :0.0000 Median :3.000
## Mean :0.2651 Mean :0.4266 Mean :0.1041 Mean :2.504
## 3rd Qu.:0.0000 3rd Qu.:1.0000 3rd Qu.:0.0000 3rd Qu.:3.000
## Max. :3.0000 Max. :3.0000 Max. :3.0000 Max. :3.000
## NA's :2 NA's :1 NA's :1 NA's :1
## cryspell feltsad dislike getgoing
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000
## Mean :0.1967 Mean :0.5288 Mean :0.0892 Mean :0.5865
## 3rd Qu.:0.0000 3rd Qu.:1.0000 3rd Qu.:0.0000 3rd Qu.:1.0000
## Max. :3.0000 Max. :3.0000 Max. :3.0000 Max. :3.0000
##
## NA's :2
## cesscore
## Min. : 0.000
## 1st Qu.: 1.000
## Median : 5.000
## Mean : 7.899
## 3rd Qu.:12.000
## Max. :48.000
## NA's :4
```

```
head(final.participants)
```

```
## [1] "200004" "200005" "200008" "200032" "200086" "200113"
```

```
head(as.character(final.participants))
```

```
## [1] "200004" "200005" "200008" "200032" "200086" "200113"
```

```
head(CSHA.1991.zarit_disorders_design[, "CASEID"])
```

```
## [1] 200004 200005 200008 200032 200086 200113
```

```
head(rownames(CSHA.1991.zarit_disorders_design))
```

```
## [1] "200004" "200005" "200008" "200032" "200086" "200113"
```

```
#rownames(CSHA.1991.zarit_disorders_design) <- CSHA.1991.zarit_disorders_design[, "CASEID"]
fin.des <- CSHA.1991.zarit_disorders_design[as.character(final.participants), 2:6]
dim(fin.des)
```

```
## [1] 798 5
```

```
head(fin.des)
```

```
##          DEMENTIA ALZ PD STROKE FIN.DX
## 200004 INS.CASE CASE NO DNK PROB.ALZ
## 200005 INS.CASE N/A NO YES POSS.ALZ
## 200008 COMM.CASE N/A NO NO POSS.ALZ
## 200032 INS.CASE N/A NO NO POSS.ALZ
## 200086 INS.CASE N/A DNK DNK POSS.ALZ
## 200113 INS.CASE N/A YES MISSING OTHER.DEM
```

```
fin.des.nom <- makeNominalData(fin.des)
```

```
dim(fin.des.nom)
```

```
## [1] 798 18
```

```
colSums(fin.des.nom)
```

```
## DEMENTIA.INS.CASE DEMENTIA.COMM.CASE ALZ.CASE
##          495          303          307
##          ALZ.N/A          ALZ.MISSING          PD.NO
##          444          47          590
##          PD.DNK          PD.YES          PD.MISSING
##          25          44          139
##          STROKE.DNK          STROKE.YES          STROKE.NO
##          44          216          421
##          STROKE.MISSING FIN.DX.PROB.ALZ FIN.DX.POSS.ALZ
##          117          329          202
##          FIN.DX.OTHER.DEM          FIN.DX.VDEM FIN.DX.UNCLASS.DEM
##          51          154          62
```

```
## FIN REORDERING
```

```
fin.des <- fin.des[rownames(fin.des),]
head(fin.des)
```

```
##          DEMENTIA ALZ PD STROKE FIN.DX
## 200004 INS.CASE CASE NO DNK PROB.ALZ
## 200005 INS.CASE N/A NO YES POSS.ALZ
## 200008 COMM.CASE N/A NO NO POSS.ALZ
## 200032 INS.CASE N/A NO NO POSS.ALZ
## 200086 INS.CASE N/A DNK DNK POSS.ALZ
## 200113 INS.CASE N/A YES MISSING OTHER.DEM
```

```
fin.des.nom <- fin.des.nom[rownames(fin.des),]
head(fin.des.nom)
```

```
##          DEMENTIA.INS.CASE DEMENTIA.COMM.CASE ALZ.CASE ALZ.N/A ALZ.MISSING
## 200004          1          0          1          0          0
## 200005          1          0          0          1          0
## 200008          0          1          0          1          0
## 200032          1          0          0          1          0
## 200086          1          0          0          1          0
## 200113          1          0          0          1          0
##          PD.NO PD.DNK PD.YES PD.MISSING STROKE.DNK STROKE.YES STROKE.NO
## 200004          1          0          0          0          1          0          0
## 200005          1          0          0          0          0          1          0
## 200008          1          0          0          0          0          0          1
## 200032          1          0          0          0          0          0          1
## 200086          0          1          0          0          1          0          0
## 200113          0          0          1          0          0          0          0
##          STROKE.MISSING FIN.DX.PROB.ALZ FIN.DX.POSS.ALZ FIN.DX.OTHER.DEM
## 200004          0          1          0          0
## 200005          0          0          1          0
## 200008          0          0          1          0
## 200032          0          0          1          0
## 200086          0          0          1          0
## 200113          1          0          0          1
##          FIN.DX.VDEM FIN.DX.UNCLASS.DEM
## 200004          0          0
## 200005          0          0
## 200008          0          0
## 200032          0          0
```

```
## 200086      0      0
## 200113      0      0

fin.preds <- fin.preds[rownames(fin.des),]
head(fin.preds)[,1:5]
```

```
##      studysex clinage studied cgsex cgage
## 200004      2      85      10      1      64
## 200005      2      83      12      2      49
## 200008      2      90      15      2      64
## 200032      2      80       5      2      53
## 200086      1      84      16      2      51
## 200113      1      84      17      2      74
```

```
fin.outs <- fin.outs[rownames(fin.des),]
head(fin.outs)[,1:5]
```

```
##      askhelp notime feelstre feelemba feelangr
## 200004      0      3      3      0      0
## 200005      0      3      3      0      0
## 200008      1      2      3      2      2
## 200032      0      0      4      4      0
## 200086      0      0      0      0      0
## 200113      0      0      0      0      0
```

```
save(fin.des,file='./Final/fin.des.rda')
save(fin.des.nom,file='./Final/fin.des.nom.rda')
save(fin.preds,file='./Final/fin.preds.rda')
save(fin.outs,file='./Final/fin.outs.rda')
```