Caregiver burden data preparation

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May 14, 2017

```
## 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, intead 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 neuropsychogical 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
```

```r
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
```

```r
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.

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

```r
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", "tokentes", "verbal", "animal", "buschke",
    "visualn", "tokencol", "waisbloc", "digit", "popsize",
    "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",
```

```r
    "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")
```

```r
## variables that exist somewhere between predictors and
## additional variables of interest dementia
dementia <- c("shorterm", "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")]
```

```r
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
```

```r
dim(full.predictors)
```

```
## [1] 851 332
```

```r
dim(full.outcomes)  # we may want to reduce it a bit.
```

```
## [1] 851  47
```

```r
#"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

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

  final.predictors$edulevel[final.predictors$edulevel==5] <- "HS"
```

```r
    final.predictors$edulevel[final.predictors$edulevel==6 | final.predictors$edulevel==7 | final.predict

    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$cgedlev==2 | final.predictors$cg

final.predictors$cgedlev[final.predictors$cgedlev==5] <- "HS"

final.predictors$cgedlev[final.predictors$cgedlev==6 | final.predictors$cgedlev==7 | final.predictors$cg

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, eduyear, 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", "popsize",
```

```r
    "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("studyed", "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", "tokentes",
    "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")
```

```r
## 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          studyed          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         addement          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
```

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##    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
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##    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             reyb1
##  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
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##    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         tokentes         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            popsize          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
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##   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
```

21

```
##   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", "cesscore")

###
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.   :0.000
##  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   :0.5424   Mean   :0.6087   Mean   :0.4712   Mean   :1.154
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:2.000
##  Max.   :4.0000   Max.   :4.0000   Max.   :4.0000   Max.   :4.000
##  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          health2          bother           poorapp
## Min.   :1.000    Min.   :1.000    Min.   :0.0000   Min.   :0.0000
## 1st Qu.:1.000    1st Qu.:2.000    1st Qu.:0.0000   1st Qu.:0.0000
## Median :2.000    Median :2.000    Median :0.0000   Median :0.0000
## Mean   :1.755    Mean   :1.969    Mean   :0.3908   Mean   :0.1936
## 3rd Qu.:2.000    3rd Qu.:2.000    3rd Qu.:1.0000   3rd Qu.:0.0000
## Max.   :5.000    Max.   :3.000    Max.   :3.0000   Max.   :3.0000
## NA's   :11       NA's   :11       NA's   :4        NA's   :4
##     shake            good             mind             depressd
## Min.   :0.0000   Min.   :0.000    Min.   :0.0000   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:3.000    1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000   Median :3.000    Median :0.0000   Median :0.0000
## Mean   :0.3306   Mean   :2.641    Mean   :0.4286   Mean   :0.4262
## 3rd Qu.:0.0000   3rd Qu.:3.000    3rd Qu.:1.0000   3rd Qu.:1.0000
## Max.   :3.0000   Max.   :3.000    Max.   :3.0000   Max.   :3.0000
## NA's   :4        NA's   :7        NA's   :4        NA's   :4
##     eveffort         hopeful          failure          fearful
## Min.   :0.0000   Min.   :0.000    Min.   :0.000    Min.   :0.000
## 1st Qu.:0.0000   1st Qu.:2.000    1st Qu.:0.000    1st Qu.:0.000
## Median :0.0000   Median :3.000    Median :0.000    Median :0.000
## Mean   :0.5596   Mean   :2.248    Mean   :0.154    Mean   :0.282
## 3rd Qu.:1.0000   3rd Qu.:3.000    3rd Qu.:0.000    3rd Qu.:0.000
## Max.   :3.0000   Max.   :3.000    Max.   :3.000    Max.   :3.000
## NA's   :4        NA's   :12       NA's   :7        NA's   :7
##     restls           happy            talkless          lonely
## Min.   :0.0000   Min.   :0.000    Min.   :0.0000   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:2.000    1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000   Median :3.000    Median :0.0000   Median :0.0000
## Mean   :0.7794   Mean   :2.421    Mean   :0.2645   Mean   :0.4171
## 3rd Qu.:1.0000   3rd Qu.:3.000    3rd Qu.:0.0000   3rd Qu.:1.0000
## Max.   :3.0000   Max.   :3.000    Max.   :3.0000   Max.   :3.0000
## NA's   :8        NA's   :7        NA's   :8        NA's   :7
##     unfriend         enjoylif         cryspell          feltsad
## Min.   :0.0000   Min.   :0.0      Min.   :0.0      Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:2.0      1st Qu.:0.0      1st Qu.:0.0000
## Median :0.0000   Median :3.0      Median :0.0      Median :0.0000
```

```
##  Mean   :0.1031   Mean   :2.5   Mean   :0.2   Mean   :0.5314
##  3rd Qu.:0.0000   3rd Qu.:3.0   3rd Qu.:0.0   3rd Qu.:1.0000
##  Max.   :3.0000   Max.   :3.0   Max.   :3.0   Max.   :3.0000
##  NA's   :7         NA's   :7     NA's   :6     NA's   :6
##      dislike         getgoing         cesscore
##  Min.   :0.0000   Min.   :0.0000   Min.   : 0.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 1.000
##  Median :0.0000   Median :0.0000   Median : 5.000
##  Mean   :0.0866   Mean   :0.5893   Mean   : 7.912
##  3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:12.000
##  Max.   :3.0000   Max.   :3.0000   Max.   :48.000
##  NA's   :8         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 relavent = 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,iters=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,iter
```

```
## [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,iters=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,iter
```

```
## [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,iter
```

```
## [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
```

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

```r
dim(full.outcomes.NAs)
```

[1] 851 47

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

[1] 845 47

```r
dim(full.predictors.NAs)
```

[1] 851 332

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

[1] 797 124

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

[1] 803 147

```r
#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"
```

```r
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"  "health2"  "bother"   "poorapp"  "shake"    "good"
## [31] "mind"     "depressd" "eveffort" "hopeful"  "failure"  "fearful"
## [37] "restls"   "happy"    "talkless" "lonely"   "unfriend" "enjoylif"
## [43] "cryspell" "feltsad"  "dislike"  "getgoing" "cesscore"
```

```r
dim(predictors.missing.clean.25.25$data.out[,c("CASEID","studysex", "clinage", "studyed", "cgsex", "cgag
```

```
## [1] 803  94
```

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

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

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

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

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

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

```r
  ## 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")],predicto

  ## I need to add painkill.
fin.preds <- predictors.missing.clean.25.25$data.out[,c("CASEID","studysex", "clinage", "studyed", "cgs
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
```

```r
summary(fin.preds)
```

```
##     studysex         clinage         studyed          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
```

```r
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  46
```

```r
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
##    health2          bother            poorapp           shake
## Min.   :1.000     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 :2.000     Median :0.0000   Median :0.0000    Median :0.0000
## Mean   :1.968     Mean   :0.3972   Mean   :0.1917    Mean   :0.3246
## 3rd Qu.:2.000     3rd Qu.:1.0000   3rd Qu.:0.0000    3rd Qu.:0.0000
## Max.   :3.000     Max.   :3.0000   Max.   :3.0000    Max.   :3.0000
## NA's   :11
##    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   :2.639     Mean   :0.4298   Mean   :0.4311    Mean   :0.5639
## 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   :3
##    hopeful          failure           fearful           restls
## 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   :2.254     Mean   :0.1543   Mean   :0.2773    Mean   :0.7764
## 3rd Qu.:3.000     3rd Qu.:0.0000   3rd Qu.:0.0000    3rd Qu.:1.0000
## Max.   :3.000     Max.   :3.0000   Max.   :3.0000    Max.   :3.0000
## NA's   :6         NA's   :1        NA's   :1         NA's   :2
##    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   :2.424   Mean   :0.2651   Mean   :0.4266   Mean   :0.1041
##  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   :1       NA's   :2        NA's   :1        NA's   :1
##     enjoylif        cryspell         feltsad          dislike
##  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   :2.504   Mean   :0.1967   Mean   :0.5288   Mean   :0.0892
##  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   :1                                         NA's   :2
##     getgoing        cesscore
##  Min.   :0.0000   Min.   : 0.000
##  1st Qu.:0.0000   1st Qu.: 1.000
##  Median :0.0000   Median : 5.000
##  Mean   :0.5865   Mean   : 7.899
##  3rd Qu.:1.0000   3rd Qu.:12.000
##  Max.   :3.0000   Max.   :48.000
##                   NA's   :4
```

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

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

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

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

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

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

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

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

```r
#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
```

```r
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
```

```r
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 studyed 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')
```