# Caregiver burden data preparation

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## 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
```

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

```
##        DEMENTIA.INS.CASE DEMENTIA.COMM.CASE ALZ.CASE ALZ.N/A ALZ.MISSING
## 200004                 1                  0        1       0           0
## 200005                 1                  0        0       1           0
## 200008                 0                  1        0       1           0
## 200032                 1                  0        0       1           0
## 200086                 1                  0        0       1           0
## 200113                 1                  0        0       1           0
##        PD.NO PD.DNK PD.YES PD.MISSING STROKE.DNK STROKE.YES STROKE.NO
## 200004     1      0      0          0          1          0         0
## 200005     1      0      0          0          0          1         0
## 200008     1      0      0          0          0          0         1
## 200032     1      0      0          0          0          0         1
## 200086     0      1      0          0          1          0         0
## 200113     0      0      1          0          0          0         0
```

```
##        STROKE.MISSING FIN.DX.PROB.ALZ FIN.DX.POSS.ALZ FIN.DX.OTHER.DEM
## 200004              0               1               0                 0
## 200005              0               0               1                 0
## 200008              0               0               1                 0
## 200032              0               0               1                 0
## 200086              0               0               1                 0
## 200113              1               0               0                 1
##        FIN.DX.VDEM FIN.DX.UNCLASS.DEM
## 200004           0                  0
## 200005           0                  0
## 200008           0                  0
## 200032           0                  0
## 200086           0                  0
## 200113           0                  0
```

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

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

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

```
## predictors demographics
demographics <- c("studysex", "agestrat", "studyage", "clinage",
    "studyed", "eduyear", "edulevel", "region", "race",
    "ethnic1", "ethnic2", "wbocc", "working", "institut")
### caregiver demographics
cg.demographics <- c("relat", "cgsex", "cgage", "cgeth1",
    "cgeth2", "cgedyrs", "cgedlev")
### cognition
cognition <- c("langabil", "mmms", "score3ms")
### behavioral disturbance
beh.disturb <- c("apathy", "wander", "violenc", "disinhi",
    "otherbe")


### full neuropsych neuropsych batteries
neuropsych <- c("neurdone", "languagn", "doi", "occup",
    "materlan", "difficul", "othrcomn", "psyid", "clinic",
    "training", "experien", "coopern", "facility", "fatigabi",
    "inattn", "affectn", "articul", "tension", "appearn",
    "reaction", "effort", "express", "memoryn", "restless",
    "insight", "gaitn", "agitat", "persever", "impulsiv",
    "socialn", "tangent", "comprehe", "confusi", "latency",
    "rulev", "tolerate", "visionn", "hearingn", "physical",
```

```
    "gaitdiso", "tremdiso", "dyskdiso", "psycdiso", "slowdiso",
    "hearaid", "glasses", "wheel", "wechsler", "buschfr1",
    "buschcr1", "buschtr1", "buschfr2", "buschcr2", "buschtr2",
    "buschfr3", "buschcr3", "buschtr3", "buschfr", "buschcr",
    "buschtr", "delaytim", "reya1", "reya2", "reya3", "reya4",
    "reya5", "reya6", "reyb1", "trueposi", "truenega", "correct",
    "benmirro", "digitspa", "lag1", "lag2", "waisimil",
    "waisjudg", "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",
    "effort", "express", "memoryn", "restless", "insight",
    "gaitn", "agitat", "persever", "impulsiv", "socialn",
    "tangent", "comprehe", "confusi", "latency", "rulev",
    "tolerate", "visionn", "hearingn", "physical", "hearaid",
    "glasses", "wheel")
#### neuropsych: movement disorders
np.move_disorder <- c("gaitdiso", "tremdiso", "dyskdiso",
    "psycdiso", "slowdiso")
#### neuropsych: memory, fluency, etc...
np.battery <- c("wechsler", "buschfr1", "buschcr1", "buschtr1",
    "buschfr2", "buschcr2", "buschtr2", "buschfr3", "buschcr3",
    "buschtr3", "buschfr", "buschcr", "buschtr", "delaytim",
    "reya1", "reya2", "reya3", "reya4", "reya5", "reya6",
    "reyb1", "trueposi", "truenega", "correct", "benmirro",
    "digitspa", "lag1", "lag2", "waisimil", "waisjudg",
    "tokentes", "verbal", "animal", "buschke", "visualn",
    "tokencol", "waisbloc", "digit")
#### neuropsych: impairments & diagnoses
```

```
np.impair_diagnoses <- c("nshorter", "nlongter", "nverbal",
    "njudgeme", "naphasia", "napraxia", "nagnosia", "nconstru",
    "ndisturb", "delirium", "majordep", "diagdeme", "profile",
    "corticr", "corticl", "subcort", "cnocoglo", "ccogloss",
    "cad", "cvasdem", "cother", "cunclass", "daily", "ndiag",
    "severity", "shrtlosn", "longlosn")
#### neuropsych: personality
np.personality <- c("c238", "c239", "c240", "c241", "c242",
    "c243", "c244", "c245", "c246")
#### neuropsych: memory
np.memory <- c("c247", "c248", "c249", "c250", "c251", "c252",
    "c253", "c253am", "c253ay")
#### neuropsych: general function
np.gen_func <- c("c253bm", "c253by", "c254", "c255", "c256",
    "c257", "c258", "c259", "c260", "c261", "c262")
#### neuropsych: every day activities
np.everyday <- c("c263", "c264", "c265", "c266", "c267",
    "c268", "c269")
#### neuropsych: delerium
np.delerium <- c("c270", "c271", "c272", "c273", "c274")
#### neuropsych: depression
np.depress <- c("c275", "c276", "c277", "c278", "c279")
#### neuropsych: sleep
np.sleep <- c("c280", "c281", "c282", "c283", "c284", "c285")
#### neuropsych: paranoia
np.paranoia <- c("c286", "c286a", "c287", "c287a")
#### neuropsych: cardiovascular
np.cv <- c("c288", "c289", "c290", "c291")
#### neuropsych: summary
np.gen_sum <- c("c292", "c293", "c294")
#### neuropsych: past medical history
np.history <- c("c295", "c296", "c297", "c298", "c299",
    "c300", "c301", "c302", "c303", "c304", "c305", "c306",
    "c307", "c308", "c309", "c310")



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

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

dim(targeted.predictors)
```

```
## [1] 851  70
```

```
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.predictor

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

  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",
    "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")

## 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
##  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
```

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##  NA's   :545     NA's   :547     NA's   :545     NA's   :546
##      effort          express          memoryn          restless
##  Min.   :1.000   Min.   :1.000   Min.   :1.000   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:1.000   1st Qu.:2.000   1st Qu.:1.000
##  Median :2.000   Median :2.000   Median :2.000   Median :1.000
##  Mean   :2.114   Mean   :1.734   Mean   :2.426   Mean   :1.541
##  3rd Qu.:3.000   3rd Qu.:2.000   3rd Qu.:3.000   3rd Qu.:2.000
##  Max.   :5.000   Max.   :4.000   Max.   :5.000   Max.   :5.000
##  NA's   :545     NA's   :550     NA's   :548     NA's   :546
##     insight           gaitn           agitat          persever
##  Min.   :1.000   Min.   :1.000   Min.   :1.000   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000
##  Median :2.000   Median :2.000   Median :1.000   Median :1.000
##  Mean   :2.031   Mean   :2.413   Mean   :1.406   Mean   :1.721
##  3rd Qu.:3.000   3rd Qu.:3.000   3rd Qu.:2.000   3rd Qu.:2.000
##  Max.   :5.000   Max.   :5.000   Max.   :5.000   Max.   :5.000
##  NA's   :557     NA's   :609     NA's   :600     NA's   :546
##     impulsiv        socialn         tangent          comprehe
##  Min.   :1.000   Min.   :1.00   Min.   :1.000   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:1.00   1st Qu.:1.000   1st Qu.:1.000
##  Median :1.000   Median :1.00   Median :1.000   Median :2.000
##  Mean   :1.243   Mean   :1.23   Mean   :1.607   Mean   :2.188
##  3rd Qu.:1.000   3rd Qu.:1.00   3rd Qu.:2.000   3rd Qu.:3.000
##  Max.   :4.000   Max.   :5.00   Max.   :5.000   Max.   :5.000
##  NA's   :546     NA's   :546    NA's   :546     NA's   :547
##     confusi         latency          rulev           tolerate
##  Min.   :1.000   Min.   :1.000   Min.   :1.000   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000
##  Median :1.000   Median :1.000   Median :1.000   Median :2.000
##  Mean   :1.681   Mean   :1.661   Mean   :1.503   Mean   :1.921
##  3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.000
##  Max.   :5.000   Max.   :5.000   Max.   :5.000   Max.   :5.000
##  NA's   :550     NA's   :547     NA's   :551     NA's   :558
##     visionn         hearingn        physical        gaitdiso
##  Min.   :1.000   Min.   :1.000   Min.   :1.000   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000
##  Median :1.000   Median :1.000   Median :1.000   Median :1.000
##  Mean   :1.668   Mean   :1.881   Mean   :1.602   Mean   :1.457
##  3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.000
##  Max.   :5.000   Max.   :5.000   Max.   :5.000   Max.   :2.000
##  NA's   :547     NA's   :549     NA's   :592     NA's   :687
##     tremdiso        dyskdiso       psycdiso      slowdiso
##  Min.   :1.000   Min.   :1.00   Min.   :1.0   Min.   :1.000
##  1st Qu.:1.000   1st Qu.:2.00   1st Qu.:2.0   1st Qu.:2.000
##  Median :2.000   Median :2.00   Median :2.0   Median :2.000
##  Mean   :1.713   Mean   :1.91   Mean   :1.9   Mean   :1.754
##  3rd Qu.:2.000   3rd Qu.:2.00   3rd Qu.:2.0   3rd Qu.:2.000
##  Max.   :2.000   Max.   :2.00   Max.   :2.0   Max.   :2.000
##  NA's   :663     NA's   :673    NA's   :671   NA's   :668
##     hearaid         glasses          wheel           wechsler
##  Min.   :1.000   Min.   :1.000   Min.   :1.000   Min.   :0.000
##  1st Qu.:2.000   1st Qu.:1.000   1st Qu.:2.000   1st Qu.:1.000
##  Median :2.000   Median :1.000   Median :2.000   Median :2.000
##  Mean   :1.865   Mean   :1.222   Mean   :1.816   Mean   :2.575
```

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##  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
##  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
##  Median :1.000   Median :3.000   Median :3.000   Median :2.000
##  Mean   :1.239   Mean   :2.664   Mean   :3.219   Mean   :1.997
##  3rd Qu.:1.000   3rd Qu.:4.000   3rd Qu.:4.000   3rd Qu.:2.000
##  Max.   :5.000   Max.   :5.000   Max.   :5.000   Max.   :2.000
##  NA's   :558     NA's   :565     NA's   :559     NA's   :558
##     majordep       diagdeme        profile          corticr        corticl
##  Min.   :2     Min.   :1.00   Min.   :1.000   Min.   :0.0   Min.   :0.00
##  1st Qu.:2     1st Qu.:1.00   1st Qu.:3.000   1st Qu.:1.0   1st Qu.:0.00
##  Median :2     Median :1.00   Median :3.000   Median :2.0   Median :2.00
##  Mean   :2     Mean   :1.21   Mean   :4.238   Mean   :1.5   Mean   :1.31
##  3rd Qu.:2     3rd Qu.:1.00   3rd Qu.:6.000   3rd Qu.:2.0   3rd Qu.:2.00
##  Max.   :2     Max.   :2.00   Max.   :6.000   Max.   :3.0   Max.   :3.00
##  NA's   :562   NA's   :575    NA's   :679     NA's   :811   NA's   :809
##     subcort          cnocoglo       ccogloss          cad
```

```
##  Min.   :1.000   Min.   :12    Min.   :11.00   Min.   :11.00
##  1st Qu.:1.000   1st Qu.:12    1st Qu.:12.00   1st Qu.:12.00
##  Median :1.000   Median :12    Median :13.00   Median :13.00
##  Mean   :1.394   Mean   :12    Mean   :15.87   Mean   :14.33
##  3rd Qu.:2.000   3rd Qu.:12    3rd Qu.:21.50   3rd Qu.:13.00
##  Max.   :2.000   Max.   :12    Max.   :24.00   Max.   :23.00
##  NA's   :818     NA's   :850   NA's   :812     NA's   :692
##     cvasdem          cother         cunclass         daily
##  Min.   :11.00   Min.   :12.00   Min.   :11.00   Min.   :1.000
##  1st Qu.:12.00   1st Qu.:12.00   1st Qu.:12.00   1st Qu.:2.000
##  Median :12.00   Median :13.00   Median :12.00   Median :3.000
##  Mean   :13.93   Mean   :14.44   Mean   :13.11   Mean   :2.533
##  3rd Qu.:13.00   3rd Qu.:13.75   3rd Qu.:13.00   3rd Qu.:3.000
##  Max.   :23.00   Max.   :22.00   Max.   :22.00   Max.   :4.000
##  NA's   :807     NA's   :833     NA's   :807     NA's   :566
##      ndiag         severity        shrtlosn      longlosn
##  Min.   :100   Min.   :1.000   Min.   :1     Min.   :0.0000
##  1st Qu.:401   1st Qu.:1.000   1st Qu.:1     1st Qu.:1.0000
##  Median :701   Median :2.000   Median :1     Median :1.0000
##  Mean   :579   Mean   :1.637   Mean   :1     Mean   :0.8472
##  3rd Qu.:701   3rd Qu.:2.000   3rd Qu.:1     3rd Qu.:1.0000
##  Max.   :703   Max.   :3.000   Max.   :1     Max.   :1.0000
##                NA's   :683     NA's   :685   NA's   :707
##     clanguag        cdofint           cintid            c235
##  Min.   :1.000   Min.   : 10591   Min.   :  1.00   Min.   :1.000
##  1st Qu.:1.000   1st Qu.: 80891   1st Qu.:  8.00   1st Qu.:1.000
##  Median :1.000   Median :160591   Median : 13.00   Median :1.000
##  Mean   :1.189   Mean   :158885   Mean   : 26.05   Mean   :1.439
##  3rd Qu.:1.000   3rd Qu.:240192   3rd Qu.: 26.00   3rd Qu.:2.000
##  Max.   :2.000   Max.   :311091   Max.   :204.00   Max.   :2.000
##                  NA's   :5        NA's   :225      NA's   :10
##       c236            c236a             c237            c238
##  Min.   :1.000   Min.   :0.0000   Min.   :1.000   Min.   :0.0000
##  1st Qu.:3.000   1st Qu.:0.0000   1st Qu.:2.000   1st Qu.:0.0000
##  Median :4.000   Median :0.0000   Median :3.000   Median :1.0000
##  Mean   :3.921   Mean   :0.2615   Mean   :2.886   Mean   :0.6679
##  3rd Qu.:4.000   3rd Qu.:1.0000   3rd Qu.:4.000   3rd Qu.:1.0000
##  Max.   :8.000   Max.   :1.0000   Max.   :8.000   Max.   :1.0000
##  NA's   :14      NA's   :461      NA's   :11      NA's   :11
##       c239             c240             c241             c242
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median :1.0000   Median :0.0000
##  Mean   :0.3558   Mean   :0.4606   Mean   :0.8177   Mean   :0.7365
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:2.0000   3rd Qu.:2.0000
##  Max.   :1.0000   Max.   :1.0000   Max.   :2.0000   Max.   :2.0000
##  NA's   :22       NA's   :26       NA's   :17       NA's   :39
##       c243             c244             c245             c246
##  Min.   :0.0000   Min.   :0.0000   Min.   :  1.00   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 18.00   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median : 36.00   Median :0.0000
##  Mean   :0.2122   Mean   :0.8007   Mean   : 51.12   Mean   :0.2049
##  3rd Qu.:0.0000   3rd Qu.:2.0000   3rd Qu.: 60.00   3rd Qu.:0.0000
##  Max.   :1.0000   Max.   :2.0000   Max.   :696.00   Max.   :1.0000
```

```
##  NA's   :78       NA's   :23       NA's   :188      NA's   :197
##       c247             c248             c249             c250
##  Min.   :0.000   Min.   :0.000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:1.000   1st Qu.:1.000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :2.000   Median :2.000   Median :1.0000   Median :0.0000
##  Mean   :1.525   Mean   :1.448   Mean   :0.8774   Mean   :0.6504
##  3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.0000   3rd Qu.:2.0000
##  Max.   :2.000   Max.   :2.000   Max.   :2.0000   Max.   :2.0000
##  NA's   :70      NA's   :29      NA's   :27       NA's   :156
##       c251             c252             c253            c253am
##  Min.   :0.00   Min.   :  1.00   Min.   :0.0000   Min.   : 1.00
##  1st Qu.:0.00   1st Qu.: 18.00   1st Qu.:0.0000   1st Qu.: 4.00
##  Median :1.00   Median : 36.00   Median :0.0000   Median : 6.00
##  Mean   :1.02   Mean   : 44.72   Mean   :0.1651   Mean   : 6.61
##  3rd Qu.:2.00   3rd Qu.: 60.00   3rd Qu.:0.0000   3rd Qu.:10.00
##  Max.   :2.00   Max.   :696.00   Max.   :1.0000   Max.   :12.00
##  NA's   :342    NA's   :96       NA's   :124      NA's   :774
##      c253ay           c253bm           c253by           c254
##  Min.   :43.00   Min.   : 1.000   Min.   :43.00   Min.   :0.0000
##  1st Qu.:85.00   1st Qu.: 4.000   1st Qu.:84.25   1st Qu.:1.0000
##  Median :87.00   Median : 7.000   Median :88.00   Median :1.0000
##  Mean   :86.09   Mean   : 6.907   Mean   :85.77   Mean   :0.8022
##  3rd Qu.:89.00   3rd Qu.:10.000   3rd Qu.:90.00   3rd Qu.:1.0000
##  Max.   :91.00   Max.   :12.000   Max.   :92.00   Max.   :1.0000
##  NA's   :608     NA's   :797      NA's   :689     NA's   :17
##       c255             c256             c257             c258
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:1.000
##  Median :1.0000   Median :0.0000   Median :1.0000   Median :1.000
##  Mean   :0.9044   Mean   :0.4726   Mean   :0.6548   Mean   :0.756
##  3rd Qu.:2.0000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.000
##  Max.   :2.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.000
##  NA's   :87       NA's   :66       NA's   :179      NA's   :56
##       c259             c260             c261             c262
##  Min.   :0.000   Min.   :  1.00   Min.   :0.000   Min.   :0.0000
##  1st Qu.:1.000   1st Qu.: 18.00   1st Qu.:0.000   1st Qu.:0.0000
##  Median :1.000   Median : 36.00   Median :0.000   Median :0.0000
##  Mean   :0.759   Mean   : 44.79   Mean   :0.169   Mean   :0.2786
##  3rd Qu.:1.000   3rd Qu.: 60.00   3rd Qu.:0.000   3rd Qu.:1.0000
##  Max.   :1.000   Max.   :696.00   Max.   :1.000   Max.   :1.0000
##  NA's   :42      NA's   :77       NA's   :76      NA's   :126
##       c263             c264             c265             c266
##  Min.   :0.000   Min.   :0.000   Min.   :0.000   Min.   :0.000
##  1st Qu.:0.000   1st Qu.:0.000   1st Qu.:0.000   1st Qu.:0.000
##  Median :2.000   Median :2.000   Median :0.000   Median :2.000
##  Mean   :1.184   Mean   :1.241   Mean   :1.598   Mean   :2.987
##  3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:2.000   3rd Qu.:6.000
##  Max.   :2.000   Max.   :2.000   Max.   :6.000   Max.   :6.000
##  NA's   :176     NA's   :180     NA's   :15      NA's   :26
##       c267             c268             c269             c270
##  Min.   :0.000   Min.   :  1.00   Min.   :0.0000   Min.   :0.000
##  1st Qu.:0.000   1st Qu.: 12.00   1st Qu.:0.0000   1st Qu.:0.000
##  Median :2.000   Median : 24.00   Median :0.0000   Median :0.000
##  Mean   :2.732   Mean   : 37.65   Mean   :0.2075   Mean   :0.361
```

```
##  3rd Qu.:6.000   3rd Qu.: 48.00   3rd Qu.:0.0000   3rd Qu.:1.000
##  Max.   :6.000   Max.   :504.00   Max.   :1.0000   Max.   :1.000
##  NA's   :34      NA's   :199      NA's   :210      NA's   :31
##       c271             c272             c273             c274
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :  1.00
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 12.00
##  Median :1.0000   Median :1.0000   Median :0.0000   Median : 24.00
##  Mean   :0.5461   Mean   :0.7074   Mean   :0.3955   Mean   : 35.07
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.: 48.00
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :696.00
##  NA's   :569      NA's   :581      NA's   :631      NA's   :555
##       c275             c276             c277             c278
##  Min.   :0.0000   Min.   :0.00000   Min.   :0.0000   Min.   :  1.00
##  1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.0000   1st Qu.: 12.00
##  Median :1.0000   Median :0.00000   Median :0.0000   Median : 30.00
##  Mean   :0.5785   Mean   :0.07519   Mean   :0.4138   Mean   : 52.15
##  3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.: 60.00
##  Max.   :1.0000   Max.   :1.00000   Max.   :1.0000   Max.   :720.00
##  NA's   :42       NA's   :53        NA's   :51       NA's   :382
##       c279             c280             c281             c282
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median :0.0000   Median :0.0000
##  Mean   :0.1932   Mean   :0.2146   Mean   :0.3024   Mean   :0.1868
##  3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:0.0000
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
##  NA's   :380      NA's   :68       NA's   :107      NA's   :123
##       c283             c284             c285             c286
##  Min.   :0.0000   Min.   :  1.00   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.: 12.00   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median : 24.00   Median :0.0000   Median :0.0000
##  Mean   :0.1752   Mean   : 49.55   Mean   :0.1472   Mean   :0.2337
##  3rd Qu.:0.0000   3rd Qu.: 48.00   3rd Qu.:0.0000   3rd Qu.:0.0000
##  Max.   :1.0000   Max.   :600.00   Max.   :1.0000   Max.   :1.0000
##  NA's   :132      NA's   :584      NA's   :586      NA's   :38
##      c286a            c287            c287a            c288
##  Min.   :  1.00   Min.   :0.0000   Min.   :  1.00   Min.   :0.0000
##  1st Qu.: 12.00   1st Qu.:0.0000   1st Qu.:  9.00   1st Qu.:0.0000
##  Median : 25.00   Median :0.0000   Median : 24.00   Median :0.0000
##  Mean   : 51.79   Mean   :0.2142   Mean   : 42.97   Mean   :0.2553
##  3rd Qu.: 60.00   3rd Qu.:0.0000   3rd Qu.: 48.00   3rd Qu.:1.0000
##  Max.   :648.00   Max.   :1.0000   Max.   :696.00   Max.   :1.0000
##  NA's   :682      NA's   :48       NA's   :698      NA's   :44
##       c289             c290             c291             c292
##  Min.   :0.0000   Min.   :0.0000   Min.   :  1.00   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 18.00   1st Qu.:0.000
##  Median :0.0000   Median :0.0000   Median : 36.00   Median :1.000
##  Mean   :0.3852   Mean   :0.2989   Mean   : 65.66   Mean   :1.041
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.: 78.00   3rd Qu.:2.000
##  Max.   :1.0000   Max.   :1.0000   Max.   :600.00   Max.   :2.000
##  NA's   :54       NA's   :38       NA's   :407      NA's   :76
##       c293             c294             c295             c296
##  Min.   :  1.00   Min.   :  2.00   Min.   :0.0000   Min.   :0.0000
##  1st Qu.: 24.00   1st Qu.: 25.75   1st Qu.:0.0000   1st Qu.:0.0000
```

```
##  Median : 48.00   Median : 60.00   Median :0.0000   Median :0.0000
##  Mean   : 72.18   Mean   : 73.26   Mean   :0.4119   Mean   :0.1693
##  3rd Qu.: 96.00   3rd Qu.: 96.00   3rd Qu.:1.0000   3rd Qu.:0.0000
##  Max.   :720.00   Max.   :720.00   Max.   :1.0000   Max.   :2.0000
##  NA's   :140      NA's   :191      NA's   :79       NA's   :24
##       c297             c298             c299             c300
##  Min.   :0.0000   Min.   :0.00000   Min.   :0.00000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.00000   1st Qu.:0.0000
##  Median :0.0000   Median :0.00000   Median :0.00000   Median :0.0000
##  Mean   :0.1384   Mean   :0.05615   Mean   :0.03171   Mean   :0.1597
##  3rd Qu.:0.0000   3rd Qu.:0.00000   3rd Qu.:0.00000   3rd Qu.:0.0000
##  Max.   :1.0000   Max.   :1.00000   Max.   :1.00000   Max.   :1.0000
##  NA's   :13       NA's   :14        NA's   :31        NA's   :18
##       c301             c302            c303            c304
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.000   Min.   :0.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:0.000
##  Median :0.0000   Median :0.0000   Median :0.000   Median :0.000
##  Mean   :0.1421   Mean   :0.1004   Mean   :0.298   Mean   :0.276
##  3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:1.000   3rd Qu.:1.000
##  Max.   :3.0000   Max.   :3.0000   Max.   :1.000   Max.   :1.000
##  NA's   :70       NA's   :24       NA's   :12      NA's   :14
##       c305             c306            c307             c308
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median :0.0000   Median :0.0000
##  Mean   :0.1188   Mean   :0.0566   Mean   :0.4689   Mean   :0.2862
##  3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:1.0000
##  Max.   :1.0000   Max.   :1.0000   Max.   :5.0000   Max.   :1.0000
##  NA's   :85       NA's   :109      NA's   :30       NA's   :9
##       c309             c310            c311             c312
##  Min.   :0.0000   Min.   :0.0000   Min.   : 0.000   Min.   : 0.00
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 1.000   1st Qu.: 1.00
##  Median :0.0000   Median :1.0000   Median : 2.000   Median : 2.00
##  Mean   :0.1954   Mean   :0.6625   Mean   : 3.233   Mean   : 2.79
##  3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.: 5.000   3rd Qu.: 4.00
##  Max.   :6.0000   Max.   :1.0000   Max.   :18.000   Max.   :12.00
##  NA's   :32       NA's   :771      NA's   :13       NA's   :43
##       c313             c314            c315             c316
##  Min.   : 0.000   Min.   : 1.000   Min.   : 19.00   Min.   : 1.00
##  1st Qu.: 1.000   1st Qu.: 1.250   1st Qu.: 66.00   1st Qu.:34.75
##  Median : 2.000   Median : 3.000   Median : 78.00   Median :45.00
##  Mean   : 2.716   Mean   : 3.436   Mean   : 74.31   Mean   :43.02
##  3rd Qu.: 4.000   3rd Qu.: 4.000   3rd Qu.: 85.00   3rd Qu.:55.00
##  Max.   :13.000   Max.   :16.000   Max.   :104.00   Max.   :82.00
##  NA's   :42       NA's   :65       NA's   :190      NA's   :267
##       c317             c318            c319            c320
##  Min.   : 20.00   Min.   :0.0000   Min.   :0.000   Min.   :0.00000
##  1st Qu.: 60.00   1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:0.00000
##  Median : 75.00   Median :0.0000   Median :0.000   Median :0.00000
##  Mean   : 70.75   Mean   :0.2827   Mean   :0.135   Mean   :0.02983
##  3rd Qu.: 82.00   3rd Qu.:0.0000   3rd Qu.:0.000   3rd Qu.:0.00000
##  Max.   :109.00   Max.   :4.0000   Max.   :5.000   Max.   :2.00000
##  NA's   :236      NA's   :87       NA's   :103     NA's   :80
##       c321             c322            c323             c324
```

```
##  Min.   :0.00000   Min.   :0.00000   Min.   :0.00000   Min.   :0.00000
##  1st Qu.:0.00000   1st Qu.:0.00000   1st Qu.:0.00000   1st Qu.:0.00000
##  Median :0.00000   Median :0.00000   Median :0.00000   Median :0.00000
##  Mean   :0.04581   Mean   :0.03299   Mean   :0.02179   Mean   :0.03439
##  3rd Qu.:0.00000   3rd Qu.:0.00000   3rd Qu.:0.00000   3rd Qu.:0.00000
##  Max.   :5.00000   Max.   :4.00000   Max.   :1.00000   Max.   :4.00000
##  NA's   :87        NA's   :63        NA's   :71        NA's   :66
##       c325              c326              c327              c328
##  Min.   :0.00000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.00000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.00000   Median :0.0000   Median :0.0000   Median :0.0000
##  Mean   :0.02699   Mean   :0.2388   Mean   :0.5423   Mean   :0.2249
##  3rd Qu.:0.00000   3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:0.0000
##  Max.   :2.00000   Max.   :3.0000   Max.   :5.0000   Max.   :7.0000
##  NA's   :73        NA's   :114      NA's   :119      NA's   :135
##       c329              c330              c331              c332
##  Min.   :0.0000   Min.   :0.0000   Min.   : 0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median : 0.0000   Median :0.0000
##  Mean   :0.1818   Mean   :0.4884   Mean   : 0.3333   Mean   :0.1623
##  3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.: 0.0000   3rd Qu.:0.0000
##  Max.   :7.0000   Max.   :8.0000   Max.   :10.0000   Max.   :5.0000
##  NA's   :136      NA's   :292      NA's   :308       NA's   :130
##       c333            dbdscore        adlrate
##  Min.   :0.00000   Min.   : 0.00   Min.   :2.000
##  1st Qu.:0.00000   1st Qu.:10.00   1st Qu.:5.000
##  Median :0.00000   Median :17.00   Median :6.000
##  Mean   :0.09623   Mean   :18.98   Mean   :5.356
##  3rd Qu.:0.00000   3rd Qu.:25.00   3rd Qu.:6.000
##  Max.   :5.00000   Max.   :76.00   Max.   :6.000
##  NA's   :134       NA's   :95      NA's   :5
```

```
### Recoding Outcome variables

## Variables with missing == 7 | 8 | 9
out.missing.x <- c("askhelp", "notime", "feelstre", "feelemba",
    "feelangr", "affects", "afraid", "dependen", "strained",
    "suffered", "privacy", "soclife", "friends", "expect",
    "expenses", "unable", "lostctrl", "leave", "uncertai",
    "doing", "better", "burdened", "bother", "poorapp",
    "shake", "good", "mind", "depressd", "eveffort", "hopeful",
    "failure", "fearful", "restls", "happy", "talkless",
    "lonely", "unfriend", "enjoylif", "cryspell", "feltsad",
    "dislike", "getgoing", "health1", "health2", "adlrate")

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

###
outcomes.NAs <- outcomes

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

```
        x
    })
outcomes.NAs[, out.missing.xx] <- apply(outcomes.NAs[, out.missing.xx],
    2, function(x) {
        x[(x == 99)] <- NA
        x
    })

summary(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         adlrate
##  Min.   :0.0000   Min.   :0.0000   Min.   : 0.000   Min.   :2.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.: 1.000   1st Qu.:5.000
##  Median :0.0000   Median :0.0000   Median : 5.000   Median :6.000
##  Mean   :0.0866   Mean   :0.5893   Mean   : 7.912   Mean   :5.356
##  3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:12.000   3rd Qu.:6.000
##  Max.   :3.0000   Max.   :3.0000   Max.   :48.000   Max.   :6.000
##  NA's   :8        NA's   :6        NA's   :10       NA's   :5
```

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