

check_in_1

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```
install.packages(c("tidyverse", "NHANES", "foreign", "haven", "survey", "mice"))
install.packages("Rnhanesdata")
```

Import data

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.1     v tibble    3.2.1
v lubridate  1.9.3     v tidyr    1.3.1
v purrr     1.0.2
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become non-conflicting
```

```
[1] "/Users/xinranyu/Documents/GitHub/BST_210_project"
```

```
Joining with `by = join_by(SEQN)`
```

scanning raw data

```
tibble [10,195 x 22] (S3: tbl_df/tbl/data.frame)
$ SEQN      : num [1:10195] 109266 109267 109268 109271 109273 ...
..- attr(*, "label")= chr "Respondent sequence number"
$ SLQ300   : chr [1:10195] "22:00" "00:00" "22:00" "23:00" ...
..- attr(*, "label")= chr "Usual sleep time on weekdays or workdays"
$ SLQ310   : chr [1:10195] "05:30" "08:00" "06:30" "09:00" ...
..- attr(*, "label")= chr "Usual wake time on weekdays or workdays"
```

```

$ SLD012 : num [1:10195] 7.5 8 8.5 10 6.5 9.5 9 7 9.5 8 ...
..- attr(*, "label")= chr "Sleep hours - weekdays or workdays"
$ SLQ320 : chr [1:10195] "23:00" "03:00" "23:00" "23:00" ...
..- attr(*, "label")= chr "Usual sleep time on weekends"
$ SLQ330 : chr [1:10195] "07:00" "11:00" "07:00" "12:00" ...
..- attr(*, "label")= chr "Usual wake time on weekends"
$ SLD013 : num [1:10195] 8 8 8 13 8 9.5 10 8 8 10 ...
..- attr(*, "label")= chr "Sleep hours - weekends"
$ SLQ030 : num [1:10195] 1 0 0 0 0 1 3 3 0 0 ...
..- attr(*, "label")= chr "How often do you snore?"
$ SLQ040 : num [1:10195] 0 0 0 0 0 0 1 0 0 0 ...
..- attr(*, "label")= chr "How often do you snort or stop breathing"
$ SLQ050 : num [1:10195] 2 2 2 1 1 2 1 1 2 2 ...
..- attr(*, "label")= chr "Ever told doctor had trouble sleeping?"
$ SLQ120 : num [1:10195] 0 2 1 3 2 0 3 3 2 0 ...
..- attr(*, "label")= chr "How often feel overly sleepy during day?"
$ BMXBMI : num [1:10195] 37.8 NA NA 29.7 21.9 30.2 NA 26.6 NA 39.1 ...
..- attr(*, "label")= chr "Body Mass Index (kg/m**2)"
$ ALQ121 : num [1:10195] 10 NA NA 0 0 4 NA 0 NA NA ...
..- attr(*, "label")= chr "Past 12 mo how often drink alcoholic bev"
$ RIAGENDR: num [1:10195] 2 NA NA 1 1 1 NA 1 NA 2 ...
..- attr(*, "label")= chr "Gender"
$ RIDRETH1: num [1:10195] 5 NA NA 3 3 5 NA 3 NA 1 ...
..- attr(*, "label")= chr "Race/Hispanic origin"
$ RIDAGEYR: num [1:10195] 29 NA NA 49 36 68 NA 76 NA 44 ...
..- attr(*, "label")= chr "Age in years at screening"
$ INDFMPIR: num [1:10195] 5 NA NA NA 0.83 1.2 NA 3.61 NA NA ...
..- attr(*, "label")= chr "Ratio of family income to poverty"
$ LBXSNASI: num [1:10195] 140 NA NA 141 139 138 NA 145 NA 141 ...
..- attr(*, "label")= chr "Sodium (mmol/L)"
$ LBXSKSI : num [1:10195] 3.6 NA NA 4.3 4.3 3.9 NA 4.5 NA 4.1 ...
..- attr(*, "label")= chr "Potassium (mmol/L)"
$ LBDSCASI: num [1:10195] 2.2 NA NA 2.23 2.42 ...
..- attr(*, "label")= chr "Total Calcium (mmol/L)"
$ LBXSCLSI: num [1:10195] 99 NA NA 101 100 99 NA 105 NA 103 ...
..- attr(*, "label")= chr "Chloride (mmol/L)"
$ PAD680 : num [1:10195] 480 NA NA 60 180 300 NA 900 NA 360 ...
..- attr(*, "label")= chr "Minutes sedentary activity"
- attr(*, "label")= chr "Sleep Disorders"

```

SEQN	SLQ300	SLQ310	SLD012
Min. :109266	Length:10195	Length:10195	Min. : 2.000

1st Qu.:113208	Class :character	Class :character	1st Qu.: 7.000
Median :117039	Mode :character	Mode :character	Median : 7.500
Mean : 117076			Mean : 7.641
3rd Qu.:120974			3rd Qu.: 8.500
Max. :124822			Max. :14.000
			NA's :90
SLQ320	SLQ330	SLD013	SLQ030
Length:10195	Length:10195	Min. : 2.000	Min. :0.000
Class :character	Class :character	1st Qu.: 7.000	1st Qu.:0.000
Mode :character	Mode :character	Median : 8.000	Median :1.000
		Mean : 8.362	Mean :1.956
		3rd Qu.: 9.500	3rd Qu.:3.000
		Max. :14.000	Max. :9.000
		NA's :96	
SLQ040	SLQ050	SLQ120	BMXBMI
Min. :0.0000	Min. :1.000	Min. :0.000	Min. :14.20
1st Qu.:0.0000	1st Qu.:1.000	1st Qu.:1.000	1st Qu.:24.70
Median :0.0000	Median :2.000	Median :2.000	Median :28.60
Mean : 0.8382	Mean :1.737	Mean :1.767	Mean :29.88
3rd Qu.:1.0000	3rd Qu.:2.000	3rd Qu.:3.000	3rd Qu.:33.60
Max. :9.0000	Max. :9.000	Max. :9.000	Max. :92.30
			NA's :1405
ALQ121	RIAGENDR	RIDRETH1	RIDAGEYR
Min. : 0.000	Min. :1.000	Min. :1.000	Min. :18.00
1st Qu.: 1.000	1st Qu.:1.000	1st Qu.:3.000	1st Qu.:33.00
Median : 5.000	Median :2.000	Median :3.000	Median :50.00
Mean : 4.946	Mean :1.514	Mean :3.265	Mean :49.47
3rd Qu.: 8.000	3rd Qu.:2.000	3rd Qu.:4.000	3rd Qu.:64.00
Max. :99.000	Max. :2.000	Max. :5.000	Max. :80.00
NA's :2692	NA's :1230	NA's :1230	NA's :1230
INDFMPIR	LBXSNASI	LBXSKSI	LBDSCASI
Min. :0.000	Min. :121.0	Min. :2.600	Min. :1.600
1st Qu.:1.170	1st Qu.:139.0	1st Qu.:3.900	1st Qu.:2.250
Median :2.160	Median :141.0	Median :4.100	Median :2.325
Mean :2.559	Mean :140.6	Mean :4.089	Mean :2.318
3rd Qu.:4.140	3rd Qu.:142.0	3rd Qu.:4.300	3rd Qu.:2.375
Max. :5.000	Max. :151.0	Max. :7.100	Max. :3.075
NA's :2490	NA's :1937	NA's :1945	NA's :1940
LBXSCLSI	PAD680		
Min. : 84.0	Min. : 0.0		
1st Qu.:100.0	1st Qu.: 180.0		
Median :101.0	Median : 300.0		
Mean :101.4	Mean : 396.3		

```

3rd Qu.:103.0   3rd Qu.: 480.0
Max.     :117.0   Max.    :9999.0
NA's     :1937    NA's    :1247

```

Data cleaning

scanning cleaned data

```

tibble [5,394 x 23] (S3: tbl_df/tbl/data.frame)
$ ID                      : Factor w/ 5394 levels "109266","109273",...: 1 2 3 4 5 6 7 ...
$ sleep_time_weekdays      :Formal class 'Period' [package "lubridate"] with 6 slots
... .@ .Data : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ year  : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ month : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ day   : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ hour  : num [1:5394] 22 8 21 23 21 22 23 22 9 23 ...
... .@ minute: num [1:5394] 0 0 30 0 0 0 0 0 0 0 ...
$ wake_time_weekdays       :Formal class 'Period' [package "lubridate"] with 6 slots
... .@ .Data : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ year  : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ month : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ day   : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ hour  : num [1:5394] 5 14 7 6 1 5 6 6 15 6 ...
... .@ minute: num [1:5394] 30 35 0 0 30 30 30 30 30 0 0 ...
$ sleep_hours_weekdays     : num [1:5394] 7.5 6.5 9.5 7 4.5 7.5 7.5 8.5 6 7 ...
..- attr(*, "label")= chr "Sleep hours - weekdays or workdays"
$ sleep_time_weekends      :Formal class 'Period' [package "lubridate"] with 6 slots
... .@ .Data : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ year  : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ month : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ day   : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ hour  : num [1:5394] 23 21 21 23 21 23 23 23 1 23 ...
... .@ minute: num [1:5394] 0 0 30 0 0 0 0 0 0 0 ...
$ wake_time_weekends       :Formal class 'Period' [package "lubridate"] with 6 slots
... .@ .Data : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ year  : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ month : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ day   : num [1:5394] 0 0 0 0 0 0 0 0 0 0 ...
... .@ hour  : num [1:5394] 7 5 7 7 1 5 10 6 10 6 ...
... .@ minute: num [1:5394] 0 0 0 0 30 30 0 30 0 0 ...
$ sleep_hours_weekends     : num [1:5394] 8 8 9.5 8 4.5 6.5 11 7.5 9 7 ...

```

```

..- attr(*, "label")= chr "Sleep hours - weekends"
$ frq_snore : Factor w/ 4 levels "0","1","2","3": 2 1 2 4 1 3 1 2 2 4 ...
$ frq_snort_or_stop_breathing : Factor w/ 4 levels "0","1","2","3": 1 1 1 1 1 3 1 1 1 ...
$ sleep_trouble : Factor w/ 2 levels "1","2": 2 1 2 1 1 2 2 2 2 1 ...
$ overly_sleepy : Factor w/ 5 levels "0","1","2","3",...: 1 3 1 4 3 4 1 2 2 ...
$ BMI : num [1:5394] 37.8 21.9 30.2 26.6 30.5 30.1 24.6 23.9 30.5 ...
..- attr(*, "label")= chr "Body Mass Index (kg/m**2)"
$ alcohol : Factor w/ 11 levels "0","1","2","3",...: 11 1 5 1 5 1 10 1 ...
$ gender : Factor w/ 2 levels "1","2": 2 1 1 1 1 1 2 1 2 ...
$ Race_Hispanic_origin : Factor w/ 5 levels "1","2","3","4",...: 5 3 5 3 2 3 5 3 4 ...
$ age : num [1:5394] 29 36 68 76 58 44 47 48 22 19 ...
..- attr(*, "label")= chr "Age in years at screening"
$ Family_income_to_poverty_ratio: num [1:5394] 5 0.83 1.2 3.61 1.6 0.02 1.38 5 4.93 0.06 ...
..- attr(*, "label")= chr "Ratio of family income to poverty"
$ Na : num [1:5394] 140 139 138 145 140 138 142 139 138 140 ...
..- attr(*, "label")= chr "Sodium (mmol/L)"
$ K : num [1:5394] 3.6 4.3 3.9 4.5 4.8 3.7 3.8 3.9 3.7 4.2 ...
..- attr(*, "label")= chr "Potassium (mmol/L)"
$ Ca : num [1:5394] 2.2 2.42 2.27 2.27 2.33 ...
..- attr(*, "label")= chr "Total Calcium (mmol/L)"
$ Cl : num [1:5394] 99 100 99 105 102 98 104 100 99 105 ...
..- attr(*, "label")= chr "Chloride (mmol/L)"
$ sedentary_activity : num [1:5394] 480 180 300 900 600 360 120 180 600 360 ...
..- attr(*, "label")= chr "Minutes sedentary activity"
$ sleep_hours_avg : num [1:5394] 7.64 6.93 9.5 7.29 4.5 ...
..- attr(*, "label")= chr "Sleep hours - weekends"
- attr(*, "label")= chr "Sleep Disorders"

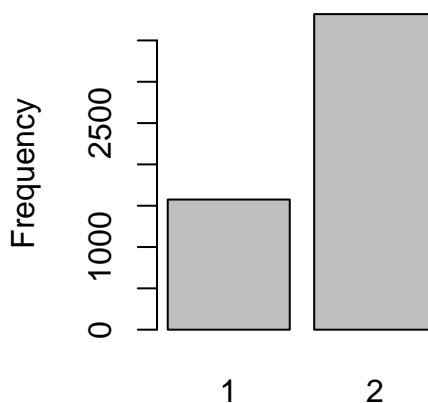
```

ID	sleep_time_weekdays
109266 :	1 Min. :0S
109273 :	1 1st Qu.:3H 0M 0S
109274 :	1 Median :22H 0M 0S
109282 :	1 Mean :16H 7M 51.134593993309S
109292 :	1 3rd Qu.:23H 0M 0S
109293 :	1 Max. :23H 45M 0S
(Other):5388	
wake_time_weekdays	sleep_hours_weekdays
Min. :0S	Min. : 3.000
1st Qu.:5H 30M 0S	1st Qu.: 6.500
Median :6H 30M 0S	Median : 7.500
Mean :6H 43M 20.2780867630718S	Mean : 7.569
3rd Qu.:7H 30M 0S	3rd Qu.: 8.500

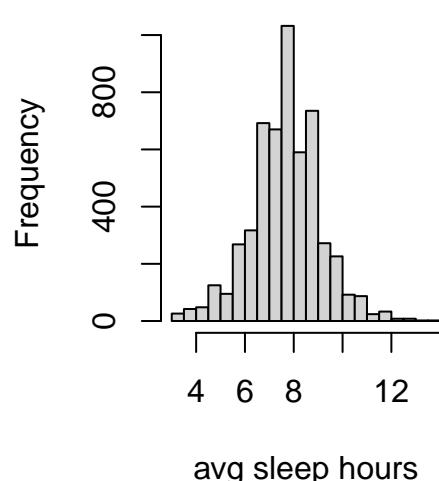
Max. :23H 30M 0S	Max. :14.000			
sleep_time_weekends	wake_time_weekends			
Min. :0S	Min. :0S			
1st Qu.:1H 0M 0S	1st Qu.:6H 30M 0S			
Median :21H 0M 0S	Median :8H 0M 0S			
Mean :12H 55M 52.2803114571652S	Mean :7H 49M 18.2313681868654S			
3rd Qu.:23H 0M 0S	3rd Qu.:9H 0M 0S			
Max. :23H 50M 0S	Max. :23H 0M 0S			
sleep_hours_weekends	frq_snore	frq_snort_or_stop_breathing	sleep_trouble	
Min. : 3.000	0:1393	0:3981	1:1575	
1st Qu.: 7.000	1:1433	1: 748	2:3819	
Median : 8.000	2:1058	2: 346		
Mean : 8.265	3:1510	3: 319		
3rd Qu.: 9.000				
Max. :14.000				
overly_sleepy	BMI	alcohol	gender	Race_Hispanic_origin
0: 803	Min. :14.60	0 :1098	1:2737	1: 653
1:1291	1st Qu.:24.80	6 : 753	2:2657	2: 526
2:1882	Median :28.80	9 : 575		3:2107
3:1000	Mean :30.02	10 : 568		4:1320
4: 418	3rd Qu.:33.80	4 : 462		5: 788
	Max. :92.30	7 : 439		
		(Other):1499		
age	Family_income_to_poverty_ratio		Na	K
Min. :18.00	Min. :0.00		Min. :121.0	Min. :2.60
1st Qu.:33.00	1st Qu.:1.23		1st Qu.:139.0	1st Qu.:3.90
Median :49.00	Median :2.37		Median :141.0	Median :4.10
Mean :48.78	Mean :2.68		Mean :140.5	Mean :4.09
3rd Qu.:63.00	3rd Qu.:4.44		3rd Qu.:142.0	3rd Qu.:4.30
Max. :80.00	Max. :5.00		Max. :150.0	Max. :7.10
Ca	Cl	sedentary_activity	sleep_hours_avg	
Min. :1.600	Min. : 84.0	Min. : 0.0	Min. : 3.000	
1st Qu.:2.250	1st Qu.:100.0	1st Qu.: 180.0	1st Qu.: 7.000	
Median :2.325	Median :101.0	Median : 300.0	Median : 7.857	
Mean :2.320	Mean :101.3	Mean : 368.6	Mean : 7.768	
3rd Qu.:2.375	3rd Qu.:103.0	3rd Qu.: 480.0	3rd Qu.: 8.643	
Max. :3.075	Max. :117.0	Max. :9999.0	Max. :13.714	

Histogram of outcome

Barplot of sleep_trouble Histogram of avg sleep hours

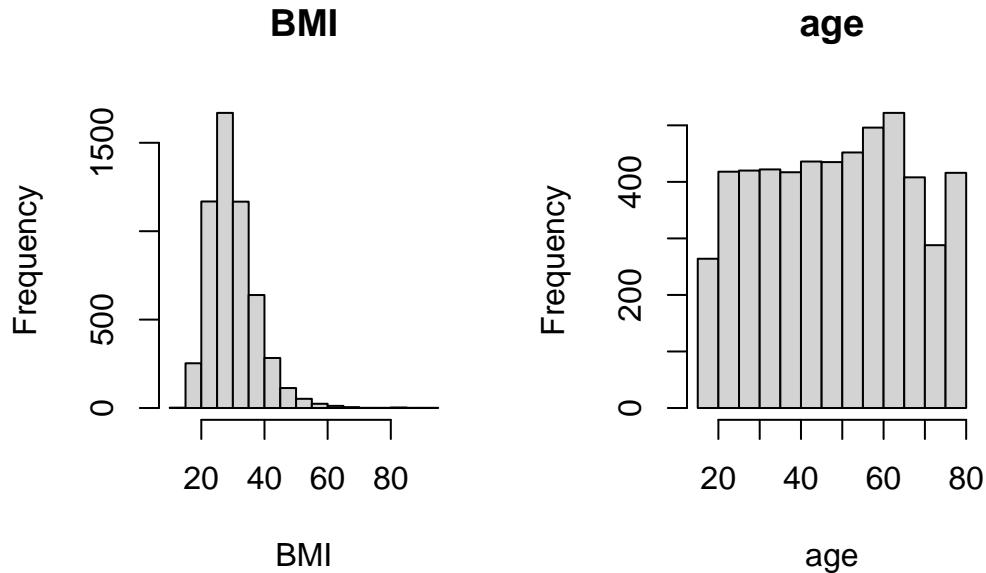


1 = Yes; 2 = No



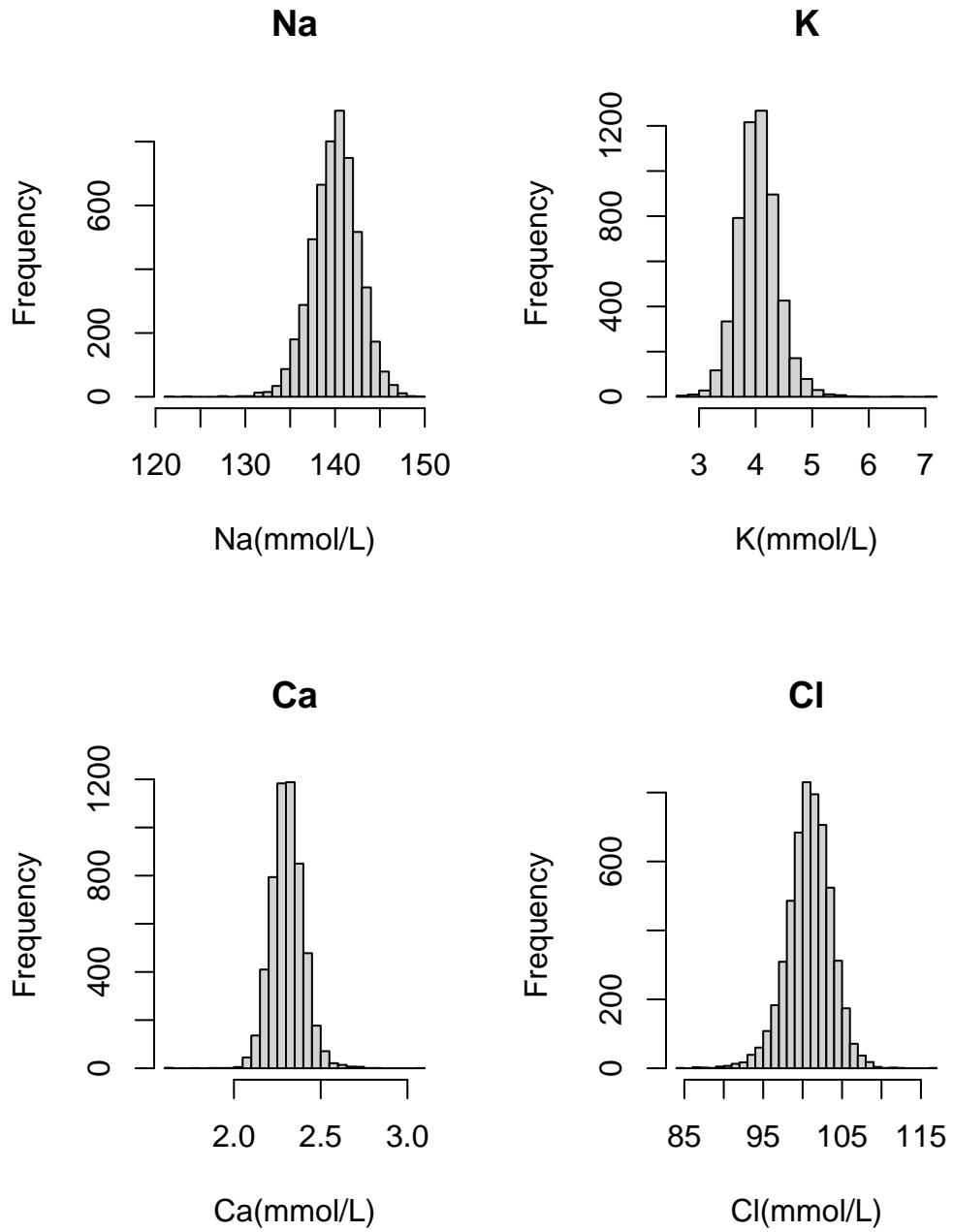
avg sleep hours

Histogram of continuous variables X

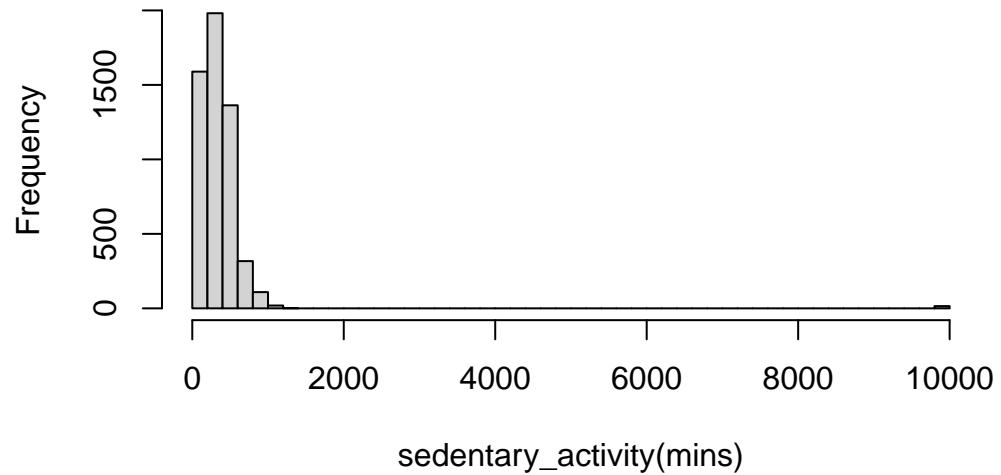


Family_income_to_poverty_ratio



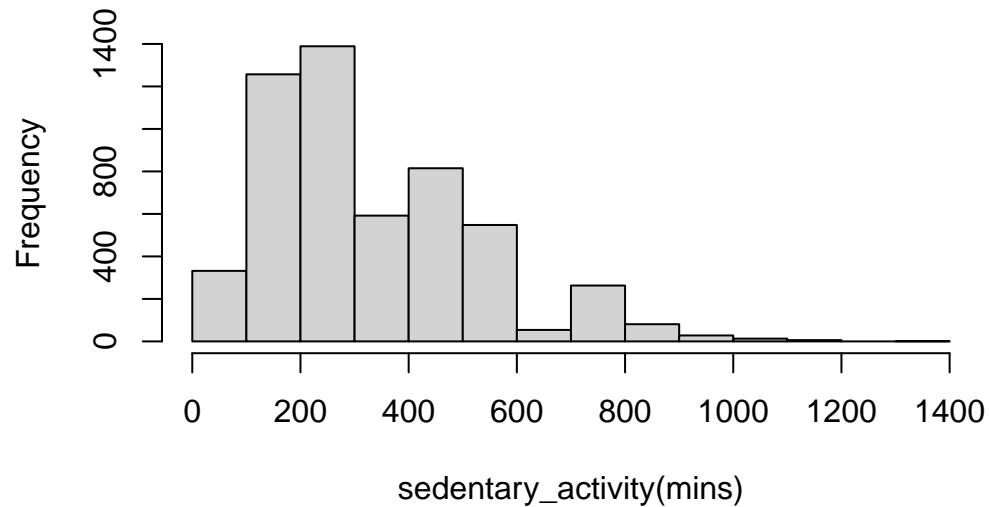


sedentary_activity

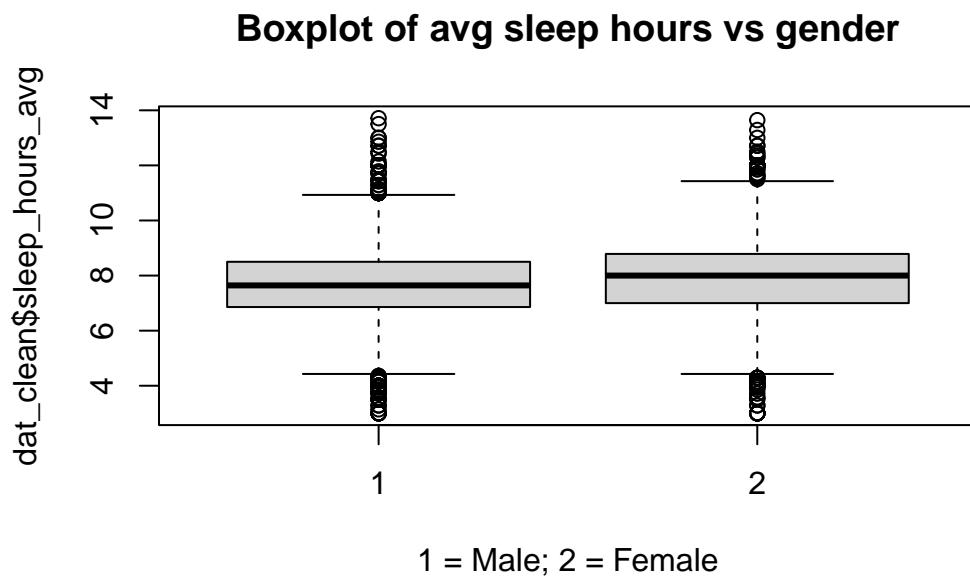
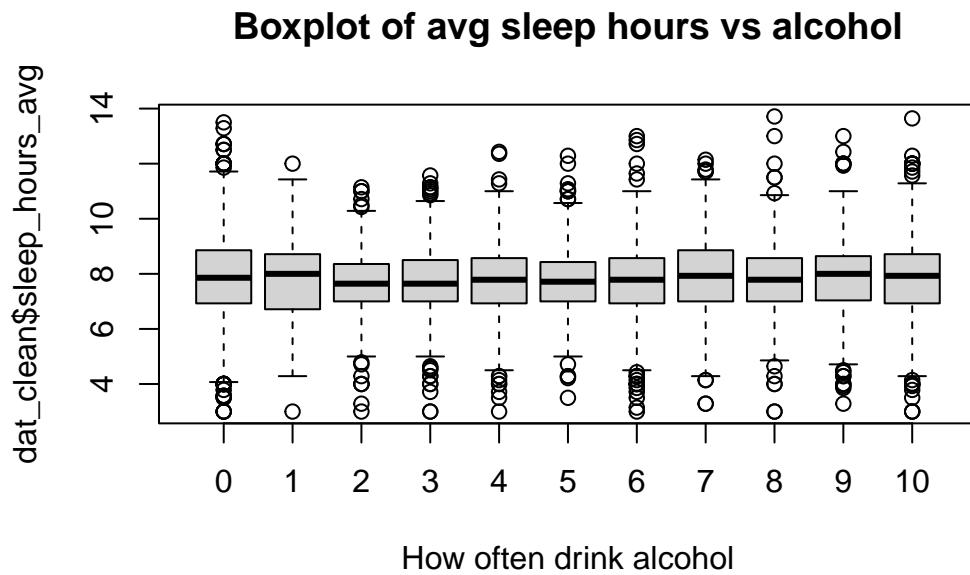


Obviously, 9000 minutes is more than the possible range of a day (1440 minutes). Thus these high leverage points are errors. It's better to remove them.

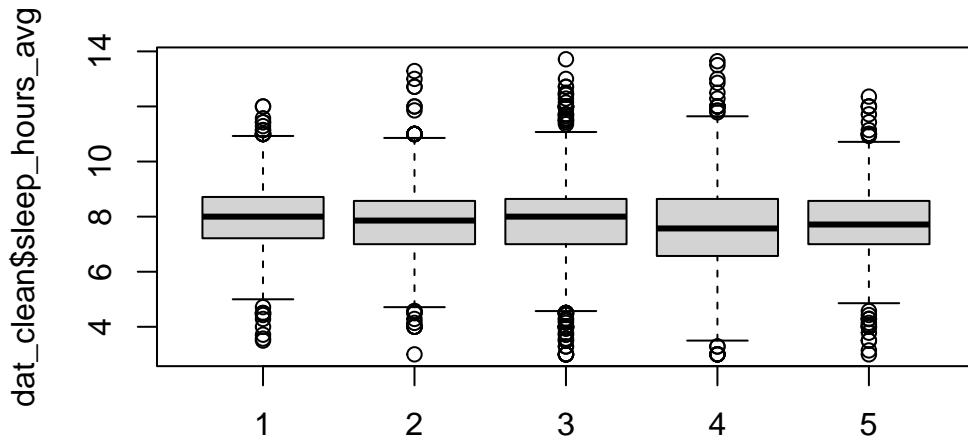
sedentary_activity replot



Boxplot

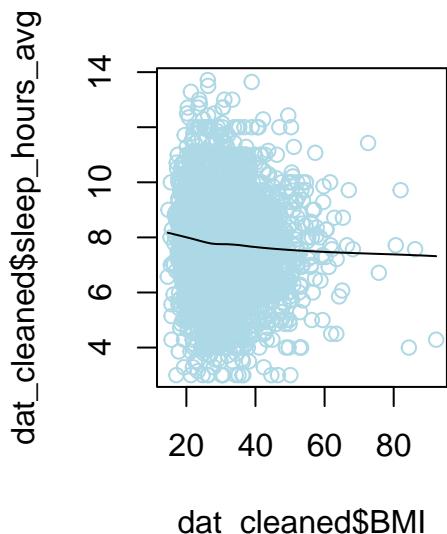


Boxplot of avg sleep hours vs races

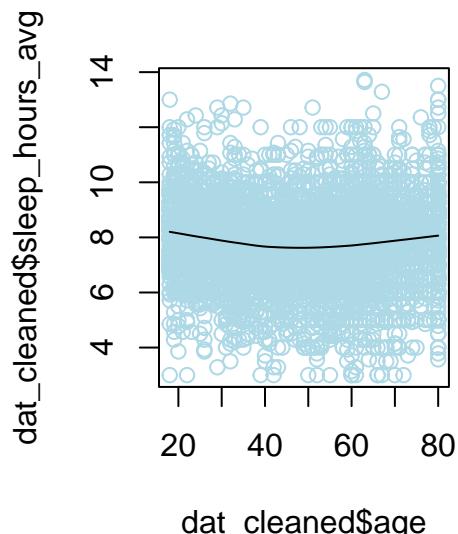


1 = Mexican American; 2 = Other Hispanic; 3 = White; 4 = Black; 5 = Other

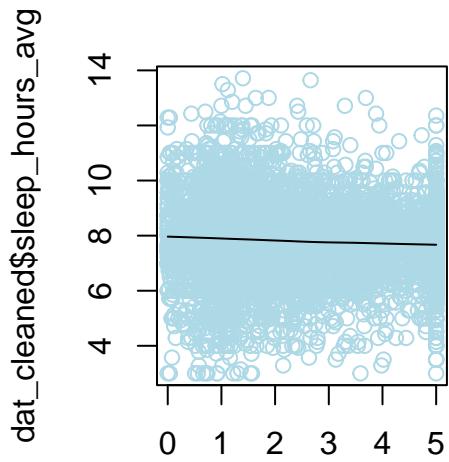
Correlations



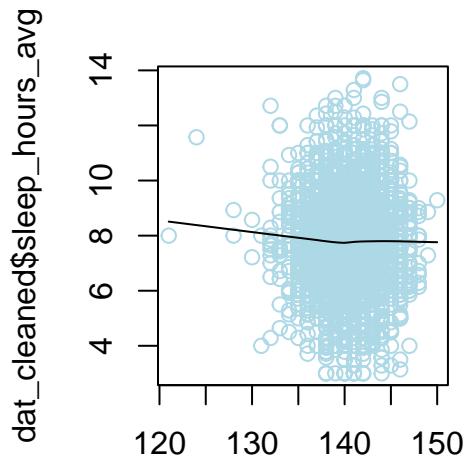
dat_cleaned\$BMI



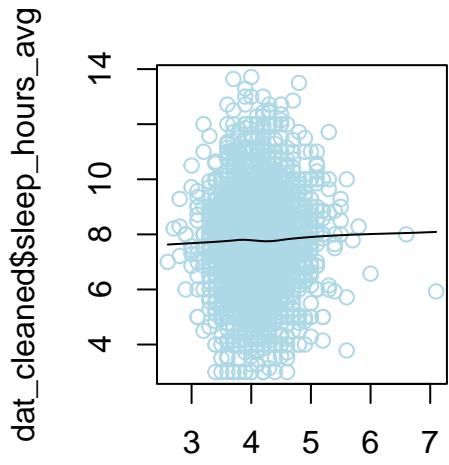
dat_cleaned\$age



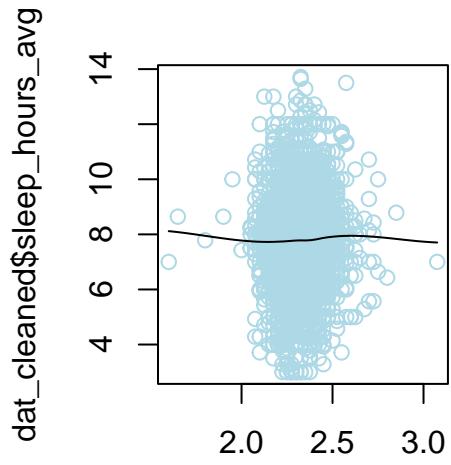
at_cleaned\$Family_income_to_povert



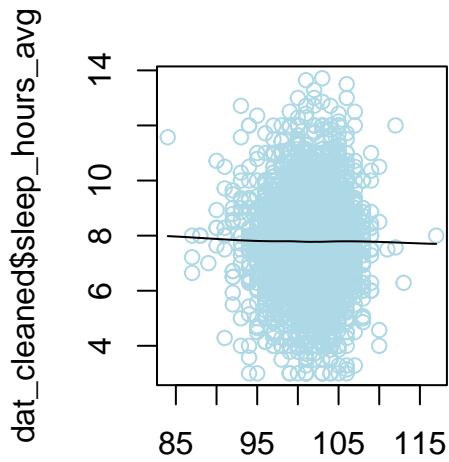
dat_cleaned\$Na



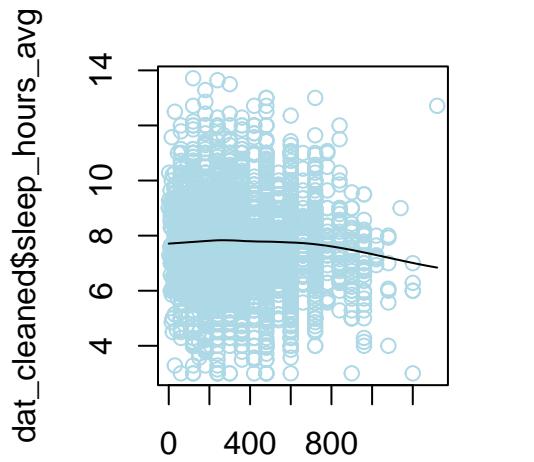
dat_cleaned\$K



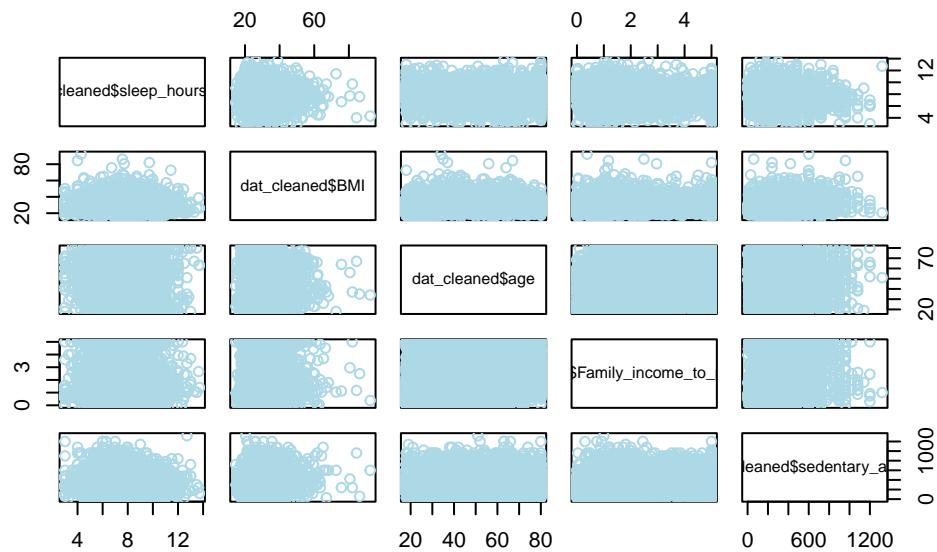
dat_cleaned\$Ca

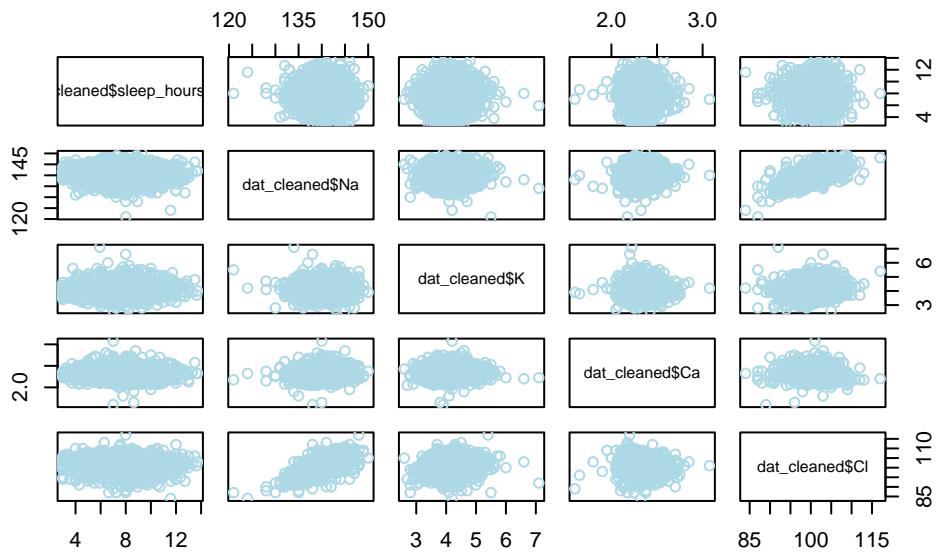


dat_cleaned\$CI



dat_cleaned\$sedentary_activity





Code Appendix

```

library(tidyverse)
library(haven)
library(NHANES)
library(dplyr)
library(purrr)
library(lubridate)

getwd()
setwd("./data/2020")

ALQ <- read_xpt("P_ALQ.XPT")
BIOPRO <- read_xpt("P_BIOPRO.XPT")
BMX <- read_xpt("P_BMX.XPT")
BPXO <- read_xpt("P_BPXO.XPT")
DEMO <- read_xpt("P_DEMO.XPT")
# FOLATE <- read_xpt("P_FOLATE.XPT")
PAQ <- read_xpt("P_PAQ.XPT")
SLQ <- read_xpt("P_SLQ.XPT")

```

```

TCHOL <- read_xpt("P_TCHOL.XPT")

datasets <- list(ALQ, BIOPRO, BMX, BPXO, DEMO, PAQ, SLQ, TCHOL)
test <- reduce(datasets, inner_join, by = "SEQN")

temp <- select(test, SEQN , BMXBMI, ALQ121, RIAGENDR, RIDRETH1, RIDAGEYR, INDFMPIR, LBXSNASI
dat_raw <- left_join(SLQ, temp)

# DMDEDUC2(education level 20+)
# DMDMARTZ - Marital status
str(dat_raw)
summary(dat_raw)
# rename cols
new_colnames <- c(
  "ID",           # SEQN;Respondent_sequence_number
  "sleep_time_weekdays",      # SLQ300;Usual_sleep_time_weekdays
  "wake_time_weekdays",       # SLQ310;Usual_wake_time_weekdays
  "sleep_hours_weekdays",     # SLD012;Sleep_hours_weekdays
  "sleep_time_weekends",      # SLQ320;Usual_sleep_time_weekends
  "wake_time_weekends",       # SLQ330;Usual_wake_time_weekends
  "sleep_hours_weekends",     # SLD013;Sleep_hours_weekends
  "frq_snore",              # SLQ030;How_often_snore
  "frq_snort_or_stop_breathing", # SLQ040;How_often_snort_or_stop_breathing
  "sleep_trouble",           # SLQ050;Ever_told_doctor_sleep_trouble
  "overly_sleepy",           # SLQ120;Feel_overly_sleepy_day
  "BMI",                     # BMXBMI;Body_Mass_Index
  "alcohol",                 # ALQ121;How_often_drink_alcohol
  "gender",                  # RIAGENDR;Gender
  "Race_Hispanic_origin",    # RIDRETH1;Race_Hispanic_origin
  "age",                      # RIDAGEYR;Age_at_screening
  "Family_income_to_poverty_ratio", # INDFMPIR;Family_income_to_poverty_ratio
  "Na",                       # LBXSNASI;Sodium_mmol_L
  "K",                        # LBXSLSI;Potassium_mmol_L
  "Ca",                       # LBDSCASI;Total_Calcium_mmol_L
  "Cl",                       # LBXSCLSI;Chloride_mmol_L
  "sedentary_activity"        # PAD680;Minutes_sedentary_activity
)
colnames(dat_raw) <- new_colnames
# remove all lines with NA
dat_raw[dat_raw == ""] <- NA
dat_clean <- dat_raw |>
  drop_na() |>

```

```

    filter(alcohol != 77 & frq_snore != 7 & frq_snore != 9 & frq_snort_or_stop_breathing != 7
mutate(across(c(sleep_time_weekdays,wake_time_weekdays,sleep_time_weekends,wake_time_weekend),as.numeric))
mutate(across(c(ID,frq_snore,frq_snort_or_stop_breathing,sleep_trouble,overly_sleepy,alcohol),as.numeric)) |>
mutate(sleep_hours_avg = 2/7*sleep_hours_weekends+5/7*sleep_hours_weekdays)

str(dat_clean)
summary(dat_clean)
par(mfrow = c(1,2))
barplot(table(dat_clean$sleep_trouble), xlab = "1 = Yes; 2 = No", main = "Barplot of sleep_trouble")
hist(dat_clean$sleep_hours_avg, main = "Histogram of avg sleep hours",breaks = 30, xlab = "avg sleep hours")
par(mfrow = c(1,2))
hist(dat_clean$BMI,main = "BMI",xlab = "BMI")
hist(dat_clean$age,main = "age", xlab = "age")
hist(dat_clean$Family_income_to_poverty_ratio,main = "Family_income_to_poverty_ratio", xlab = "Family income to poverty ratio")
par(mfrow = c(1,2))
hist(dat_clean$Na,main = "Na",xlab = "Na(mmol/L)",breaks = 30)
hist(dat_clean$K,main = "K", xlab = "K(mmol/L)",breaks = 30)
par(mfrow = c(1,2))
hist(dat_clean$Ca,main = "Ca",xlab = "Ca(mmol/L)",breaks = 30)
hist(dat_clean$Cl,main = "Cl", xlab = "Cl(mmol/L)",,breaks = 30)
hist(dat_clean$sedentary_activity,main = "sedentary_activity",xlab = "sedentary_activity(mins per day)")
dat_cleaned <- dat_clean |>
  filter(sedentary_activity < 9000)
hist(dat_cleaned$sedentary_activity,main = "sedentary_activity replot",xlab = "sedentary_activity")
boxplot(dat_clean$sleep_hours_avg~dat_clean$alcohol, main = "Boxplot of avg sleep hours vs alcohol")
boxplot(dat_clean$sleep_hours_avg~dat_clean$gender,main = "Boxplot of avg sleep hours vs gender")
boxplot(dat_clean$sleep_hours_avg~dat_clean$Race_Hispanic_origin,main = "Boxplot of avg sleep hours vs race/ethnicity")
par(mfrow = c(1,2))
scatter.smooth(dat_cleaned$BMI,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$age,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$Family_income_to_poverty_ratio,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$Na,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$K,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$Ca,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$Cl,dat_cleaned$sleep_hours_avg,col = "light blue")
scatter.smooth(dat_cleaned$sedentary_activity,dat_cleaned$sleep_hours_avg,col = "light blue")
pairs(dat_cleaned$sleep_hours_avg ~ dat_cleaned$BMI + dat_cleaned$age + dat_cleaned$Family_income_to_poverty_ratio)
pairs(dat_cleaned$sleep_hours_avg ~ dat_cleaned$Na + dat_cleaned$K + dat_cleaned$Ca + dat_cleaned$Cl)

```