imputing

2022-09-07

library(tidyverse)

## ── Attaching packages ─────────────────────────────────────── tidyverse 1.3.2 ──  
## ✔ ggplot2 3.3.6 ✔ purrr 0.3.4  
## ✔ tibble 3.1.8 ✔ dplyr 1.0.9  
## ✔ tidyr 1.2.0 ✔ stringr 1.4.0  
## ✔ readr 2.1.2 ✔ forcats 0.5.1  
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()

library(flextable)

##   
## Attaching package: 'flextable'  
##   
## The following object is masked from 'package:purrr':  
##   
## compose

library(readxl)  
library(writexl)  
library(extrafont)

## Registering fonts with R

library(missMDA)  
library(psych)

##   
## Attaching package: 'psych'  
##   
## The following objects are masked from 'package:ggplot2':  
##   
## %+%, alpha

library(arsenal)

#times new roman tables  
my\_ft\_theme <- function(ft, ...) {  
 # Remove vertical cell padding  
 ft <- padding(ft, padding.top = 0, padding.bottom = 0, part = "all")  
   
 # Change font to TNR 11  
 ft <- font(ft, fontname = "Times New Roman", part = "all")  
 ft <- fontsize(ft, part = "all", size = 12)  
 ft  
}

headscan\_full1<-read\_excel("C:\\Users\\19177\\OneDrive - Colostate\\Desktop\\Dissertation\\headscan\_dissertation\\headscan\_full1.xlsx")  
  
headscan\_full1 <- column\_to\_rownames(headscan\_full1,'ID')  
  
headscan\_num <- select\_if(headscan\_full1, is.numeric)  
headscan\_num <- subset(headscan\_num, select= -age)  
str(headscan\_num)

## 'data.frame': 2016 obs. of 27 variables:  
## $ AA\_C : num 65 55 70 58 67 60 59 59 65 65 ...  
## $ BGl\_C : num 315 289 293 313 288 306 320 NA 300 277 ...  
## $ BiW\_C : num 130 127 143 140 137 130 141 138 143 150 ...  
## $ BiW\_L : num 115 108 121 109 104 106 109 111 113 116 ...  
## $ ChCh\_C : num 62 64 68 70 70 70 67 69 67 63 ...  
## $ GoSub\_C : num 93 93 115 93 103 100 79 106 85 102 ...  
## $ NRB\_L : num 17 18 19 21 19 14 17 18 16 17 ...  
## $ ProA\_L : num 28 25 31 23 28 28 26 27 32 28 ...  
## $ ProA\_C : num 31 27 33 27 31 29 27 29 34 31 ...  
## $ ProS\_C : num 18 20 14 13 22 22 19 14 26 24 ...  
## $ ProS\_L : num 17 18 14 13 20 20 18 12 24 22 ...  
## $ SelP\_C : num 42 41 51 45 47 48 46 42 47 44 ...  
## $ SelP\_L : num 42 41 51 44 47 48 46 41 46 44 ...  
## $ SelDH\_C : num 15 9 9 11 13 15 9 9 12 14 ...  
## $ SelM\_L : num 122 99 130 115 119 126 117 112 117 117 ...  
## $ SnasM\_C : num 82 55 84 74 73 80 78 76 64 75 ...  
## $ SmanM\_C : num 59 51 45 43 33 34 55 37 61 41 ...  
## $ SmanM\_L : num 55 50 45 42 33 34 50 36 59 40 ...  
## $ SnasM\_L : num 75 53 78 69 67 76 69 71 62 69 ...  
## $ TrHO\_C : num 179 163 169 166 159 162 169 NA 167 166 ...  
## $ TrEJ\_C : num 40 32 39 29 46 42 29 32 29 33 ...  
## $ TrGo\_C : num 84 57 70 61 68 70 75 61 67 64 ...  
## $ TrSel\_C : num 149 138 150 133 140 151 140 138 156 143 ...  
## $ TrSman\_C: num 177 145 178 147 157 164 149 159 151 160 ...  
## $ TrSnas\_C: num 163 142 167 145 152 157 148 149 157 NA ...  
## $ TrTr\_C : num 296 276 292 273 279 300 283 275 307 286 ...  
## $ TrTr\_L : num 155 141 156 149 146 146 147 151 157 144 ...

summary(headscan\_num)

## AA\_C BGl\_C BiW\_C BiW\_L   
## Min. :44.00 Min. :215.0 Min. :101.0 Min. : 82.0   
## 1st Qu.:57.00 1st Qu.:283.0 1st Qu.:124.0 1st Qu.:104.0   
## Median :61.00 Median :293.0 Median :133.0 Median :111.0   
## Mean :61.25 Mean :292.8 Mean :133.4 Mean :111.2   
## 3rd Qu.:65.00 3rd Qu.:303.0 3rd Qu.:141.0 3rd Qu.:118.0   
## Max. :87.00 Max. :350.0 Max. :188.0 Max. :152.0   
## NA's :17 NA's :520 NA's :17 NA's :17   
## ChCh\_C GoSub\_C NRB\_L ProA\_L   
## Min. :47.00 Min. : 45.00 Min. : 3.00 Min. :19.00   
## 1st Qu.:62.00 1st Qu.: 88.00 1st Qu.:15.00 1st Qu.:26.00   
## Median :67.00 Median : 99.00 Median :18.00 Median :28.00   
## Mean :67.05 Mean : 98.88 Mean :17.95 Mean :27.94   
## 3rd Qu.:72.00 3rd Qu.:108.00 3rd Qu.:21.00 3rd Qu.:30.00   
## Max. :97.00 Max. :217.00 Max. :40.00 Max. :39.00   
## NA's :43 NA's :128 NA's :16 NA's :16   
## ProA\_C ProS\_C ProS\_L SelP\_C SelP\_L   
## Min. :20.00 Min. :12.0 Min. :12.00 Min. :18.00 Min. :16.00   
## 1st Qu.:28.00 1st Qu.:19.0 1st Qu.:17.00 1st Qu.:42.00 1st Qu.:42.00   
## Median :30.00 Median :21.0 Median :19.00 Median :45.00 Median :44.00   
## Mean :30.12 Mean :21.1 Mean :19.16 Mean :45.01 Mean :44.53   
## 3rd Qu.:32.00 3rd Qu.:23.0 3rd Qu.:21.00 3rd Qu.:48.00 3rd Qu.:47.00   
## Max. :44.00 Max. :43.0 Max. :42.00 Max. :66.00 Max. :65.00   
## NA's :16 NA's :31 NA's :19 NA's :15 NA's :15   
## SelDH\_C SelM\_L SnasM\_C SmanM\_C   
## Min. : 1.00 Min. : 69.0 Min. : 44.00 Min. : 0.0   
## 1st Qu.:11.00 1st Qu.:110.0 1st Qu.: 68.00 1st Qu.: 37.0   
## Median :13.00 Median :116.0 Median : 75.00 Median : 45.0   
## Mean :13.05 Mean :116.2 Mean : 75.05 Mean : 45.8   
## 3rd Qu.:15.00 3rd Qu.:123.0 3rd Qu.: 82.00 3rd Qu.: 53.5   
## Max. :31.00 Max. :145.0 Max. :125.00 Max. :170.0   
## NA's :16 NA's :224 NA's :237 NA's :281   
## SmanM\_L SnasM\_L TrHO\_C TrEJ\_C   
## Min. : 7.00 Min. : 40.00 Min. :135 Min. :20.00   
## 1st Qu.: 37.00 1st Qu.: 63.00 1st Qu.:160 1st Qu.:35.00   
## Median : 44.00 Median : 68.00 Median :167 Median :38.00   
## Mean : 44.57 Mean : 67.93 Mean :167 Mean :38.03   
## 3rd Qu.: 52.00 3rd Qu.: 74.00 3rd Qu.:173 3rd Qu.:41.00   
## Max. :137.00 Max. :128.00 Max. :213 Max. :60.00   
## NA's :242 NA's :225 NA's :282 NA's :33   
## TrGo\_C TrSel\_C TrSman\_C TrSnas\_C TrTr\_C   
## Min. : 35.00 Min. :120 Min. : 64.0 Min. :122.0 Min. :241.0   
## 1st Qu.: 54.00 1st Qu.:137 1st Qu.:143.0 1st Qu.:144.0 1st Qu.:272.2   
## Median : 60.00 Median :142 Median :152.0 Median :150.0 Median :282.0   
## Mean : 60.03 Mean :142 Mean :153.3 Mean :150.4 Mean :282.7   
## 3rd Qu.: 65.00 3rd Qu.:147 3rd Qu.:162.0 3rd Qu.:157.0 3rd Qu.:293.0   
## Max. :114.00 Max. :168 Max. :246.0 Max. :184.0 Max. :332.0   
## NA's :81 NA's :31 NA's :133 NA's :90 NA's :38   
## TrTr\_L   
## Min. :127.0   
## 1st Qu.:141.0   
## Median :146.0   
## Mean :146.5   
## 3rd Qu.:152.0   
## Max. :173.0   
## NA's :34

headscan\_stats <- describe(headscan\_num)  
  
  
headscan\_stats$na <- 2016 - headscan\_stats$n  
headscan\_stats <- rownames\_to\_column(headscan\_stats, "measure")

AA\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(AA\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(AA\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(AA\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(AA\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(AA\_C, 0.95, na.rm=TRUE))  
AA\_C\_sum$measure <- "AA\_C"  
  
  
BGl\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(BGl\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(BGl\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(BGl\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(BGl\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(BGl\_C, 0.95, na.rm=TRUE))  
BGl\_C\_sum$measure <- "BGl\_C"  
  
BiW\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(BiW\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(BiW\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(BiW\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(BiW\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(BiW\_C, 0.95, na.rm=TRUE))  
BiW\_C\_sum$measure <- "BiW\_C"  
  
BiW\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(BiW\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(BiW\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(BiW\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(BiW\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(BiW\_L, 0.95, na.rm=TRUE))  
BiW\_L\_sum$measure <- "BiW\_L"  
  
ChCh\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(ChCh\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ChCh\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ChCh\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ChCh\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ChCh\_C, 0.95, na.rm=TRUE))  
ChCh\_C\_sum$measure <- "ChCh\_C"  
  
GoSub\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(GoSub\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(GoSub\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(GoSub\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(GoSub\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(GoSub\_C, 0.95, na.rm=TRUE))  
GoSub\_C\_sum$measure <- "GoSub\_C"  
  
NRB\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(NRB\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(NRB\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(NRB\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(NRB\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(NRB\_L, 0.95, na.rm=TRUE))  
NRB\_L\_sum$measure <- "NRB\_L"  
  
ProA\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(ProA\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProA\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProA\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProA\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProA\_L, 0.95, na.rm=TRUE))  
ProA\_L\_sum$measure <- "ProA\_L"  
  
ProA\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(ProA\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProA\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProA\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProA\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProA\_C, 0.95, na.rm=TRUE))  
ProA\_C\_sum$measure <- "ProA\_C"  
  
ProS\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(ProS\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProS\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProS\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProS\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProS\_C, 0.95, na.rm=TRUE))  
ProS\_C\_sum$measure <- "ProS\_C"  
  
ProS\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(ProS\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProS\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProS\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProS\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProS\_L, 0.95, na.rm=TRUE))  
ProS\_L\_sum$measure <- "ProS\_L"  
  
SelP\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SelP\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelP\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelP\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelP\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelP\_C, 0.95, na.rm=TRUE))  
SelP\_C\_sum$measure <- "SelP\_C"  
  
SelP\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SelP\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelP\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelP\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelP\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelP\_L, 0.95, na.rm=TRUE))  
SelP\_L\_sum$measure <- "SelP\_L"  
  
SelDH\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SelDH\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelDH\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelDH\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelDH\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelDH\_C, 0.95, na.rm=TRUE))  
SelDH\_C\_sum$measure <- "SelDH\_C"  
  
SelM\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SelM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelM\_L, 0.95, na.rm=TRUE))  
SelM\_L\_sum$measure <- "SelM\_L"  
  
SnasM\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SnasM\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SnasM\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SnasM\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SnasM\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SnasM\_C, 0.95, na.rm=TRUE))  
SnasM\_C\_sum$measure <- "SnasM\_C"  
  
SmanM\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SmanM\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SmanM\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SmanM\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SmanM\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SmanM\_C, 0.95, na.rm=TRUE))  
SmanM\_C\_sum$measure <- "SmanM\_C"  
  
SmanM\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SmanM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SmanM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SmanM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SmanM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SmanM\_L, 0.95, na.rm=TRUE))  
SmanM\_L\_sum$measure <- "SmanM\_L"  
  
SnasM\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(SnasM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SnasM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SnasM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SnasM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SnasM\_L, 0.95, na.rm=TRUE))  
SnasM\_L\_sum$measure <- "SnasM\_L"  
  
TrHO\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrHO\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrHO\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrHO\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrHO\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrHO\_C, 0.95, na.rm=TRUE))  
TrHO\_C\_sum$measure <- "TrHO\_C"  
  
TrEJ\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrEJ\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrEJ\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrEJ\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrEJ\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrEJ\_C, 0.95, na.rm=TRUE))  
TrEJ\_C\_sum$measure <- "TrEJ\_C"  
  
TrGo\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrGo\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrGo\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrGo\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrGo\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrGo\_C, 0.95, na.rm=TRUE))  
TrGo\_C\_sum$measure <- "TrGo\_C"  
  
TrSel\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrSel\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSel\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSel\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSel\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSel\_C, 0.95, na.rm=TRUE))  
TrSel\_C\_sum$measure <- "TrSel\_C"  
  
TrSman\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrSman\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSman\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSman\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSman\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSman\_C, 0.95, na.rm=TRUE))  
TrSman\_C\_sum$measure <- "TrSman\_C"  
  
TrSnas\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrSnas\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSnas\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSnas\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSnas\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSnas\_C, 0.95, na.rm=TRUE))  
TrSnas\_C\_sum$measure <- "TrSnas\_C"  
  
TrTr\_C\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrTr\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrTr\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrTr\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrTr\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrTr\_C, 0.95, na.rm=TRUE))  
TrTr\_C\_sum$measure <- "TrTr\_C"  
  
TrTr\_L\_sum <- headscan\_num %>%   
 summarise(percent5th = quantile(TrTr\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrTr\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrTr\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrTr\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrTr\_L, 0.95, na.rm=TRUE))  
TrTr\_L\_sum$measure <- "TrTr\_L"

quantile\_data <- rbind(AA\_C\_sum, BGl\_C\_sum, BiW\_L\_sum, BiW\_C\_sum, ChCh\_C\_sum,  
 GoSub\_C\_sum, NRB\_L\_sum, ProA\_L\_sum, ProA\_C\_sum, ProS\_C\_sum,  
 ProS\_L\_sum, SelP\_C\_sum, SelP\_L\_sum, SelDH\_C\_sum, SelM\_L\_sum,  
 SnasM\_C\_sum, SmanM\_C\_sum, SmanM\_L\_sum, SnasM\_L\_sum, TrHO\_C\_sum,  
 TrEJ\_C\_sum, TrGo\_C\_sum, TrSel\_C\_sum, TrSman\_C\_sum, TrSnas\_C\_sum,  
 TrTr\_C\_sum, TrTr\_L\_sum)

headscan\_stats$mdn <- headscan\_stats$median  
  
headscan\_stats <- headscan\_stats[c(1,3,15,9,10,4,16,5,14)]  
  
headscan\_stats <- full\_join(headscan\_stats, quantile\_data, by="measure")  
  
headscan\_stats <- headscan\_stats %>%   
 mutate(across(where(is.numeric), round, 2))

#Autofit Width Table TNR  
flextable(headscan\_stats) %>%  
 my\_ft\_theme()%>%   
 bold(part = "header") %>%   
 set\_caption("Non-imputed SumStats (mm)") %>%   
 fit\_to\_width(7.5)

**Table** : Non-imputed SumStats (mm)

| **measure** | **n** | **na** | **min** | **max** | **mean** | **mdn** | **sd** | **se** | **percent5th** | **percent25th** | **percent50th** | **percent75th** | **percent95th** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AA\_C | 1,999 | 17 | 44 | 87 | 61.25 | 61 | 6.24 | 0.14 | 52.00 | 57.00 | 61 | 65.0 | 72.0 |
| BGl\_C | 1,496 | 520 | 215 | 350 | 292.83 | 293 | 15.13 | 0.39 | 269.00 | 283.00 | 293 | 303.0 | 318.0 |
| BiW\_C | 1,999 | 17 | 101 | 188 | 133.44 | 133 | 12.92 | 0.29 | 114.00 | 124.00 | 133 | 141.0 | 156.1 |
| BiW\_L | 1,999 | 17 | 82 | 152 | 111.20 | 111 | 9.78 | 0.22 | 96.00 | 104.00 | 111 | 118.0 | 128.0 |
| ChCh\_C | 1,973 | 43 | 47 | 97 | 67.05 | 67 | 7.43 | 0.17 | 55.00 | 62.00 | 67 | 72.0 | 80.0 |
| GoSub\_C | 1,888 | 128 | 45 | 217 | 98.88 | 99 | 15.45 | 0.36 | 75.00 | 88.00 | 99 | 108.0 | 125.0 |
| NRB\_L | 2,000 | 16 | 3 | 40 | 17.95 | 18 | 4.74 | 0.11 | 11.00 | 15.00 | 18 | 21.0 | 27.0 |
| ProA\_L | 2,000 | 16 | 19 | 39 | 27.94 | 28 | 3.03 | 0.07 | 23.00 | 26.00 | 28 | 30.0 | 33.0 |
| ProA\_C | 2,000 | 16 | 20 | 44 | 30.12 | 30 | 3.50 | 0.08 | 25.00 | 28.00 | 30 | 32.0 | 36.0 |
| ProS\_C | 1,985 | 31 | 12 | 43 | 21.10 | 21 | 3.35 | 0.08 | 16.00 | 19.00 | 21 | 23.0 | 26.0 |
| ProS\_L | 1,997 | 19 | 12 | 42 | 19.16 | 19 | 2.70 | 0.06 | 15.00 | 17.00 | 19 | 21.0 | 23.0 |
| SelP\_C | 2,001 | 15 | 18 | 66 | 45.01 | 45 | 4.49 | 0.10 | 38.00 | 42.00 | 45 | 48.0 | 53.0 |
| SelP\_L | 2,001 | 15 | 16 | 65 | 44.53 | 44 | 4.41 | 0.10 | 38.00 | 42.00 | 44 | 47.0 | 52.0 |
| SelDH\_C | 2,000 | 16 | 1 | 31 | 13.05 | 13 | 2.95 | 0.07 | 8.95 | 11.00 | 13 | 15.0 | 18.0 |
| SelM\_L | 1,792 | 224 | 69 | 145 | 116.24 | 116 | 9.40 | 0.22 | 101.00 | 110.00 | 116 | 123.0 | 131.0 |
| SnasM\_C | 1,779 | 237 | 44 | 125 | 75.05 | 75 | 10.61 | 0.25 | 57.00 | 68.00 | 75 | 82.0 | 92.0 |
| SmanM\_C | 1,735 | 281 | 0 | 170 | 45.80 | 45 | 13.62 | 0.33 | 27.00 | 37.00 | 45 | 53.5 | 70.0 |
| SmanM\_L | 1,774 | 242 | 7 | 137 | 44.57 | 44 | 12.31 | 0.29 | 26.00 | 37.00 | 44 | 52.0 | 65.0 |
| SnasM\_L | 1,791 | 225 | 40 | 128 | 67.93 | 68 | 8.66 | 0.20 | 52.00 | 63.00 | 68 | 74.0 | 81.0 |
| TrHO\_C | 1,734 | 282 | 135 | 213 | 166.98 | 167 | 10.00 | 0.24 | 152.00 | 160.00 | 167 | 173.0 | 184.0 |
| TrEJ\_C | 1,983 | 33 | 20 | 60 | 38.03 | 38 | 4.69 | 0.11 | 31.00 | 35.00 | 38 | 41.0 | 46.0 |
| TrGo\_C | 1,935 | 81 | 35 | 114 | 60.03 | 60 | 8.35 | 0.19 | 48.00 | 54.00 | 60 | 65.0 | 74.0 |
| TrSel\_C | 1,985 | 31 | 120 | 168 | 141.96 | 142 | 7.48 | 0.17 | 130.00 | 137.00 | 142 | 147.0 | 155.0 |
| TrSman\_C | 1,883 | 133 | 64 | 246 | 153.32 | 152 | 14.43 | 0.33 | 132.00 | 143.00 | 152 | 162.0 | 178.0 |
| TrSnas\_C | 1,926 | 90 | 122 | 184 | 150.36 | 150 | 9.34 | 0.21 | 136.00 | 144.00 | 150 | 157.0 | 167.0 |
| TrTr\_C | 1,978 | 38 | 241 | 332 | 282.71 | 282 | 14.34 | 0.32 | 261.00 | 272.25 | 282 | 293.0 | 308.0 |
| TrTr\_L | 1,982 | 34 | 127 | 173 | 146.50 | 146 | 7.73 | 0.17 | 135.00 | 141.00 | 146 | 152.0 | 160.0 |

Imputing data!!!

imputed <- imputePCA(headscan\_num, ncp=2)  
imputed\_data <- as.data.frame(imputed$completeObs)  
imputed\_data <- round(imputed\_data, 0)

imputed\_stats <- describe(imputed\_data)  
  
  
imputed\_stats$na <- 2016 - imputed\_stats$n  
imputed\_stats <- rownames\_to\_column(imputed\_stats, "measure")

AA\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(AA\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(AA\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(AA\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(AA\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(AA\_C, 0.95, na.rm=TRUE))  
AA\_C\_sum1$measure <- "AA\_C"  
  
  
BGl\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(BGl\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(BGl\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(BGl\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(BGl\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(BGl\_C, 0.95, na.rm=TRUE))  
BGl\_C\_sum1$measure <- "BGl\_C"  
  
BiW\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(BiW\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(BiW\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(BiW\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(BiW\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(BiW\_C, 0.95, na.rm=TRUE))  
BiW\_C\_sum1$measure <- "BiW\_C"  
  
BiW\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(BiW\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(BiW\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(BiW\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(BiW\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(BiW\_L, 0.95, na.rm=TRUE))  
BiW\_L\_sum1$measure <- "BiW\_L"  
  
ChCh\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(ChCh\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ChCh\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ChCh\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ChCh\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ChCh\_C, 0.95, na.rm=TRUE))  
ChCh\_C\_sum1$measure <- "ChCh\_C"  
  
GoSub\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(GoSub\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(GoSub\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(GoSub\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(GoSub\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(GoSub\_C, 0.95, na.rm=TRUE))  
GoSub\_C\_sum1$measure <- "GoSub\_C"  
  
NRB\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(NRB\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(NRB\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(NRB\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(NRB\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(NRB\_L, 0.95, na.rm=TRUE))  
NRB\_L\_sum1$measure <- "NRB\_L"  
  
ProA\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(ProA\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProA\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProA\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProA\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProA\_L, 0.95, na.rm=TRUE))  
ProA\_L\_sum1$measure <- "ProA\_L"  
  
ProA\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(ProA\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProA\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProA\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProA\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProA\_C, 0.95, na.rm=TRUE))  
ProA\_C\_sum1$measure <- "ProA\_C"  
  
ProS\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(ProS\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProS\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProS\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProS\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProS\_C, 0.95, na.rm=TRUE))  
ProS\_C\_sum1$measure <- "ProS\_C"  
  
ProS\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(ProS\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(ProS\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(ProS\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(ProS\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(ProS\_L, 0.95, na.rm=TRUE))  
ProS\_L\_sum1$measure <- "ProS\_L"  
  
SelP\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SelP\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelP\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelP\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelP\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelP\_C, 0.95, na.rm=TRUE))  
SelP\_C\_sum1$measure <- "SelP\_C"  
  
SelP\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SelP\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelP\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelP\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelP\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelP\_L, 0.95, na.rm=TRUE))  
SelP\_L\_sum1$measure <- "SelP\_L"  
  
SelDH\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SelDH\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelDH\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelDH\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelDH\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelDH\_C, 0.95, na.rm=TRUE))  
SelDH\_C\_sum1$measure <- "SelDH\_C"  
  
SelM\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SelM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SelM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SelM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SelM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SelM\_L, 0.95, na.rm=TRUE))  
SelM\_L\_sum1$measure <- "SelM\_L"  
  
SnasM\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SnasM\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SnasM\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SnasM\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SnasM\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SnasM\_C, 0.95, na.rm=TRUE))  
SnasM\_C\_sum1$measure <- "SnasM\_C"  
  
SmanM\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SmanM\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(SmanM\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(SmanM\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(SmanM\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(SmanM\_C, 0.95, na.rm=TRUE))  
SmanM\_C\_sum1$measure <- "SmanM\_C"  
  
SmanM\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SmanM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SmanM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SmanM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SmanM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SmanM\_L, 0.95, na.rm=TRUE))  
SmanM\_L\_sum1$measure <- "SmanM\_L"  
  
SnasM\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(SnasM\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(SnasM\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(SnasM\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(SnasM\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(SnasM\_L, 0.95, na.rm=TRUE))  
SnasM\_L\_sum1$measure <- "SnasM\_L"  
  
TrHO\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrHO\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrHO\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrHO\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrHO\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrHO\_C, 0.95, na.rm=TRUE))  
TrHO\_C\_sum1$measure <- "TrHO\_C"  
  
TrEJ\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrEJ\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrEJ\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrEJ\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrEJ\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrEJ\_C, 0.95, na.rm=TRUE))  
TrEJ\_C\_sum1$measure <- "TrEJ\_C"  
  
TrGo\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrGo\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrGo\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrGo\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrGo\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrGo\_C, 0.95, na.rm=TRUE))  
TrGo\_C\_sum1$measure <- "TrGo\_C"  
  
TrSel\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrSel\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSel\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSel\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSel\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSel\_C, 0.95, na.rm=TRUE))  
TrSel\_C\_sum1$measure <- "TrSel\_C"  
  
TrSman\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrSman\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSman\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSman\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSman\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSman\_C, 0.95, na.rm=TRUE))  
TrSman\_C\_sum1$measure <- "TrSman\_C"  
  
TrSnas\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrSnas\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrSnas\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrSnas\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrSnas\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrSnas\_C, 0.95, na.rm=TRUE))  
TrSnas\_C\_sum1$measure <- "TrSnas\_C"  
  
TrTr\_C\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrTr\_C, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrTr\_C, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrTr\_C, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrTr\_C, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrTr\_C, 0.95, na.rm=TRUE))  
TrTr\_C\_sum1$measure <- "TrTr\_C"  
  
TrTr\_L\_sum1 <- imputed\_data %>%   
 summarise(percent5th = quantile(TrTr\_L, 0.05, na.rm=TRUE),  
 percent25th = quantile(TrTr\_L, 0.25, na.rm=TRUE),  
 percent50th = quantile(TrTr\_L, 0.50, na.rm=TRUE),  
 percent75th = quantile(TrTr\_L, 0.75, na.rm=TRUE),  
 percent95th = quantile(TrTr\_L, 0.95, na.rm=TRUE))  
TrTr\_L\_sum1$measure <- "TrTr\_L"

quantile\_data <- rbind(AA\_C\_sum1, BGl\_C\_sum1, BiW\_L\_sum1, BiW\_C\_sum1, ChCh\_C\_sum1,  
 GoSub\_C\_sum1, NRB\_L\_sum1, ProA\_L\_sum1, ProA\_C\_sum1, ProS\_C\_sum1,  
 ProS\_L\_sum1, SelP\_C\_sum1, SelP\_L\_sum1, SelDH\_C\_sum1, SelM\_L\_sum1,  
 SnasM\_C\_sum1, SmanM\_C\_sum1, SmanM\_L\_sum1, SnasM\_L\_sum1, TrHO\_C\_sum1,  
 TrEJ\_C\_sum1, TrGo\_C\_sum1, TrSel\_C\_sum1, TrSman\_C\_sum1, TrSnas\_C\_sum1,  
 TrTr\_C\_sum1, TrTr\_L\_sum1)

imputed\_stats$mdn <- imputed\_stats$median  
  
imputed\_stats <- imputed\_stats[c(1,3,15,9,10,4,16,5,14)]  
  
imputed\_stats <- full\_join(imputed\_stats, quantile\_data, by="measure")  
  
imputed\_stats <- imputed\_stats %>%   
 mutate(across(where(is.numeric), round, 2))

#Autofit Width Table TNR  
flextable(imputed\_stats) %>%  
 my\_ft\_theme()%>%   
 bold(part = "header") %>%   
 set\_caption("Imputed SumStats (mm)") %>%   
 fit\_to\_width(7.5)

**Table** : Imputed SumStats (mm)

| **measure** | **n** | **na** | **min** | **max** | **mean** | **mdn** | **sd** | **se** | **percent5th** | **percent25th** | **percent50th** | **percent75th** | **percent95th** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AA\_C | 2,016 | 0 | 44 | 87 | 61.25 | 61 | 6.22 | 0.14 | 52 | 57.00 | 61 | 65 | 72.00 |
| BGl\_C | 2,016 | 0 | 215 | 350 | 291.70 | 291 | 13.57 | 0.30 | 271 | 283.00 | 291 | 300 | 315.00 |
| BiW\_C | 2,016 | 0 | 101 | 188 | 133.43 | 133 | 12.87 | 0.29 | 114 | 124.00 | 133 | 141 | 156.00 |
| BiW\_L | 2,016 | 0 | 82 | 152 | 111.19 | 111 | 9.74 | 0.22 | 96 | 104.00 | 111 | 118 | 128.00 |
| ChCh\_C | 2,016 | 0 | 47 | 97 | 67.06 | 67 | 7.36 | 0.16 | 56 | 62.00 | 67 | 72 | 80.00 |
| GoSub\_C | 2,016 | 0 | 45 | 217 | 99.24 | 99 | 15.11 | 0.34 | 75 | 89.00 | 99 | 108 | 124.00 |
| NRB\_L | 2,016 | 0 | 3 | 40 | 17.95 | 18 | 4.72 | 0.11 | 11 | 15.00 | 18 | 21 | 27.00 |
| ProA\_L | 2,016 | 0 | 19 | 39 | 27.94 | 28 | 3.01 | 0.07 | 23 | 26.00 | 28 | 30 | 33.00 |
| ProA\_C | 2,016 | 0 | 20 | 44 | 30.11 | 30 | 3.48 | 0.08 | 25 | 28.00 | 30 | 32 | 36.00 |
| ProS\_C | 2,016 | 0 | 12 | 43 | 21.11 | 21 | 3.33 | 0.07 | 16 | 19.00 | 21 | 23 | 26.00 |
| ProS\_L | 2,016 | 0 | 12 | 42 | 19.16 | 19 | 2.69 | 0.06 | 15 | 17.00 | 19 | 21 | 23.00 |
| SelP\_C | 2,016 | 0 | 18 | 66 | 45.01 | 45 | 4.48 | 0.10 | 38 | 42.00 | 45 | 48 | 53.00 |
| SelP\_L | 2,016 | 0 | 16 | 65 | 44.53 | 44 | 4.39 | 0.10 | 38 | 42.00 | 44 | 47 | 52.00 |
| SelDH\_C | 2,016 | 0 | 1 | 31 | 13.05 | 13 | 2.94 | 0.07 | 9 | 11.00 | 13 | 15 | 18.00 |
| SelM\_L | 2,016 | 0 | 69 | 145 | 116.97 | 117 | 9.35 | 0.21 | 101 | 111.00 | 117 | 123 | 132.00 |
| SnasM\_C | 2,016 | 0 | 44 | 125 | 75.75 | 76 | 10.47 | 0.23 | 58 | 69.00 | 76 | 83 | 93.00 |
| SmanM\_C | 2,016 | 0 | 0 | 170 | 46.12 | 45 | 12.86 | 0.29 | 27 | 38.00 | 45 | 53 | 67.00 |
| SmanM\_L | 2,016 | 0 | 7 | 137 | 44.84 | 44 | 11.71 | 0.26 | 27 | 37.00 | 44 | 52 | 64.00 |
| SnasM\_L | 2,016 | 0 | 40 | 128 | 68.46 | 69 | 8.55 | 0.19 | 53 | 63.75 | 69 | 74 | 81.00 |
| TrHO\_C | 2,016 | 0 | 135 | 213 | 166.69 | 166 | 9.41 | 0.21 | 152 | 161.00 | 166 | 172 | 183.00 |
| TrEJ\_C | 2,016 | 0 | 20 | 60 | 38.03 | 38 | 4.66 | 0.10 | 31 | 35.00 | 38 | 41 | 46.00 |
| TrGo\_C | 2,016 | 0 | 35 | 114 | 60.12 | 60 | 8.22 | 0.18 | 48 | 55.00 | 60 | 65 | 74.00 |
| TrSel\_C | 2,016 | 0 | 120 | 168 | 141.95 | 142 | 7.45 | 0.17 | 130 | 137.00 | 142 | 147 | 155.00 |
| TrSman\_C | 2,016 | 0 | 64 | 246 | 153.74 | 153 | 14.24 | 0.32 | 132 | 143.75 | 153 | 163 | 178.00 |
| TrSnas\_C | 2,016 | 0 | 122 | 184 | 150.37 | 150 | 9.22 | 0.21 | 136 | 144.00 | 150 | 157 | 166.00 |
| TrTr\_C | 2,016 | 0 | 241 | 332 | 282.69 | 282 | 14.29 | 0.32 | 261 | 273.00 | 282 | 293 | 307.25 |
| TrTr\_L | 2,016 | 0 | 127 | 173 | 146.49 | 146 | 7.70 | 0.17 | 135 | 141.00 | 146 | 152 | 160.00 |

diff <- headscan\_stats  
  
diff <- diff %>%   
 rename(original\_n=n,  
 original\_na=na,  
 original\_min=min,  
 original\_max=max,  
 original\_mean=mean,  
 original\_mdn=mdn,  
 original\_sd=sd,  
 original\_se=se,  
 original5th=percent5th,  
 original25th=percent25th,  
 original50th=percent50th,  
 original75th=percent75th,  
 original95th=percent95th)  
  
diff$imputed\_n <- imputed\_stats$n  
diff$imputed\_na <- imputed\_stats$na  
diff$imputed\_min <- imputed\_stats$min  
diff$imputed\_max <- imputed\_stats$max  
diff$imputed\_mean <- imputed\_stats$mean  
diff$imputed\_mdn <- imputed\_stats$mdn  
diff$imputed\_sd <- imputed\_stats$sd  
diff$imputed\_se <- imputed\_stats$se  
diff$imputed5th <- imputed\_stats$percent5th  
diff$imputed25th <- imputed\_stats$percent25th  
diff$imputed50th <- imputed\_stats$percent50th  
diff$imputed75th <- imputed\_stats$percent75th  
diff$imputed95th <- imputed\_stats$percent95th  
  
  
diff <- diff %>%   
 mutate(across(where(is.numeric), round, 2))  
  
diff$n\_diff <- diff$imputed\_n - diff$original\_n  
diff$na\_diff <- diff$imputed\_na - diff$original\_na  
diff$min\_diff <- diff$imputed\_min - diff$original\_min  
diff$max\_diff <- diff$imputed\_max - diff$original\_max  
diff$mean\_diff <- diff$imputed\_mean - diff$original\_mean  
diff$mdn\_diff <- diff$imputed\_mdn - diff$original\_mdn  
diff$sd\_diff <- diff$imputed\_sd - diff$original\_sd  
diff$se\_diff <- diff$imputed\_se - diff$original\_se  
diff$diff\_5th <- diff$imputed5th - diff$original5th  
diff$diff\_25th <- diff$imputed25th - diff$original25th  
diff$diff\_50th <- diff$imputed50th - diff$original50th  
diff$diff\_75th <- diff$imputed75th - diff$original75th  
diff$diff\_95th <- diff$imputed95th - diff$original95th  
  
diff <- diff[c(1, 28:40)]  
  
str(diff)

## Classes 'psych', 'describe' and 'data.frame': 27 obs. of 14 variables:  
## $ measure : chr "AA\_C" "BGl\_C" "BiW\_C" "BiW\_L" ...  
## $ n\_diff : num 17 520 17 17 43 128 16 16 16 31 ...  
## $ na\_diff : num -17 -520 -17 -17 -43 -128 -16 -16 -16 -31 ...  
## $ min\_diff : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ max\_diff : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ mean\_diff: num 0 -1.13 -0.01 -0.01 0.01 ...  
## $ mdn\_diff : num 0 -2 0 0 0 0 0 0 0 0 ...  
## $ sd\_diff : num -0.02 -1.56 -0.05 -0.04 -0.07 ...  
## $ se\_diff : num 0 -0.09 0 0 -0.01 ...  
## $ diff\_5th : num 0 2 0 0 1 0 0 0 0 0 ...  
## $ diff\_25th: num 0 0 0 0 0 1 0 0 0 0 ...  
## $ diff\_50th: num 0 -2 0 0 0 0 0 0 0 0 ...  
## $ diff\_75th: num 0 -3 0 0 0 0 0 0 0 0 ...  
## $ diff\_95th: num 0 -3 -0.1 0 0 ...

#Autofit Width Table TNR  
flextable(diff) %>%  
 my\_ft\_theme()%>%   
 bold(part = "header") %>%   
 set\_caption("Differences (mm) Between Imputed and Original SumStats") %>%   
 fit\_to\_width(7.5)

**Table** : Differences (mm) Between Imputed and Original SumStats

| **measure** | **n\_diff** | **na\_diff** | **min\_diff** | **max\_diff** | **mean\_diff** | **mdn\_diff** | **sd\_diff** | **se\_diff** | **diff\_5th** | **diff\_25th** | **diff\_50th** | **diff\_75th** | **diff\_95th** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AA\_C | 17 | -17 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| BGl\_C | 520 | -520 | 0 | 0 | -1.13 | -2 | -1.56 | -0.09 | 2.00 | 0.00 | -2 | -3.0 | -3.00 |
| BiW\_C | 17 | -17 | 0 | 0 | -0.01 | 0 | -0.05 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | -0.10 |
| BiW\_L | 17 | -17 | 0 | 0 | -0.01 | 0 | -0.04 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| ChCh\_C | 43 | -43 | 0 | 0 | 0.01 | 0 | -0.07 | -0.01 | 1.00 | 0.00 | 0 | 0.0 | 0.00 |
| GoSub\_C | 128 | -128 | 0 | 0 | 0.36 | 0 | -0.34 | -0.02 | 0.00 | 1.00 | 0 | 0.0 | -1.00 |
| NRB\_L | 16 | -16 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| ProA\_L | 16 | -16 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| ProA\_C | 16 | -16 | 0 | 0 | -0.01 | 0 | -0.02 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| ProS\_C | 31 | -31 | 0 | 0 | 0.01 | 0 | -0.02 | -0.01 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| ProS\_L | 19 | -19 | 0 | 0 | 0.00 | 0 | -0.01 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| SelP\_C | 15 | -15 | 0 | 0 | 0.00 | 0 | -0.01 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| SelP\_L | 15 | -15 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| SelDH\_C | 16 | -16 | 0 | 0 | 0.00 | 0 | -0.01 | 0.00 | 0.05 | 0.00 | 0 | 0.0 | 0.00 |
| SelM\_L | 224 | -224 | 0 | 0 | 0.73 | 1 | -0.05 | -0.01 | 0.00 | 1.00 | 1 | 0.0 | 1.00 |
| SnasM\_C | 237 | -237 | 0 | 0 | 0.70 | 1 | -0.14 | -0.02 | 1.00 | 1.00 | 1 | 1.0 | 1.00 |
| SmanM\_C | 281 | -281 | 0 | 0 | 0.32 | 0 | -0.76 | -0.04 | 0.00 | 1.00 | 0 | -0.5 | -3.00 |
| SmanM\_L | 242 | -242 | 0 | 0 | 0.27 | 0 | -0.60 | -0.03 | 1.00 | 0.00 | 0 | 0.0 | -1.00 |
| SnasM\_L | 225 | -225 | 0 | 0 | 0.53 | 1 | -0.11 | -0.01 | 1.00 | 0.75 | 1 | 0.0 | 0.00 |
| TrHO\_C | 282 | -282 | 0 | 0 | -0.29 | -1 | -0.59 | -0.03 | 0.00 | 1.00 | -1 | -1.0 | -1.00 |
| TrEJ\_C | 33 | -33 | 0 | 0 | 0.00 | 0 | -0.03 | -0.01 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| TrGo\_C | 81 | -81 | 0 | 0 | 0.09 | 0 | -0.13 | -0.01 | 0.00 | 1.00 | 0 | 0.0 | 0.00 |
| TrSel\_C | 31 | -31 | 0 | 0 | -0.01 | 0 | -0.03 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |
| TrSman\_C | 133 | -133 | 0 | 0 | 0.42 | 1 | -0.19 | -0.01 | 0.00 | 0.75 | 1 | 1.0 | 0.00 |
| TrSnas\_C | 90 | -90 | 0 | 0 | 0.01 | 0 | -0.12 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | -1.00 |
| TrTr\_C | 38 | -38 | 0 | 0 | -0.02 | 0 | -0.05 | 0.00 | 0.00 | 0.75 | 0 | 0.0 | -0.75 |
| TrTr\_L | 34 | -34 | 0 | 0 | -0.01 | 0 | -0.03 | 0.00 | 0.00 | 0.00 | 0 | 0.0 | 0.00 |

diff\_selected <- diff[c(1,3,4,6,7,11,13,15,19,24,26,27),]  
  
#Autofit Width Table TNR  
flextable(diff\_selected) %>%  
 my\_ft\_theme()%>%   
 bold(part = "header") %>%   
 set\_caption("Differences (mm) Between Imputed and Original SumStats") %>%   
 fit\_to\_width(7.5)

**Table** : Differences (mm) Between Imputed and Original SumStats

| **measure** | **n\_diff** | **na\_diff** | **min\_diff** | **max\_diff** | **mean\_diff** | **mdn\_diff** | **sd\_diff** | **se\_diff** | **diff\_5th** | **diff\_25th** | **diff\_50th** | **diff\_75th** | **diff\_95th** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AA\_C | 17 | -17 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |
| BiW\_C | 17 | -17 | 0 | 0 | -0.01 | 0 | -0.05 | 0.00 | 0 | 0.00 | 0 | 0 | -0.10 |
| BiW\_L | 17 | -17 | 0 | 0 | -0.01 | 0 | -0.04 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |
| GoSub\_C | 128 | -128 | 0 | 0 | 0.36 | 0 | -0.34 | -0.02 | 0 | 1.00 | 0 | 0 | -1.00 |
| NRB\_L | 16 | -16 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |
| ProS\_L | 19 | -19 | 0 | 0 | 0.00 | 0 | -0.01 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |
| SelP\_L | 15 | -15 | 0 | 0 | 0.00 | 0 | -0.02 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |
| SelM\_L | 224 | -224 | 0 | 0 | 0.73 | 1 | -0.05 | -0.01 | 0 | 1.00 | 1 | 0 | 1.00 |
| SnasM\_L | 225 | -225 | 0 | 0 | 0.53 | 1 | -0.11 | -0.01 | 1 | 0.75 | 1 | 0 | 0.00 |
| TrSman\_C | 133 | -133 | 0 | 0 | 0.42 | 1 | -0.19 | -0.01 | 0 | 0.75 | 1 | 1 | 0.00 |
| TrTr\_C | 38 | -38 | 0 | 0 | -0.02 | 0 | -0.05 | 0.00 | 0 | 0.75 | 0 | 0 | -0.75 |
| TrTr\_L | 34 | -34 | 0 | 0 | -0.01 | 0 | -0.03 | 0.00 | 0 | 0.00 | 0 | 0 | 0.00 |

headscan\_full1 <- rownames\_to\_column(headscan\_full1, "ID")  
imputed\_data <- rownames\_to\_column(imputed\_data, "ID")  
  
headscan\_demographics <- headscan\_full1[c(1,29:33)]  
  
imputed\_data <- full\_join(imputed\_data, headscan\_demographics, by="ID")  
  
write\_xlsx(imputed\_data, "C:\\Users\\19177\\OneDrive - Colostate\\Desktop\\Dissertation\\headscan\_dissertation\\imputed\_data.xlsx")