

# Group Assignment

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```
library(ggplot2)
library(cowplot)
```

```
## Warning: package 'cowplot' was built under R version 4.3.2
```

```
library(lattice)
library(reshape2)
```

Independent variables: sex, Age, SNP, Period

Dependent variables: SHS, Severity

ID variable: id

Time variable: Visit

```
load("Group_4.RData")
data_df = DF
data_df$SNP = factor(data_df$SNP, levels = 0:2, labels = 0:2)
# data_t_df_v = list() for (i in 0:7){ data_t_df_v[[i+1]] =
# data_df[data_df$Visit == i, ] }
data0_df = data_df[data_df$Visit == 0, ]
```

## Descriptive Analysis

sex, Age, SNP, Period:

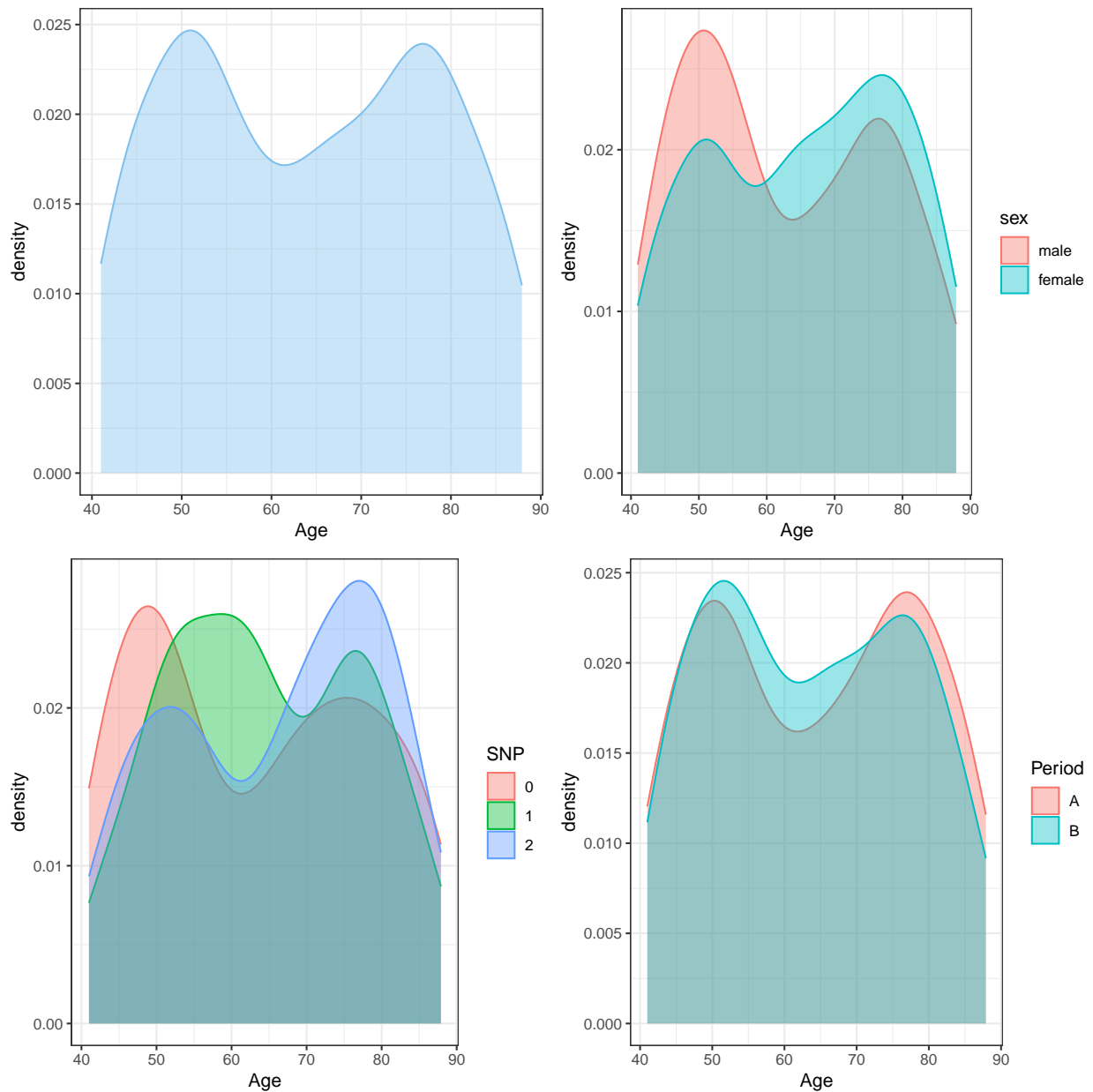
```
summary(data0_df[, c("sex", "Age", "SNP", "Period")])
```

```
##      sex      Age      SNP      Period
## male  :247  Min.   :41.00  0:250    A:250
## female:253  1st Qu.:51.58  1:149    B:250
##                Median :64.50  2:101
##                Mean    :64.11
##                3rd Qu.:76.62
##                Max.    :87.90
```

```

d1 = ggplot(data = data0_df, mapping = aes(x = Age)) + theme_bw() + geom_density(color = "skyblue2",
  fill = "skyblue2", alpha = 0.4)
d2 = ggplot(data = data0_df, mapping = aes(x = Age, color = sex, fill = sex)) + theme_bw() +
  geom_density(alpha = 0.4)
d3 = ggplot(data = data0_df, mapping = aes(x = Age, color = SNP, fill = SNP)) + theme_bw() +
  geom_density(alpha = 0.4)
d4 = ggplot(data = data0_df, mapping = aes(x = Age, color = Period, fill = Period)) +
  theme_bw() + geom_density(alpha = 0.4)
plot_grid(d1, d2, d3, d4, ncol = 2, nrow = 2)

```

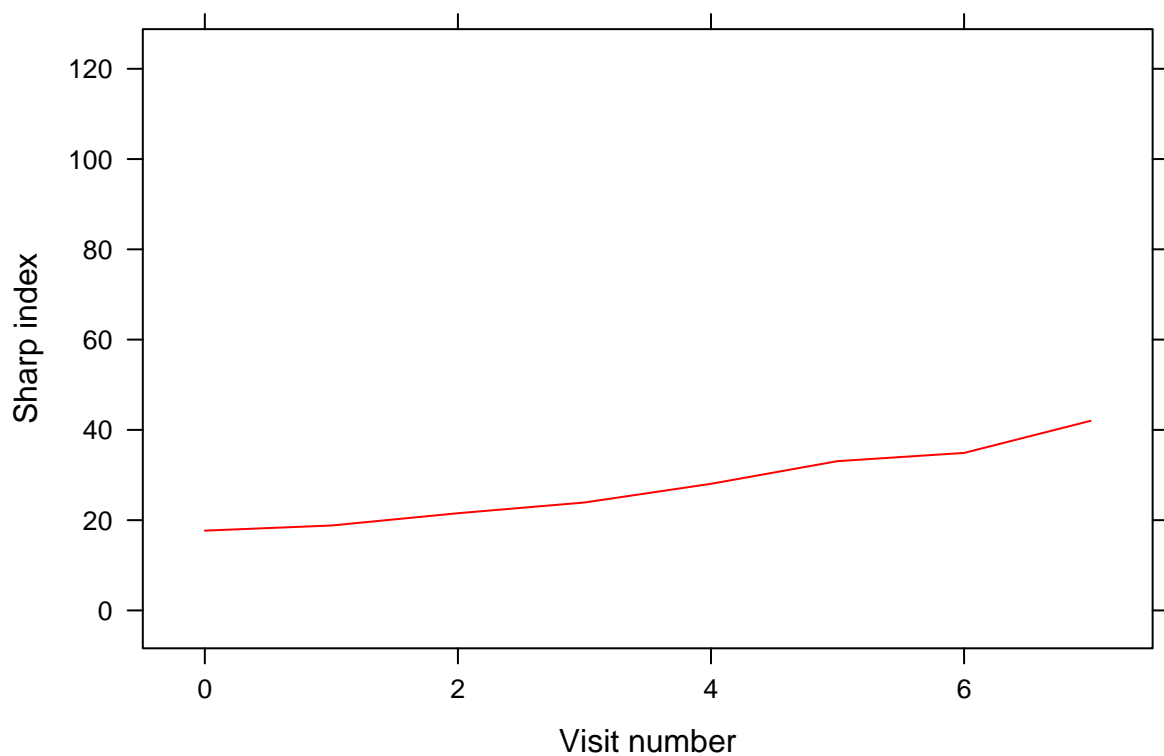


```
data_df$Age2 = as.factor(ifelse(data_df$Age <= 60, "<=60", ">60"))
```

SHS:

Mean structure:

```
p1 = xyplot(SHS ~ Visit, groups = id, data = data_df, xlab = "Visit number", ylab = "Sharp index",
  type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#FF0000")
  })
p1
```

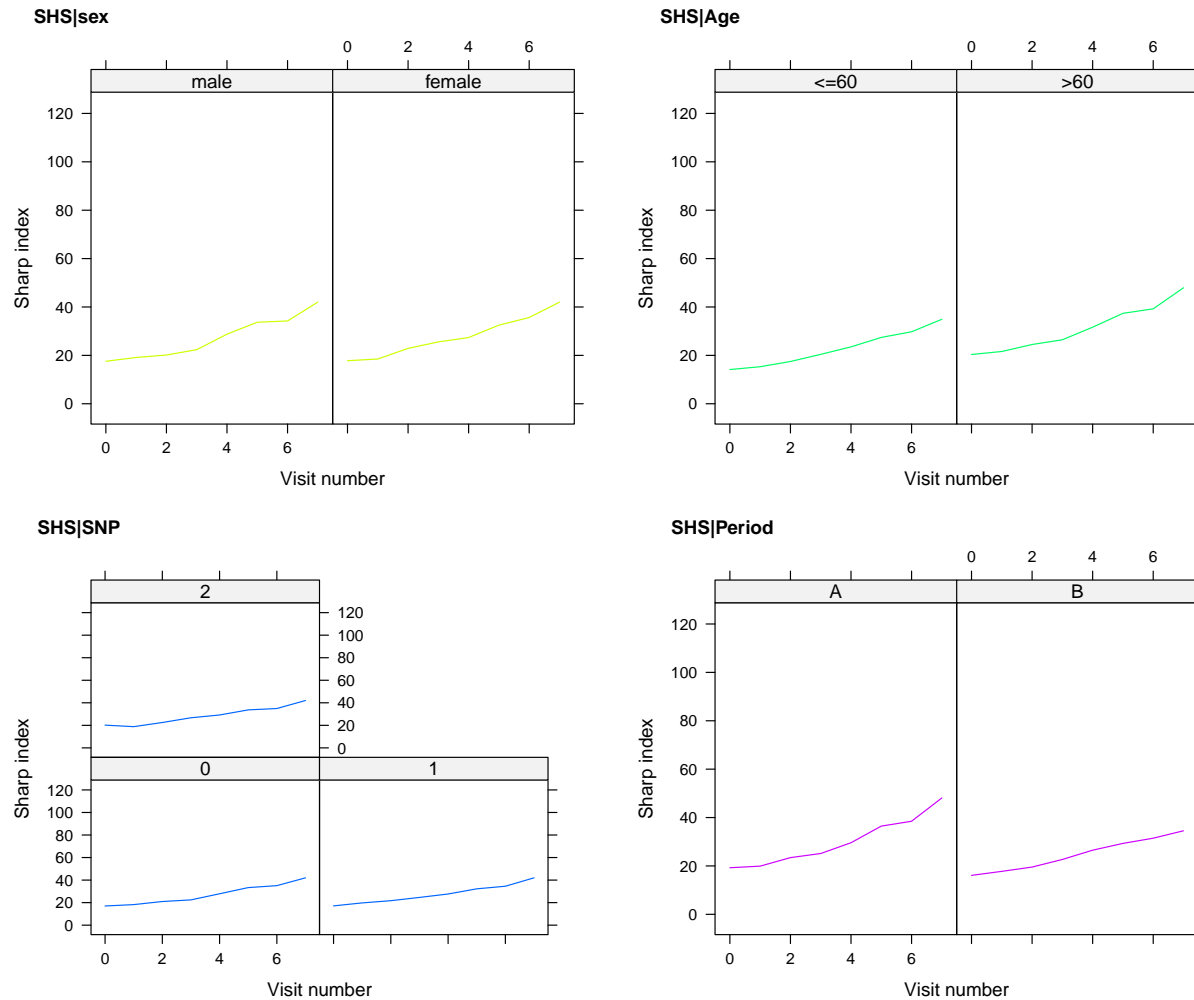


```
p2 = xyplot(SHS ~ Visit | sex, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Sharp index", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#CCFF00")
  })
p3 = xyplot(SHS ~ Visit | Age2, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Sharp index", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#00FF66")
  })
p4 = xyplot(SHS ~ Visit | SNP, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Sharp index", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#0066FF")
  })
p5 = xyplot(SHS ~ Visit | Period, groups = id, data = data_df, xlab = "Visit number",
```

```

ylab = "Sharp index", type = "l", panel = function(x, y) {
  panel.average(x, y, horizontal = FALSE, col = "#CC00FF")
})
plot_grid(p2, p3, p4, p5, ncol = 2, nrow = 2, labels = c("SHS|sex", "SHS|Age", "SHS|SNP",
  "SHS|Period"), label_colour = "black", label_size = 12)

```



Variance structure:

```

data_df_wide = dcast(data_df[, -which(colnames(data_df) == "Severity")], id + Period +
  Age + sex + SNP + Age2 ~ Visit, value.var = "SHS")
round(diag(cov(data_df_wide[, c("0", "1", "2", "3", "4", "5", "6", "7")], use = "pairwise.complete.obs".
  2)

```

```

##      0      1      2      3      4      5      6      7
## 87.44 123.26 172.36 205.96 278.66 408.13 356.94 418.78

```

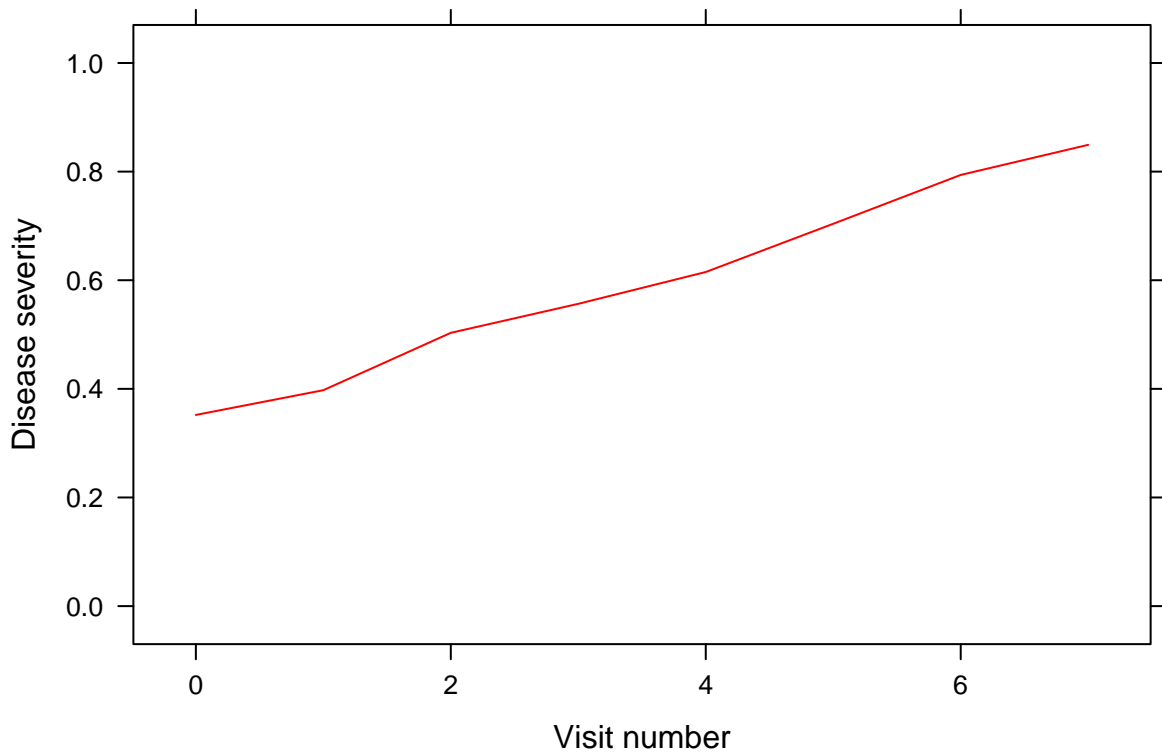
```
round(cor(data_df_wide[, c("0", "1", "2", "3", "4", "5", "6", "7")], use = "pairwise.complete.obs"),
      2)
```

```
##      0      1      2      3      4      5      6      7
## 0 1.00 0.52 0.38 0.39 0.30 0.37 0.42 0.44
## 1 0.52 1.00 0.67 0.57 0.44 0.36 0.29 0.44
## 2 0.38 0.67 1.00 0.62 0.54 0.33 0.36 0.41
## 3 0.39 0.57 0.62 1.00 0.64 0.44 0.48 0.47
## 4 0.30 0.44 0.54 0.64 1.00 0.67 0.69 0.58
## 5 0.37 0.36 0.33 0.44 0.67 1.00 0.77 0.63
## 6 0.42 0.29 0.36 0.48 0.69 0.77 1.00 0.66
## 7 0.44 0.44 0.41 0.47 0.58 0.63 0.66 1.00
```

Severity:

Mean structure:

```
p1 = xyplot(Severity ~ Visit, groups = id, data = data_df, xlab = "Visit number",
            ylab = "Disease severity", type = "l", panel = function(x, y) {
              panel.average(x, y, horizontal = FALSE, col = "#FF0000")
            })
p1
```



```

p2 = xyplot(Severity ~ Visit | sex, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Disease severity", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#CCFF00")
  })
p3 = xyplot(Severity ~ Visit | Age2, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Disease severity", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#00FF66")
  })
p4 = xyplot(Severity ~ Visit | SNP, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Disease severity", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#0066FF")
  })
p5 = xyplot(Severity ~ Visit | Period, groups = id, data = data_df, xlab = "Visit number",
  ylab = "Disease severity", type = "l", panel = function(x, y) {
    panel.average(x, y, horizontal = FALSE, col = "#CC00FF")
  })
plot_grid(p2, p3, p4, p5, ncol = 2, nrow = 2, labels = c("Severity|sex", "Severity|Age",
  "Severity|SNP", "Severity|Period"), label_colour = "black", label_size = 12)

```

