Untitled

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Randomization

- Note: We made a mistake with the initial calculation of sample size and only had 144 participants. We finished random assingment and collection of data before we realized that we actually needed 180 participants total so we randomized the treatments of the 36 extra participants later on seperately

```
# We numbered our partipants from 2 to 145. #2-#49 are young, #50-#97 are middle aged, #98-#145 are old
Young <- c(2:49)
Middle <- c(50:97)
Old <- c(98:145)

Treatments <- rep(c("Dance","Classical","None"),16)

set.seed(875928)
newYoung <- sample (Young, 48, replace = F)
newMiddle <- sample (Middle, 48, replace = F)
newOld <- sample (Old, 48, replace = F)

youngTreatment <- sample (Treatments, 48, replace = F)
middleTreatment <- sample (Treatments, 48, replace = F)
oldTreatment <- sample (Treatments, 48, replace = F)

youngAssigment <- data.frame(newYoung,youngTreatment )
middleAssignment <- data.frame(newMiddle,middleTreatment)
oldAssignment <- data.frame(newOld,oldTreatment)

youngAssigment[order(youngAssigment$newYoung),]
```

```
##    newYoung youngTreatment
## 39        2          Dance
## 24        3          Dance
## 1         4           None
## 36        5      Classical
## 15        6      Classical
## 6         7      Classical
## 43        8           None
## 35        9          Dance
## 2        10          Dance
## 38       11      Classical
## 21       12          Dance
## 19       13      Classical
## 47       14          Dance
## 7        15      Classical
## 16       16           None
## 29       17           None
## 25       18          Dance
## 28       19          Dance
```

```
## 18       20           None
## 17       21           None
## 9        22      Classical
## 30       23          Dance
## 45       24      Classical
## 13       25           None
## 4        26      Classical
## 8        27           None
## 46       28           None
## 37       29      Classical
## 27       30           None
## 20       31      Classical
## 5        32      Classical
## 12       33           None
## 33       34          Dance
## 23       35          Dance
## 44       36          Dance
## 42       37          Dance
## 14       38      Classical
## 41       39          Dance
## 10       40          Dance
## 34       41          Dance
## 32       42      Classical
## 48       43      Classical
## 22       44           None
## 31       45           None
## 40       46           None
## 11       47           None
## 26       48           None
## 3        49      Classical
```

```
middleAssignment[order(middleAssignment$newMiddle),]
```

```
##    newMiddle middleTreatment
## 5         50           Dance
## 40        51           Dance
## 15        52           Dance
## 16        53       Classical
## 32        54       Classical
## 23        55           Dance
## 28        56       Classical
## 43        57           Dance
## 30        58       Classical
## 25        59           Dance
## 19        60            None
## 21        61       Classical
## 9         62            None
## 24        63            None
## 14        64       Classical
## 29        65           Dance
## 44        66            None
## 7         67           Dance
## 41        68            None
## 18        69           Dance
## 13        70           Dance
```

```
## 17        71       Classical
## 37        72       Classical
## 22        73            None
## 12        74       Classical
## 39        75           Dance
## 27        76       Classical
## 11        77            None
## 42        78           Dance
## 31        79            None
## 26        80       Classical
## 2         81            None
## 1         82            None
## 6         83           Dance
## 48        84       Classical
## 8         85       Classical
## 47        86            None
## 20        87            None
## 36        88           Dance
## 33        89            None
## 3         90           Dance
## 45        91       Classical
## 35        92       Classical
## 38        93            None
## 46        94            None
## 4         95       Classical
## 10        96            None
## 34        97           Dance
```

```
oldAssignment[order(oldAssignment$newOld),]
```

```
##    newOld oldTreatment
## 17     98        Dance
## 36     99    Classical
## 3     100        Dance
## 8     101        Dance
## 40    102         None
## 41    103    Classical
## 4     104    Classical
## 27    105         None
## 29    106    Classical
## 7     107        Dance
## 19    108         None
## 6     109    Classical
## 5     110        Dance
## 11    111         None
## 39    112    Classical
## 14    113    Classical
## 13    114         None
## 1     115         None
## 22    116    Classical
## 10    117         None
## 15    118        Dance
## 24    119    Classical
## 20    120         None
## 47    121    Classical
```

```
## 37    122         None
## 48    123        Dance
## 28    124        Dance
## 12    125    Classical
## 46    126    Classical
## 42    127         None
## 25    128    Classical
## 9     129    Classical
## 18    130        Dance
## 26    131         None
## 30    132         None
## 45    133        Dance
## 35    134         None
## 32    135        Dance
## 33    136         None
## 21    137         None
## 31    138        Dance
## 38    139    Classical
## 2     140        Dance
## 43    141        Dance
## 23    142        Dance
## 16    143        Dance
## 34    144    Classical
## 44    145         None
```

```
##The extra 36 participants random treatment assingment
Young2 <- c(26:31,56:61)
Middle2 <- c(86:91,116:121)
Old2 <- c(146:151,175:180)
Treatments2 <- rep(c("Dance","Classical","None"),4)

set.seed(875929)
newYoung2 <- sample (Young2, 12, replace = F)
newMiddle2 <- sample (Middle2, 12, replace = F)
newOld2 <- sample (Old2, 12, replace = F)

youngTreatment2 <- sample (Treatments2, 12, replace = F)
middleTreatment2 <- sample (Treatments2, 12, replace = F)
oldTreatment2 <- sample (Treatments2, 12, replace = F)

youngAssigment2 <- data.frame(newYoung2,youngTreatment2 )
middleAssignment2 <- data.frame(newMiddle2,middleTreatment2)
oldAssignment2 <- data.frame(newOld2,oldTreatment2)

youngAssigment2[order(youngAssigment2$newYoung2),]
```

```
##    newYoung2 youngTreatment2
## 7         26           Dance
## 6         27            None
## 3         28       Classical
## 11        29            None
## 5         30       Classical
## 1         31           Dance
## 9         56           Dance
## 10        57       Classical
```

```
## 4         58            None
## 12        59           Dance
## 2         60            None
## 8         61       Classical
```

```
middleAssignment2[order(middleAssignment2$newMiddle2),]
```

```
##    newMiddle2 middleTreatment2
## 11         86        Classical
## 5          87        Classical
## 3          88            Dance
## 2          89            Dance
## 6          90            Dance
## 10         91             None
## 7         116             None
## 1         117        Classical
## 12        118             None
## 4         119        Classical
## 9         120            Dance
## 8         121             None
```

```
oldAssignment2[order(oldAssignment2$newOld2),]
```

```
##    newOld2 oldTreatment2
## 2      146         Dance
## 5      147     Classical
## 4      148          None
## 10     149     Classical
## 3      150     Classical
## 11     151          None
## 1      175          None
## 12     176     Classical
## 6      177         Dance
## 7      178          None
## 8      179         Dance
## 9      180         Dance
```

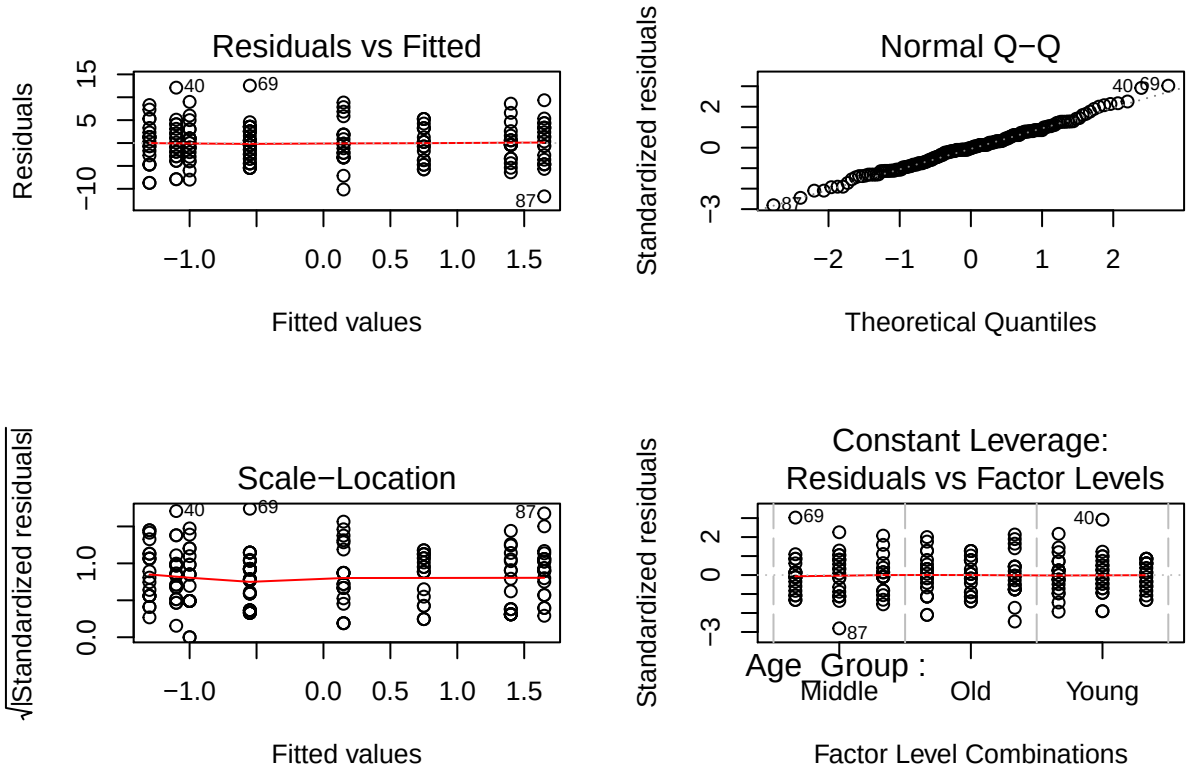
Anova and Model Checking

```
project <- read.csv("The Islanders Data (Suoyi Yang).csv")

Age_Group <- project$Age.Group
endDiastolic <- project$End.Diastolic
endSystolic <- project$End.Systolic
changeInSystolic <- project$Change.in.Systolic
changeInDiastolic <- project$Change.in.Diastolic
Music_Genre <- project$Music.Genre

par(mfrow=c(2,2))
library(knitr)

m1 <- anova(model1 <- lm(changeInDiastolic~Age_Group*Music_Genre))
kable(m1, digits = 5, caption = "Anova for Change in Diastolic BP")
```

Table 1: Anova for Change in Diastolic BP

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Age_Group	2	88.87778	44.43889	2.45483	0.08890
Music_Genre	2	71.41111	35.70556	1.97240	0.14228
Age_Group:Music_Genre	4	34.48889	8.62222	0.47630	0.75310
Residuals	171	3095.55000	18.10263	NA	NA

```
plot(model1)
```

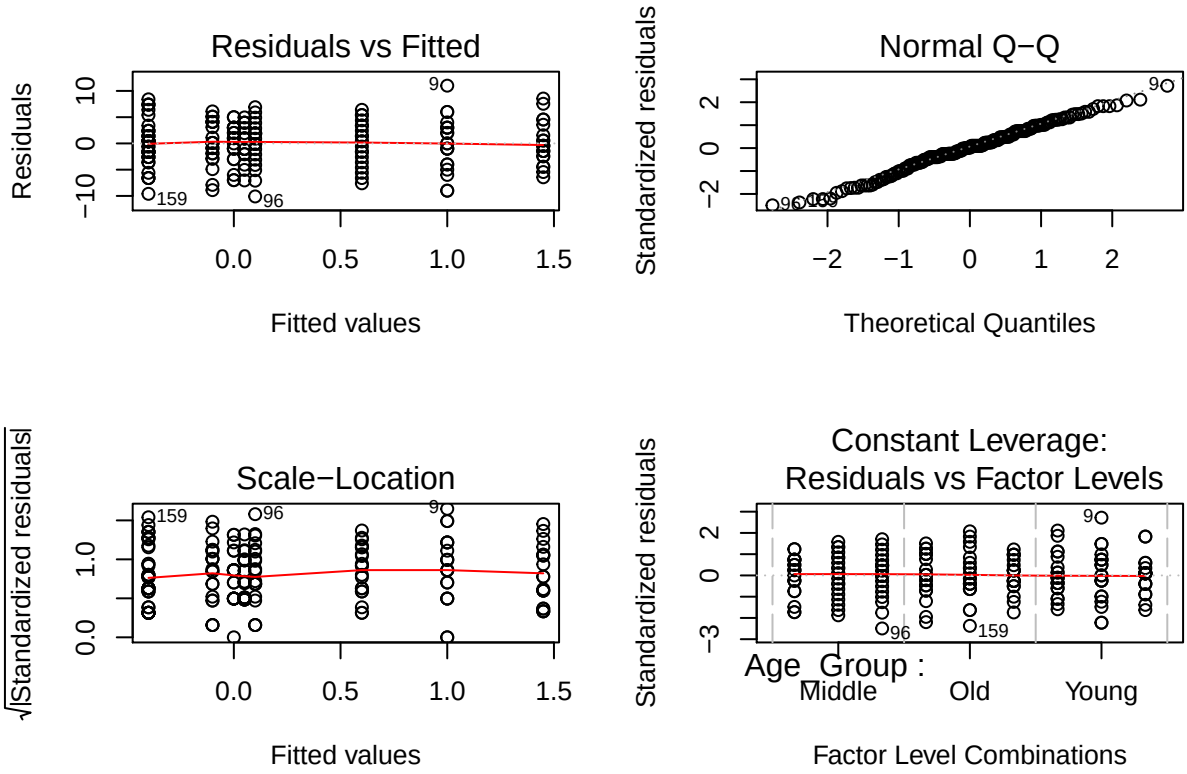



```
m2 <- anova(model2 <- lm(changeInSystolic~Age_Group*Music_Genre))
kable(m2, digits = 5, caption = "Anova for Change in Systolic BP")
```

Table 2: Anova for Change in Systolic BP

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Age_Group	2	20.87778	10.43889	0.60512	0.54717
Music_Genre	2	10.41111	5.20556	0.30176	0.73991
Age_Group:Music_Genre	4	33.05556	8.26389	0.47904	0.75109
Residuals	171	2949.90000	17.25088	NA	NA

```
plot(model2)
```

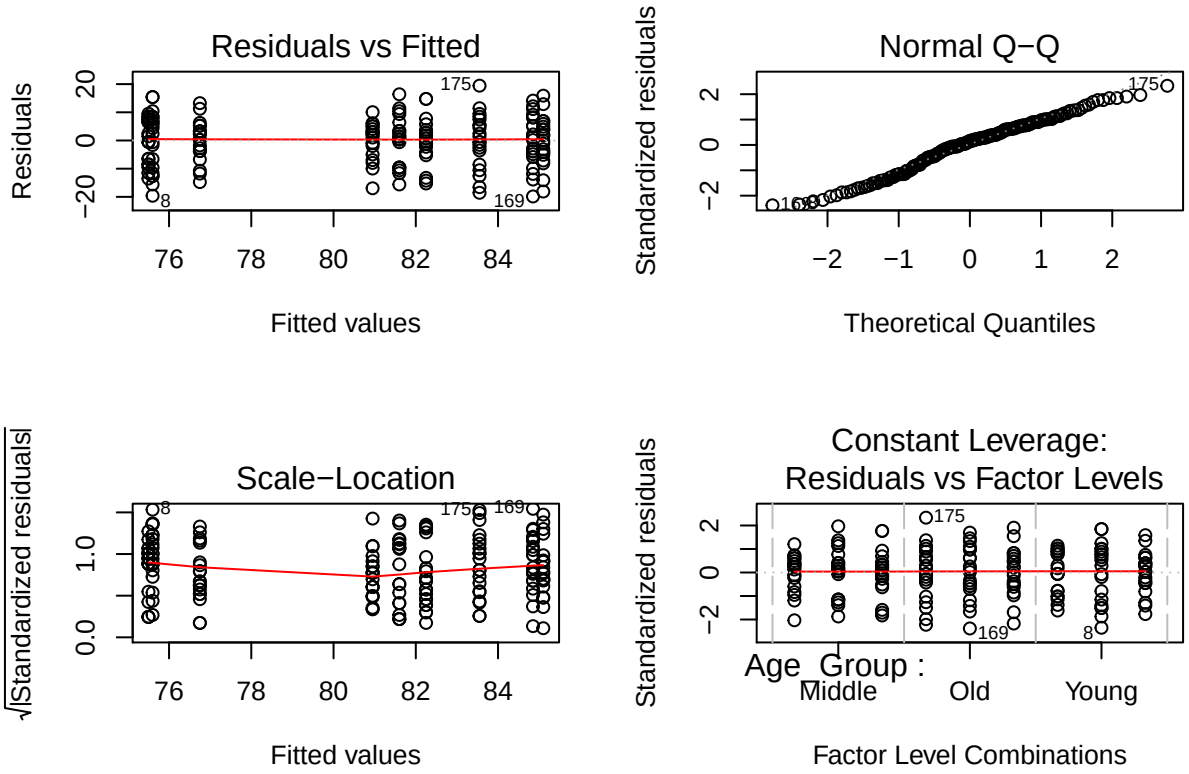



```
m3 <- anova(model3 <- lm(endDiastolic~Age_Group*Music_Genre))
kable(m3, digits = 5, caption = "Anova for Diastolic BP After Musical Treatments")
```

Table 3: Anova for Diastolic BP After Musical Treatments

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Age_Group	2	2268.70000	1134.35000	15.49764	0.00000
Music_Genre	2	56.03333	28.01667	0.38277	0.68255
Age_Group:Music_Genre	4	7.86667	1.96667	0.02687	0.99859
Residuals	171	12516.35000	73.19503	NA	NA

```
plot(model3)
```

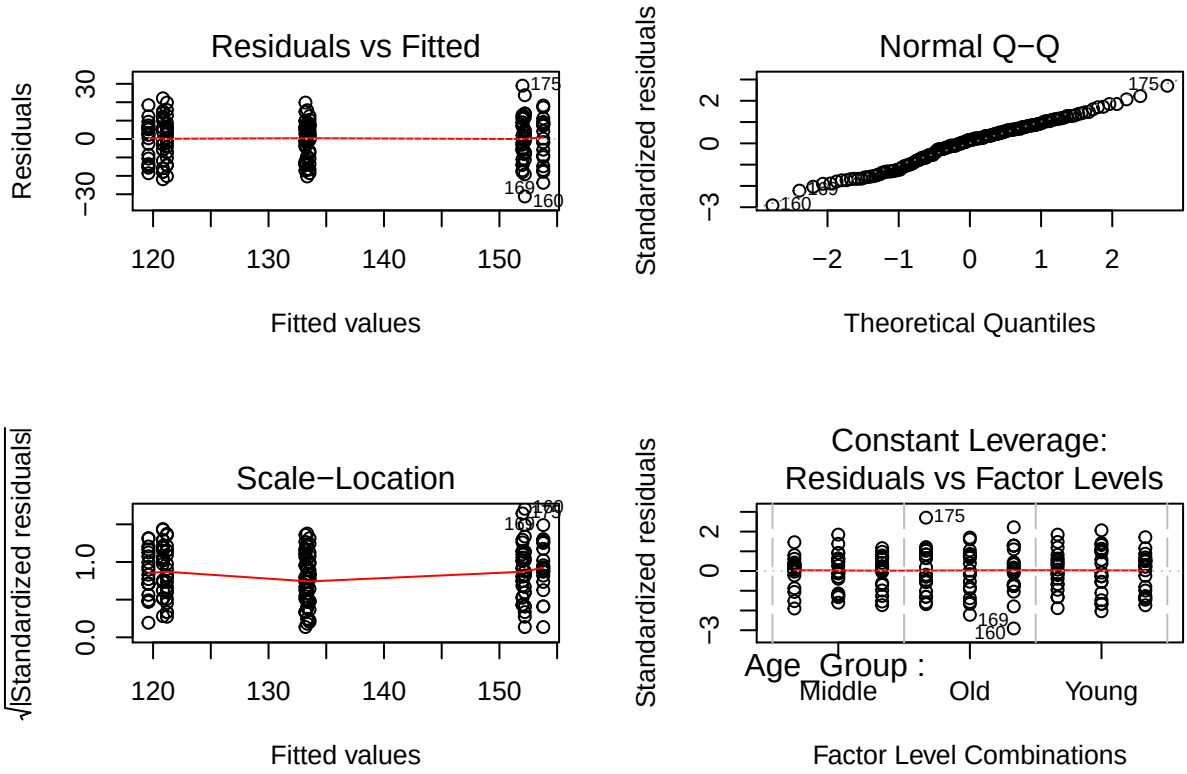



```
m4 <- anova(model4 <- lm(endSystolic~Age_Group*Music_Genre))
kable(m4, digits = 5, caption = "Anova for Systolic BP After Musical Treatments")
```

Table 4: Anova for Systolic BP After Musical Treatments

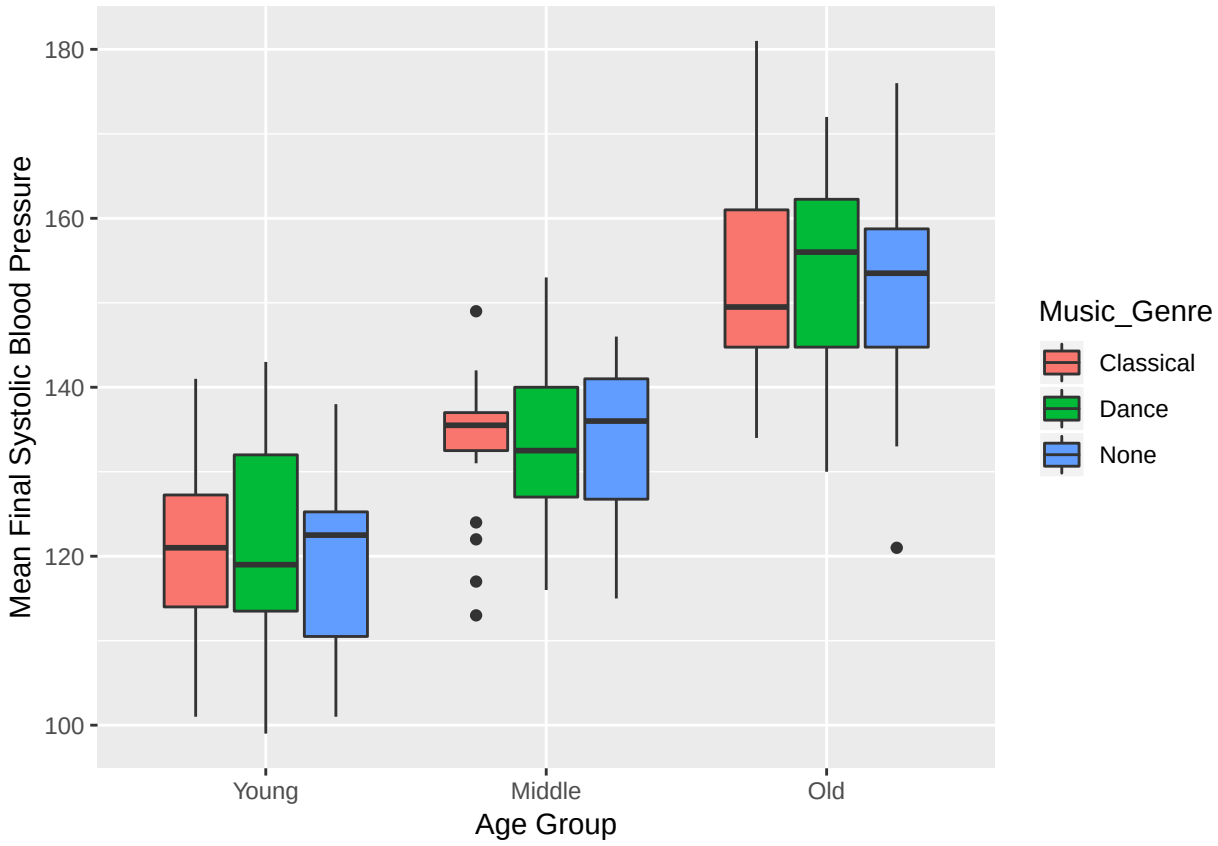
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Age_Group	2	31364.74444	15682.37222	129.63990	0.00000
Music_Genre	2	20.84444	10.42222	0.08616	0.91749
Age_Group:Music_Genre	4	47.62222	11.90556	0.09842	0.98284
Residuals	171	20685.65000	120.96871	NA	NA

```
plot(model4)
```

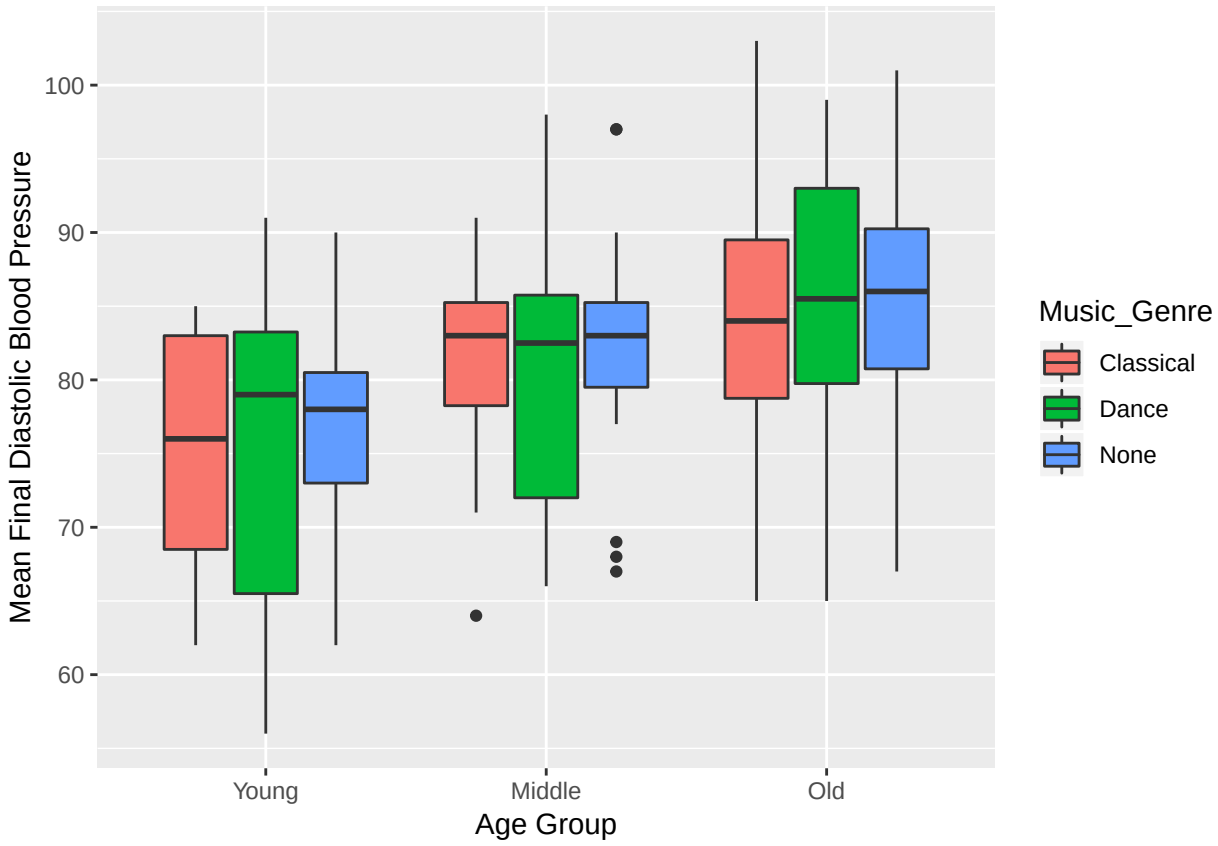


Interation and Box-Plot

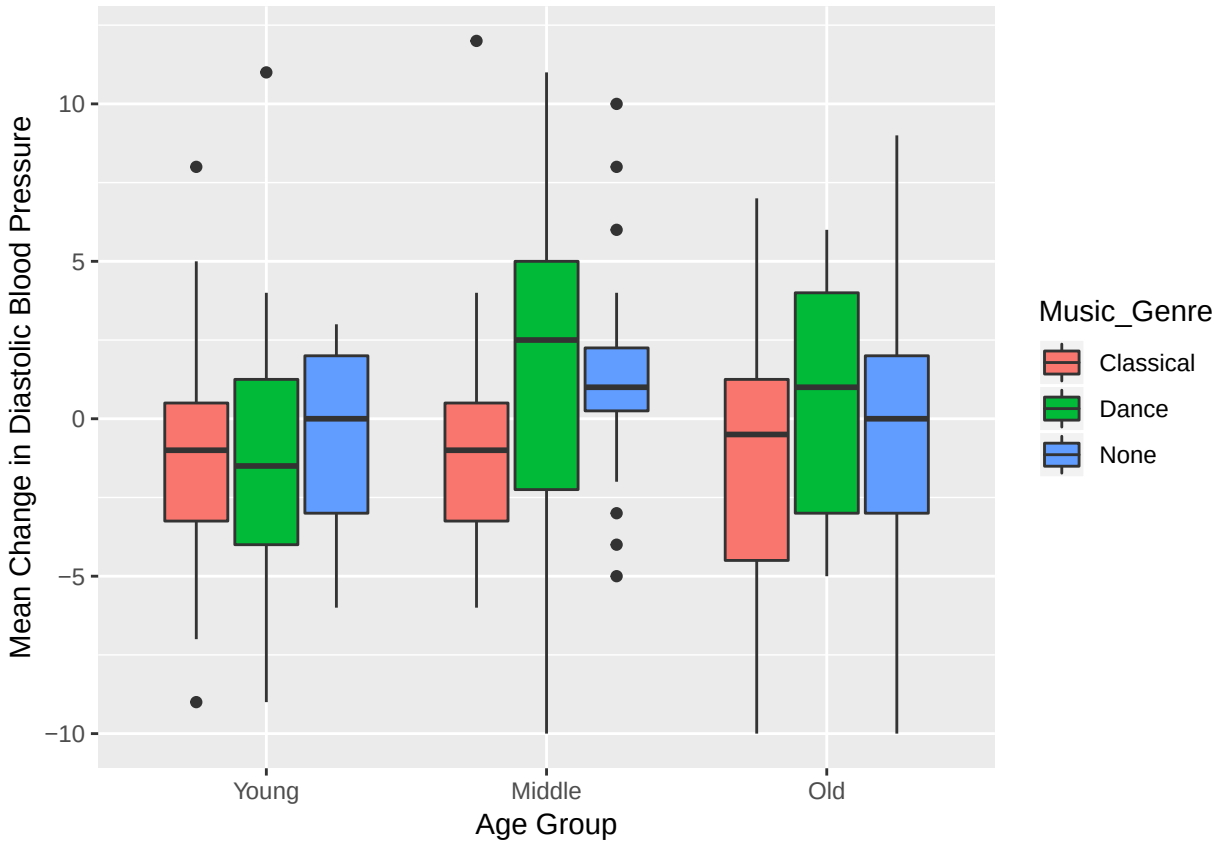
```
library(ggplot2)
x<-factor(Age_Group)
group<-factor(x,levels = c("Young","Middle","Old"))
ggplot(project,aes(x=group,y=endSystolic,fill=Music_Genre))+geom_boxplot()+
  labs(x = 'Age Group', y = 'Mean Final Systolic Blood Pressure')
```



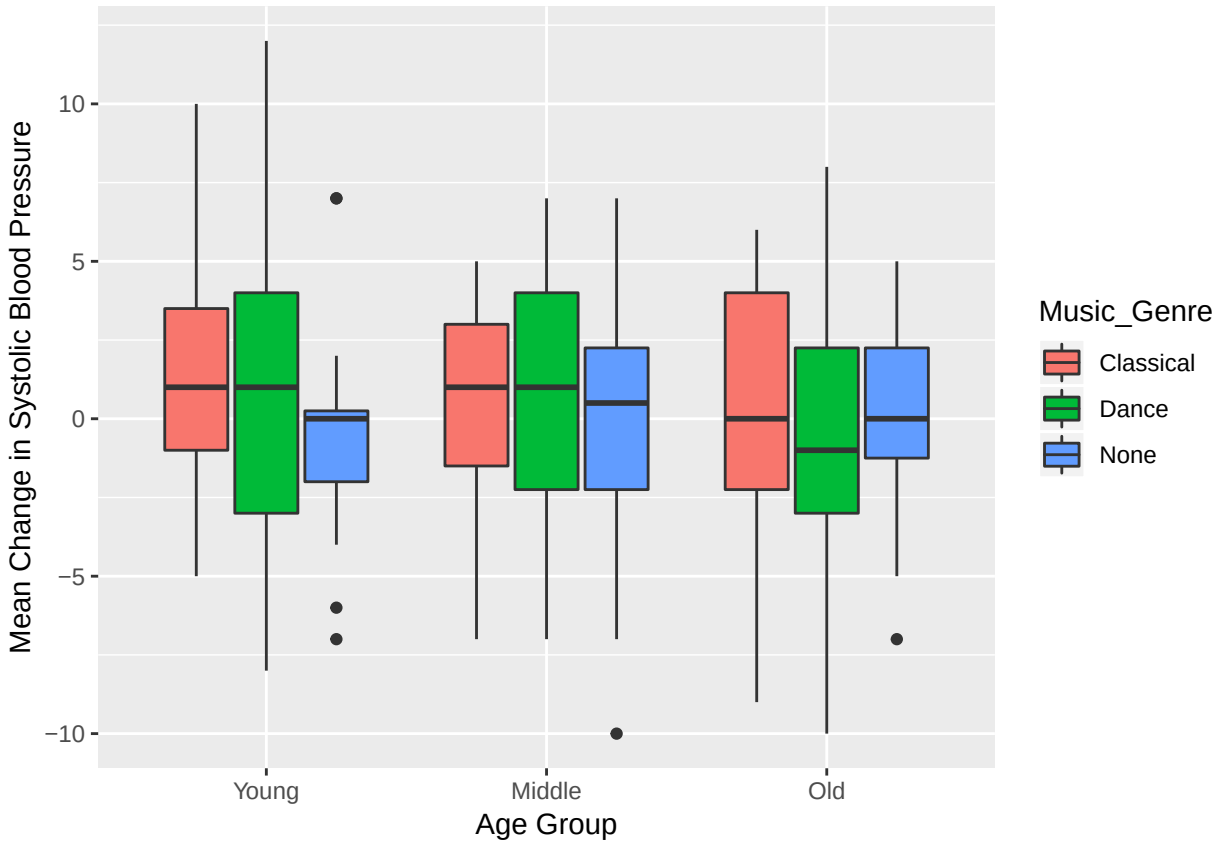

```
ggplot(project,aes(x=group,y=endDiastolic,fill=Music_Genre))+geom_boxplot()+
  labs(x = 'Age Group', y = 'Mean Final Diastolic Blood Pressure')
```



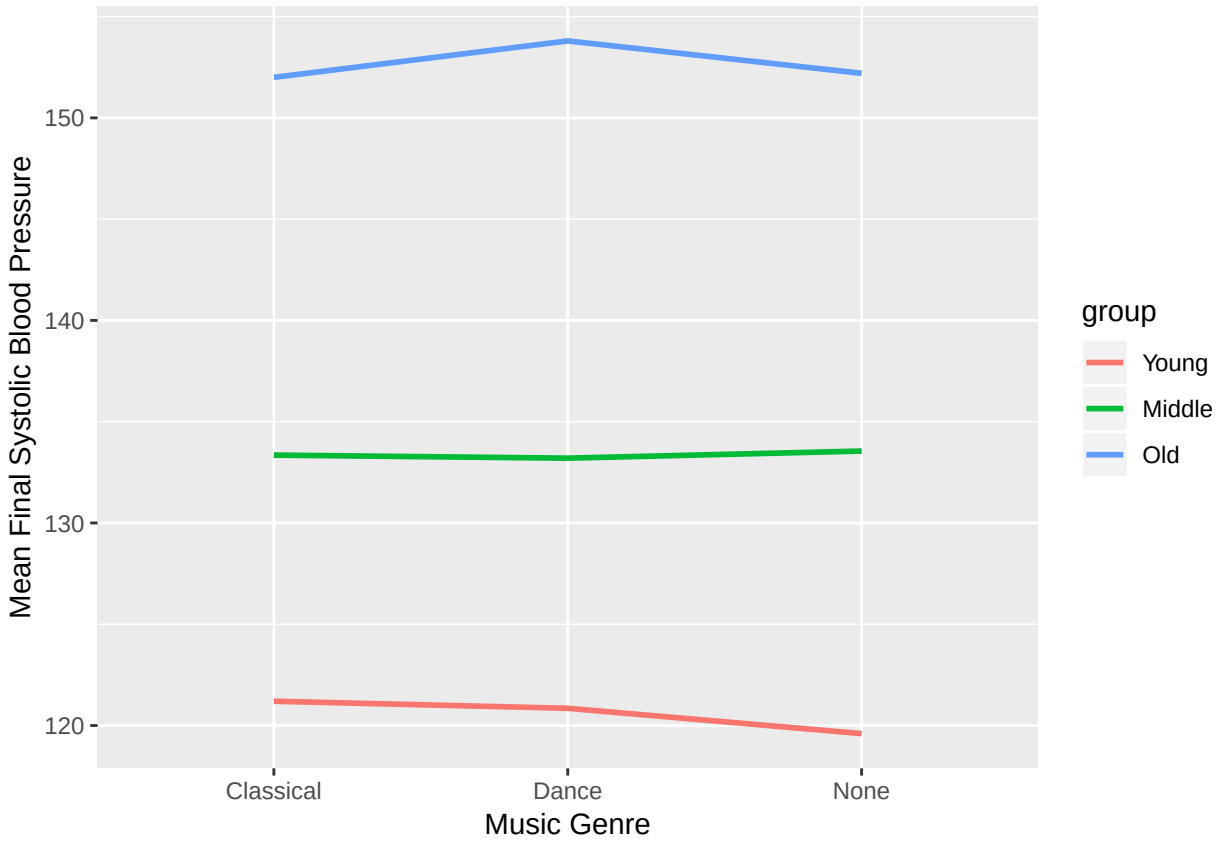

```
ggplot(project,aes(x=group,y=changeInDiastolic,fill=Music_Genre))+geom_boxplot()+
  labs(x = 'Age Group', y = 'Mean Change in Diastolic Blood Pressure')
```



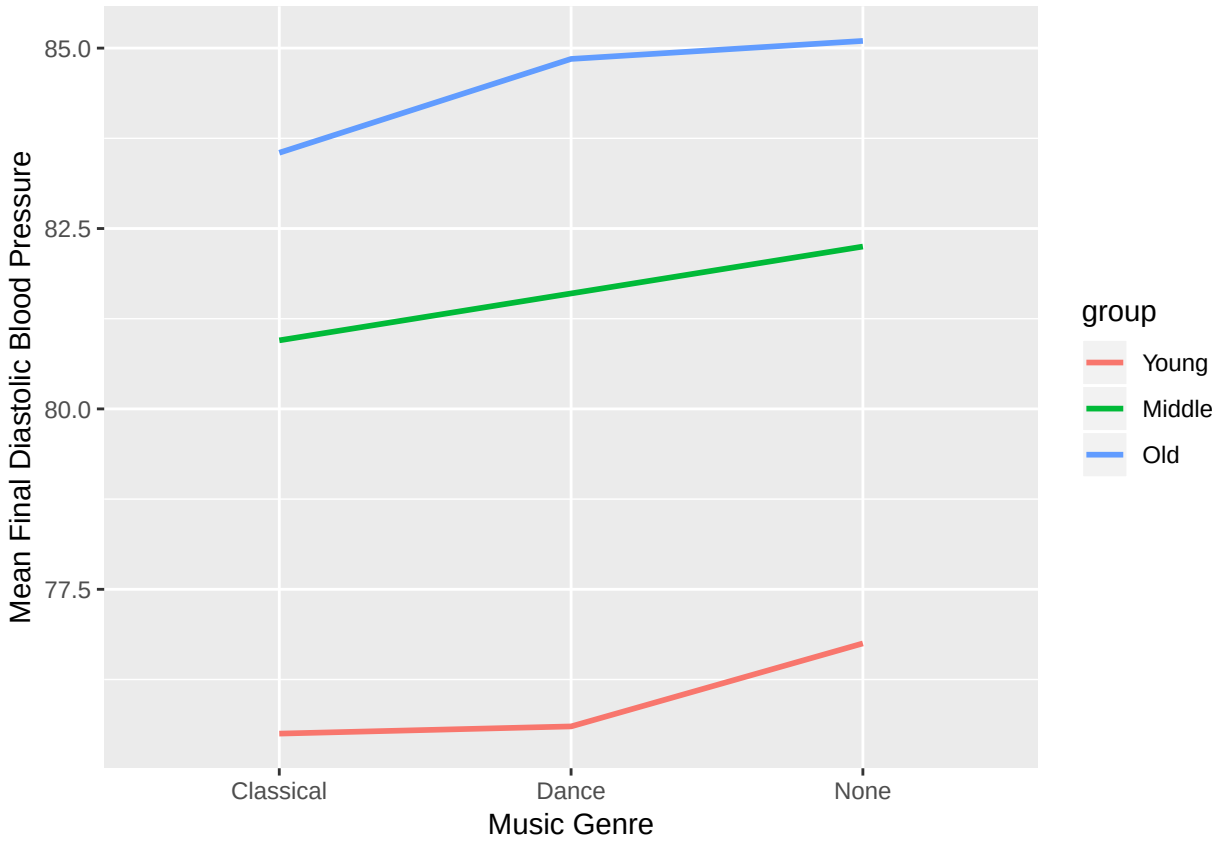

```
ggplot(project,aes(x=group,y=changeInSystolic,fill=Music_Genre))+geom_boxplot()+
  labs(x = 'Age Group', y = 'Mean Change in Systolic Blood Pressure')
```



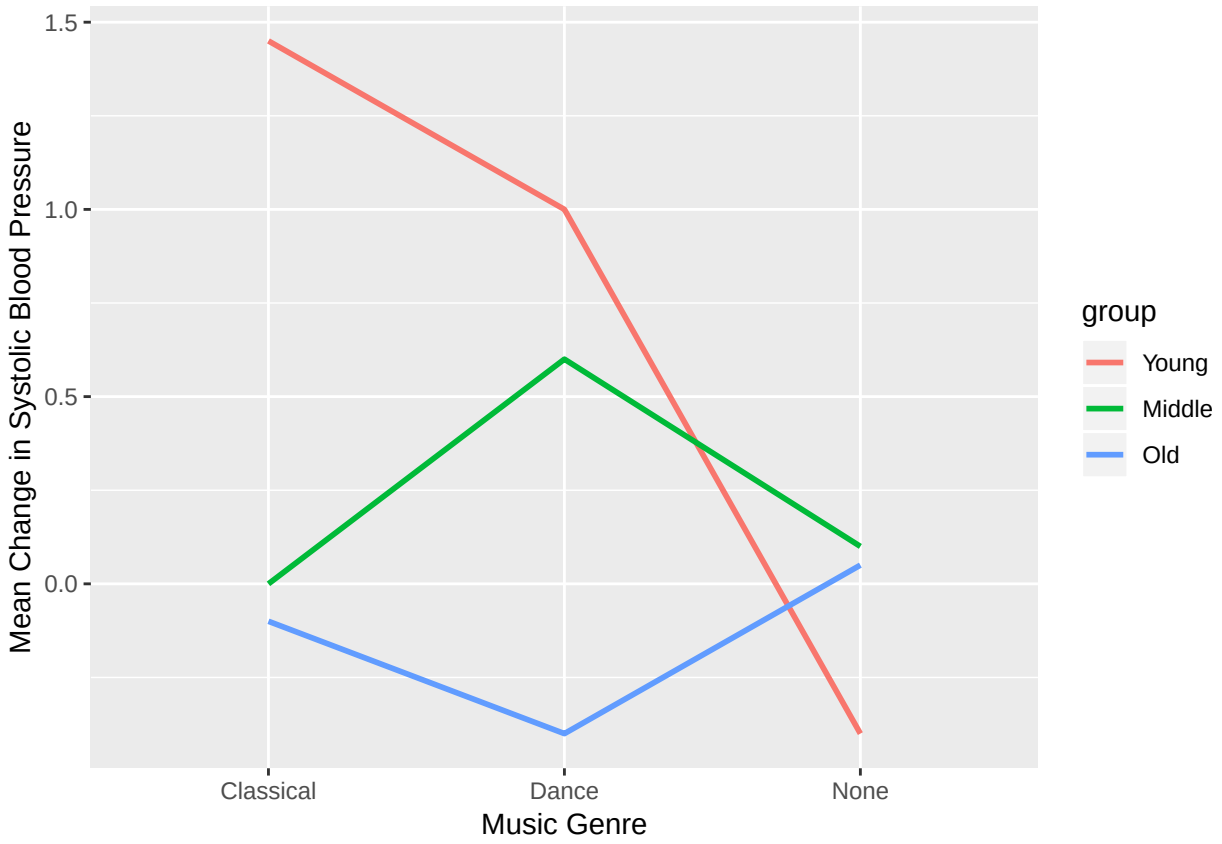

```
ggplot(data=project, aes(x=Music_Genre, y=predict(model4), group=group))+
      geom_line(size=1, aes(color=group))+
      ylab("Mean Final Systolic Blood Pressure")+
      xlab("Music Genre")
```



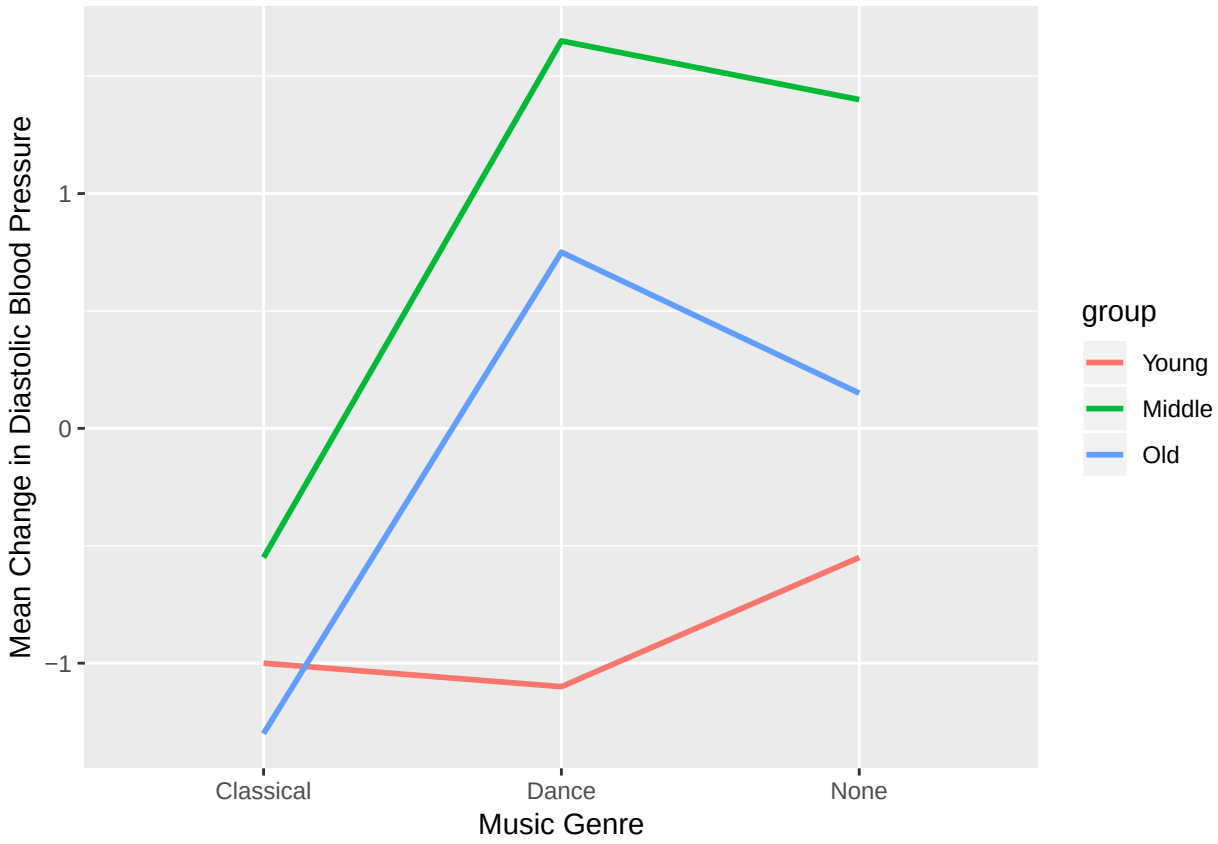

```
ggplot(data=project, aes(x=Music_Genre, y=predict(model3), group=group))+
      geom_line(size=1, aes(color=group))+
      ylab("Mean Final Diastolic Blood Pressure")+
      xlab("Music Genre")
```




```
ggplot(data=project, aes(x=Music_Genre, y=predict(model2), group=group))+
      geom_line(size=1, aes(color=group))+
      ylab("Mean Change in Systolic Blood Pressure")+
      xlab("Music Genre")
```




```
ggplot(data=project, aes(x=Music_Genre, y=predict(model1), group=group))+
      geom_line(size=1, aes(color=group))+
      ylab("Mean Change in Diastolic Blood Pressure")+
      xlab("Music Genre")
```


Mean Change in Diastolic Blood Pressure
1
0
−1
Classical
Dance
None
Music Genre
group
Young
Middle
Old