Thesis Analysis

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Checking the relationship between BIS, BAS, meal intake and EAH intake variables.

library(haven)  
library(dplyr)

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

library(ggplot2)

1. Load dataset

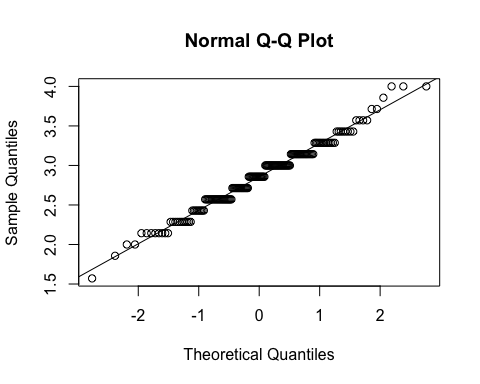
thesis\_data<-read.csv("~/Desktop/Rhea MS thesis/MS\_thesis/data/thesis\_data.csv")

1. My IV’s of interest are bis bas bas\_funseeking bas\_drive bas\_rewardresp

My DV’s of interest are meal\_grams\_consumed meal\_kcal\_consumed eah\_grams\_consumed\_foodonly eah\_kcal\_consumed

1. Checking normality and homogeneity of variance assumptions and conducting visualizations

# For variable BIS  
qqnorm(thesis\_data$bis)  
qqline(thesis\_data$bis)



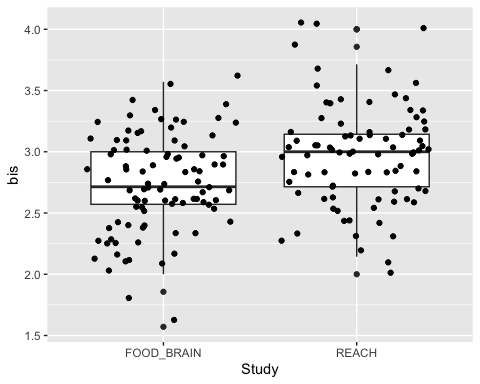
shapiro.test(thesis\_data$bis) #met normality

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$bis  
## W = 0.98488, p-value = 0.05538

#Visualizing BIS data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=bis)) + geom\_boxplot() + geom\_jitter(height = NULL) #jitters add all the data points

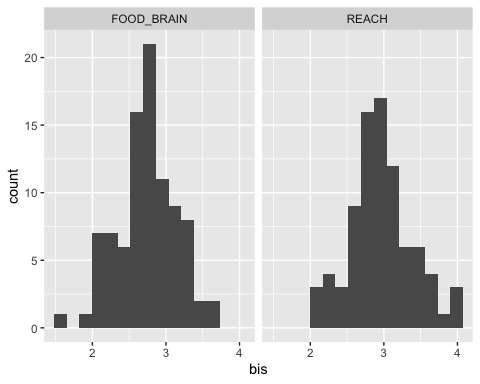
## Warning: Removed 4 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 4 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

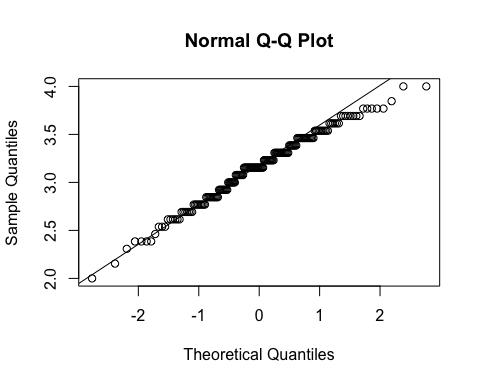


ggplot(thesis\_data,aes(bis))+ geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 4 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable BAS  
qqnorm(thesis\_data$bas)  
qqline(thesis\_data$bas)



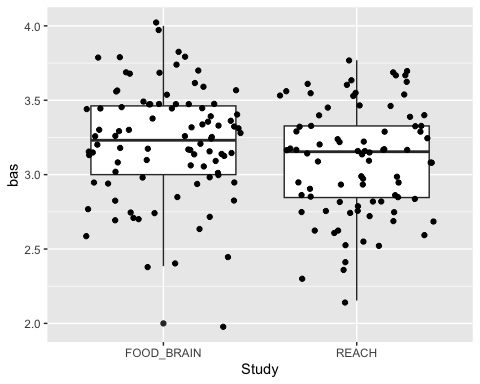
shapiro.test(thesis\_data$bas) #met normality

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$bas  
## W = 0.986, p-value = 0.07642

#Visualizing BAS data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=bas)) + geom\_boxplot() + geom\_jitter(height = NULL)

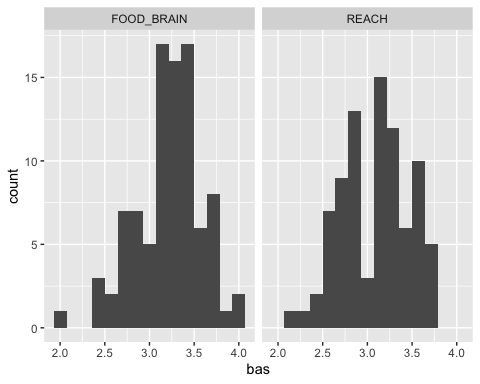
## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 3 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

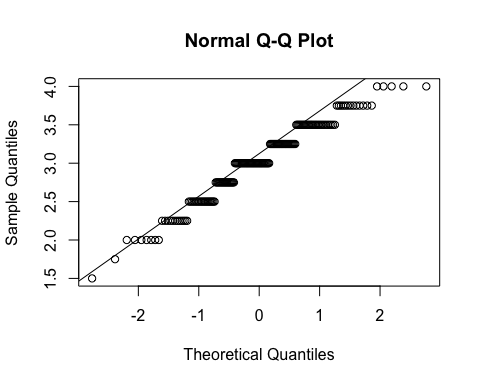


ggplot(thesis\_data,aes(bas))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable BAS funseeking  
qqnorm(thesis\_data$bas\_funseeking)  
qqline(thesis\_data$bas\_funseeking)

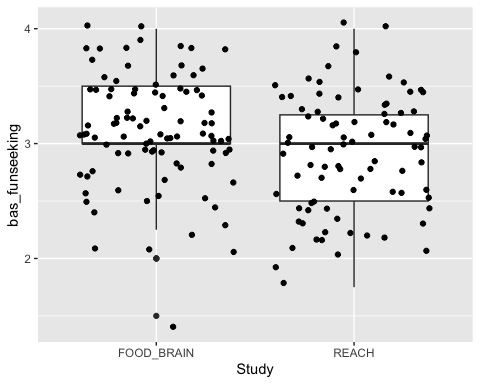


shapiro.test(thesis\_data$bas\_funseeking) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$bas\_funseeking  
## W = 0.96485, p-value = 0.0002044

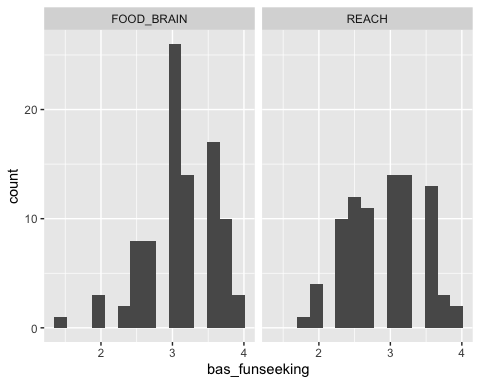
#Visualizing BAS funseeking data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=bas\_funseeking)) +geom\_boxplot() +geom\_jitter(height = NULL)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).  
## Removed 3 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

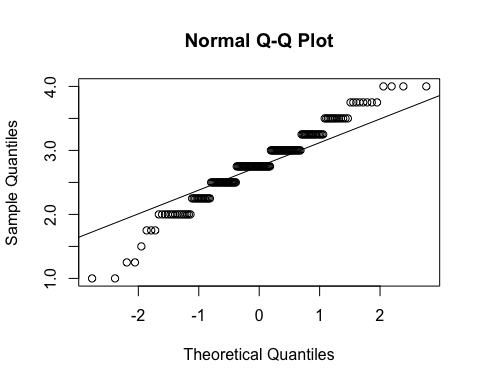


ggplot(thesis\_data,aes(bas\_funseeking))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable BAS drive  
qqnorm(thesis\_data$bas\_drive)  
qqline(thesis\_data$bas\_drive)

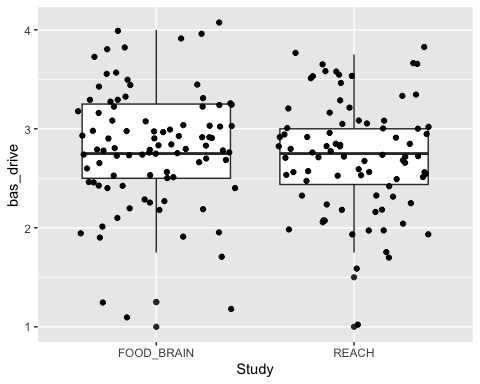


shapiro.test(thesis\_data$bas\_drive) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$bas\_drive  
## W = 0.9687, p-value = 0.0005395

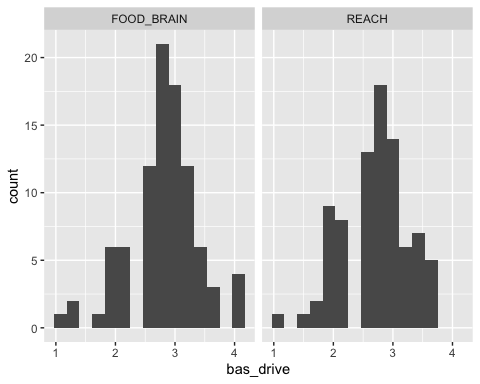
#Visualizing BAS drive data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=bas\_drive)) + geom\_boxplot() + geom\_jitter(height = NULL)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).  
## Removed 3 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

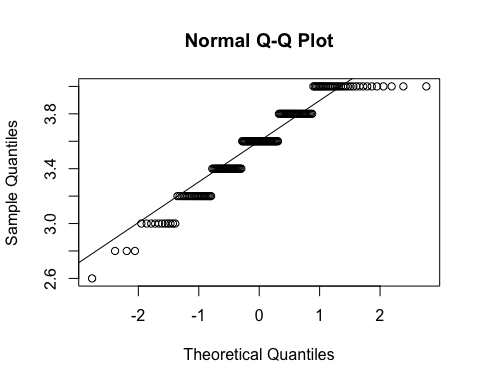


ggplot(thesis\_data,aes(bas\_drive))+geom\_histogram(bins=15)+ facet\_grid(.~Study)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable BAS reward responsive  
qqnorm(thesis\_data$bas\_rewardresp)  
qqline(thesis\_data$bas\_rewardresp)

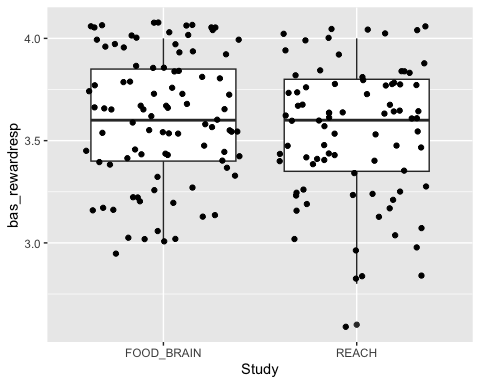


shapiro.test(thesis\_data$bas\_rewardresp) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$bas\_rewardresp  
## W = 0.92994, p-value = 1.603e-07

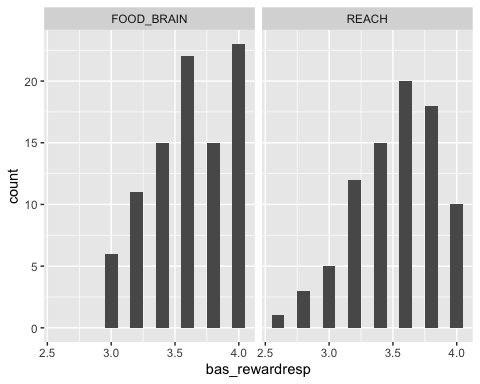
#Visualizing BAS reward responsive data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=bas\_rewardresp)) +geom\_boxplot() + geom\_jitter(height = NULL)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).  
## Removed 3 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

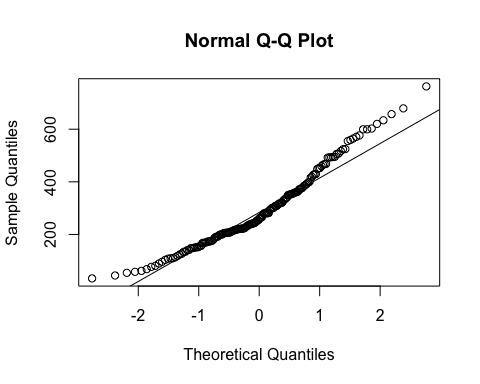


ggplot(thesis\_data,aes(bas\_rewardresp))+geom\_histogram(bins=15)+ facet\_grid(.~Study)

## Warning: Removed 3 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable Meal consumed in grams  
qqnorm(thesis\_data$meal\_grams\_consumed)  
qqline(thesis\_data$meal\_grams\_consumed)



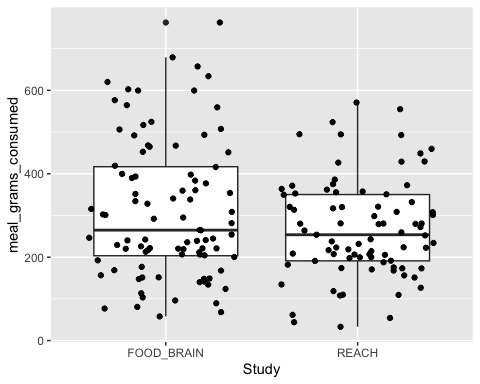
shapiro.test(thesis\_data$meal\_grams\_consumed) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$meal\_grams\_consumed  
## W = 0.95722, p-value = 3.579e-05

#Visualizing Meal consumed in grams data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=meal\_grams\_consumed)) + geom\_boxplot() + geom\_jitter(height = NULL)

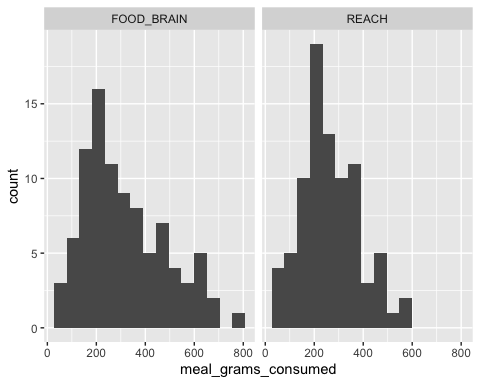
## Warning: Removed 4 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 4 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

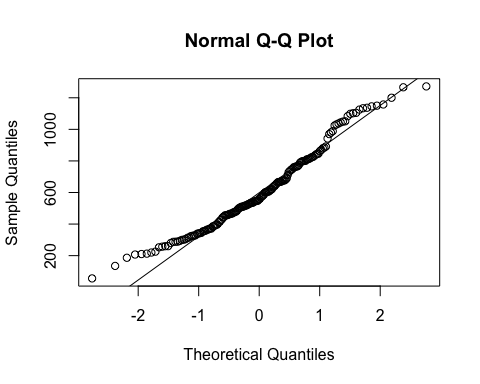


ggplot(thesis\_data,aes(meal\_grams\_consumed))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 4 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable Meal consumed in kcal  
qqnorm(thesis\_data$meal\_kcal\_consumed)  
qqline(thesis\_data$meal\_kcal\_consumed)



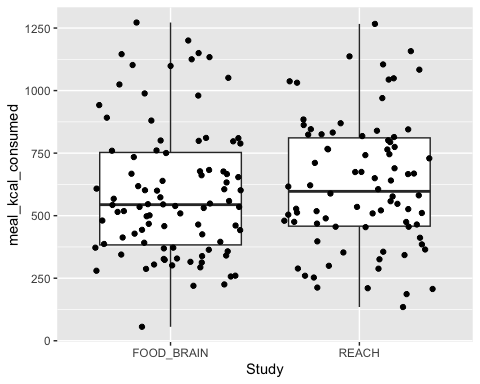
shapiro.test(thesis\_data$meal\_kcal\_consumed) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$meal\_kcal\_consumed  
## W = 0.96846, p-value = 0.0005531

#Visualizing Meal consumed in kcal data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=meal\_kcal\_consumed)) + geom\_boxplot() + geom\_jitter(height = NULL)

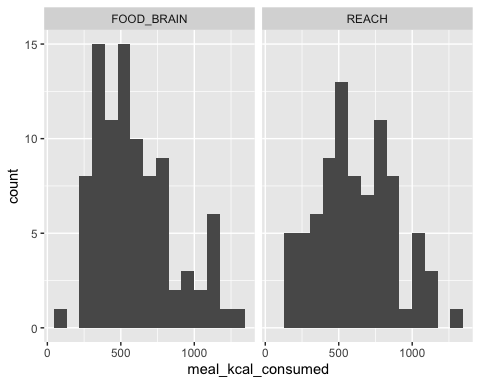
## Warning: Removed 5 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 5 rows containing missing values or values outside the scale range  
## (`geom\_point()`).

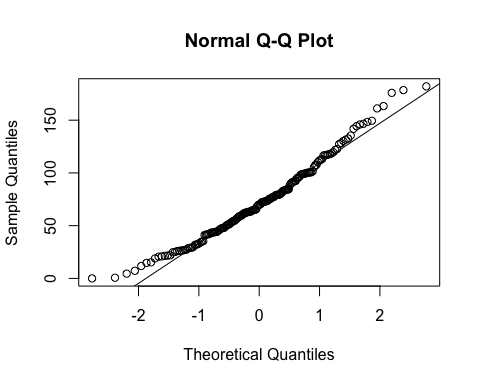


ggplot(thesis\_data,aes(meal\_kcal\_consumed))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 5 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable EAH consumed in grams  
qqnorm(thesis\_data$eah\_grams\_consumed\_foodonly)  
qqline(thesis\_data$eah\_grams\_consumed\_foodonly)



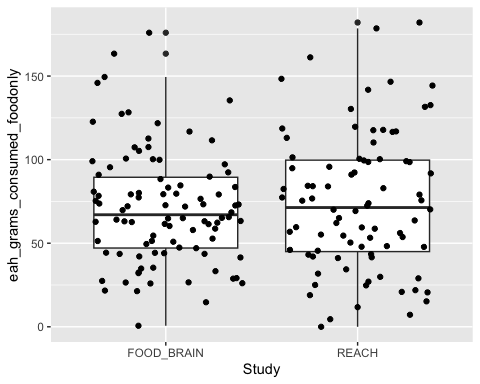
shapiro.test(thesis\_data$eah\_grams\_consumed\_foodonly) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$eah\_grams\_consumed\_foodonly  
## W = 0.97611, p-value = 0.003732

#Visualizing EAH consumed in grams data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=eah\_grams\_consumed\_foodonly)) +geom\_boxplot() + geom\_jitter(height = NULL)

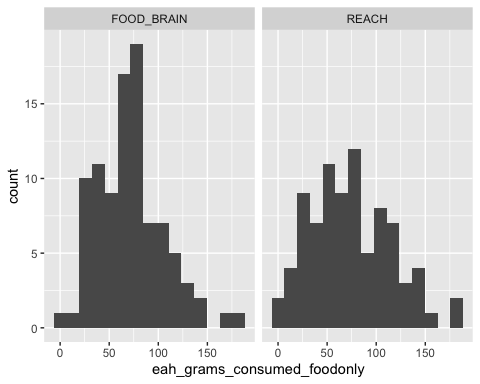
## Warning: Removed 1 row containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 1 row containing missing values or values outside the scale range  
## (`geom\_point()`).

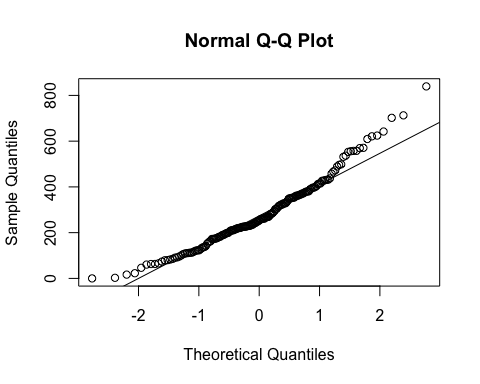


ggplot(thesis\_data,aes(eah\_grams\_consumed\_foodonly))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 1 row containing non-finite outside the scale range  
## (`stat\_bin()`).



# For variable EAH consumed in kcal  
qqnorm(thesis\_data$eah\_kcal\_consumed)  
qqline(thesis\_data$eah\_kcal\_consumed)

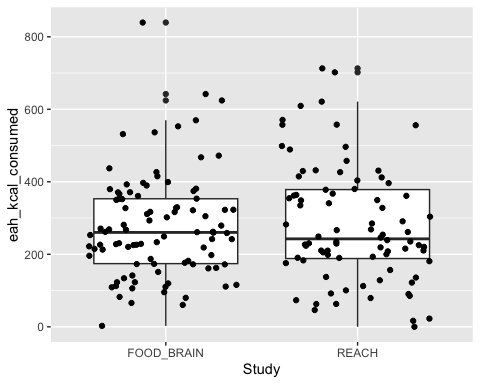


shapiro.test(thesis\_data$eah\_kcal\_consumed) #not normal

##   
## Shapiro-Wilk normality test  
##   
## data: thesis\_data$eah\_kcal\_consumed  
## W = 0.96228, p-value = 9.95e-05

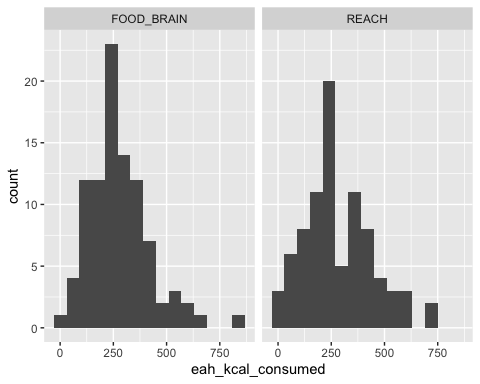
#Visualizing EAH consumed in kcal data by Study, boxplot and histogram  
ggplot(thesis\_data, aes(x=Study, y=eah\_kcal\_consumed)) + geom\_boxplot() + geom\_jitter(height = NULL)

## Warning: Removed 1 row containing non-finite outside the scale range (`stat\_boxplot()`).  
## Removed 1 row containing missing values or values outside the scale range  
## (`geom\_point()`).



ggplot(thesis\_data,aes(eah\_kcal\_consumed))+geom\_histogram(bins=15)+facet\_grid(.~Study)

## Warning: Removed 1 row containing non-finite outside the scale range  
## (`stat\_bin()`).



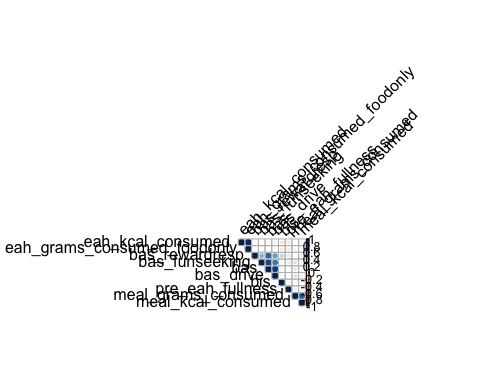
While some of the variables didn’t pass the shapiro normality test but after looking at the qqplots of these variables we can consider them as normal.

3.Corrplots between the interested variables

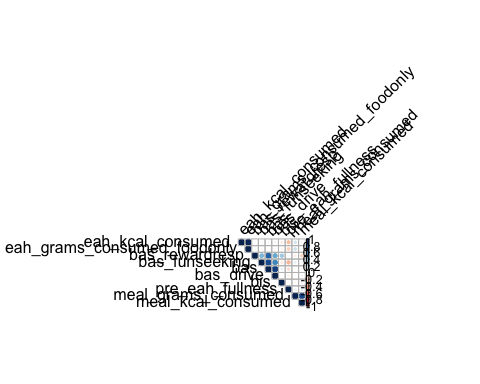
library(corrplot)

## corrplot 0.95 loaded

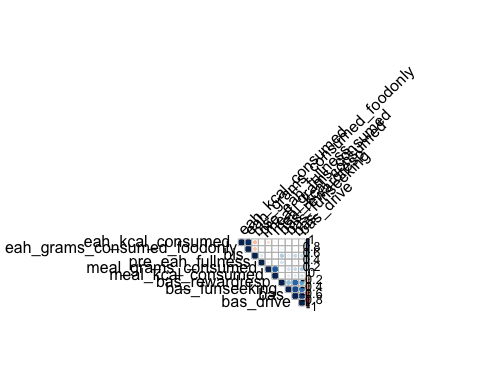
cor\_all <- cor(thesis\_data[c("bis", "bas","bas\_funseeking","bas\_drive", "bas\_rewardresp", "pre\_eah\_fullness", "meal\_grams\_consumed",  
 "meal\_kcal\_consumed","eah\_kcal\_consumed", "eah\_grams\_consumed\_foodonly")], use = "pairwise.complete.obs")  
  
cor\_reach <- cor(thesis\_data[thesis\_data$Study == "REACH", c("bis", "bas","bas\_funseeking","bas\_drive", "bas\_rewardresp", "pre\_eah\_fullness", "meal\_grams\_consumed","meal\_kcal\_consumed","eah\_kcal\_consumed", "eah\_grams\_consumed\_foodonly")], use = "pairwise.complete.obs")  
  
cor\_fb <- cor(thesis\_data[thesis\_data$Study == "FOOD\_BRAIN", c("bis", "bas","bas\_funseeking","bas\_drive", "bas\_rewardresp", "pre\_eah\_fullness", "meal\_grams\_consumed","meal\_kcal\_consumed","eah\_kcal\_consumed", "eah\_grams\_consumed\_foodonly")], use = "pairwise.complete.obs")  
  
  
corrplot(cor\_all, type = "upper", order = "hclust",   
 tl.col = "black", tl.srt = 45)



corrplot(cor\_reach, type = "upper", order = "hclust",   
 tl.col = "black", tl.srt = 45)



corrplot(cor\_fb, type = "upper", order = "hclust",   
 tl.col = "black", tl.srt = 45)



**AIM 1 : Does BIS and BAS influences eating in absence of hunger?**

# 1. Relationship between BIS and EAH  
  
## BIS is not associated with EAH gram intake  
cor.test(thesis\_data$bis, thesis\_data$eah\_grams\_consumed\_foodonly,  
 use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bis and thesis\_data$eah\_grams\_consumed\_foodonly  
## t = -1.4532, df = 172, p-value = 0.148  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.25472716 0.03928264  
## sample estimates:  
## cor   
## -0.1101308

## BIS is associated with EAH kcal intake  
cor.test(thesis\_data$bis, thesis\_data$eah\_kcal\_consumed,   
 use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bis and thesis\_data$eah\_kcal\_consumed  
## t = -2.0264, df = 172, p-value = 0.04427  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.294774354 -0.004022544  
## sample estimates:  
## cor   
## -0.152701

#2. Relationship between BAS and EAH  
  
## BAS is not associated with EAH gram intake   
cor.test(thesis\_data$bis, thesis\_data$eah\_grams\_consumed\_foodonly,   
 use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bis and thesis\_data$eah\_grams\_consumed\_foodonly  
## t = -1.4532, df = 172, p-value = 0.148  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.25472716 0.03928264  
## sample estimates:  
## cor   
## -0.1101308

## BAS is not associated with EAH kcal intake  
cor.test(thesis\_data$bas, thesis\_data$eah\_kcal\_consumed,   
 use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas and thesis\_data$eah\_kcal\_consumed  
## t = -0.34611, df = 173, p-value = 0.7297  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1739694 0.1225161  
## sample estimates:  
## cor   
## -0.02630509

#3. Relationship between BAS funseeking and EAH  
  
## BAS funseeking is not associated with EAH gram intake   
cor.test(thesis\_data$bas\_funseeking,   
 thesis\_data$eah\_grams\_consumed\_foodonly, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_funseeking and thesis\_data$eah\_grams\_consumed\_foodonly  
## t = -0.18597, df = 173, p-value = 0.8527  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1621409 0.1344873  
## sample estimates:  
## cor   
## -0.01413783

## BAS funseeking is not associated with EAH kcal intake  
cor.test(thesis\_data$bas\_funseeking,   
 thesis\_data$eah\_kcal\_consumed, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_funseeking and thesis\_data$eah\_kcal\_consumed  
## t = -0.34928, df = 173, p-value = 0.7273  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1742029 0.1222788  
## sample estimates:  
## cor   
## -0.0265458

#4. Relationship between BAS drive and EAH  
  
## BAS drive is not associated with EAH gram intake  
cor.test(thesis\_data$bas\_drive,  
 thesis\_data$eah\_grams\_consumed\_foodonly, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_drive and thesis\_data$eah\_grams\_consumed\_foodonly  
## t = -0.23044, df = 173, p-value = 0.818  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1654303 0.1311669  
## sample estimates:  
## cor   
## -0.01751707

## BAS drive is not associated with EAH kcal intake  
cor.test(thesis\_data$bas\_drive,  
 thesis\_data$eah\_kcal\_consumed, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_drive and thesis\_data$eah\_kcal\_consumed  
## t = -0.58045, df = 173, p-value = 0.5624  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1911803 0.1049419  
## sample estimates:  
## cor   
## -0.04408754

#5. Relationship between BAS reward responsive and EAH  
  
## BAS reward responsive is not associated with EAH gram intake   
cor.test(thesis\_data$bas\_rewardresp,   
 thesis\_data$eah\_grams\_consumed\_foodonly, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_rewardresp and thesis\_data$eah\_grams\_consumed\_foodonly  
## t = 0.47405, df = 173, p-value = 0.6361  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1129282 0.1833816  
## sample estimates:  
## cor   
## 0.03601829

## BAS reward responsive is not associated with EAH kcal intake  
cor.test(thesis\_data$bas\_rewardresp,   
 thesis\_data$eah\_kcal\_consumed, use = "pairwise.complete.obs")

##   
## Pearson's product-moment correlation  
##   
## data: thesis\_data$bas\_rewardresp and thesis\_data$eah\_kcal\_consumed  
## t = 0.2106, df = 173, p-value = 0.8334  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.1326488 0.1639631  
## sample estimates:  
## cor   
## 0.01600938

Based on the correlations and corr plots we can see that bis is negativley related with eah\_kcal\_consumed

1. Conducting levene’s test on bis and eah\_kcal\_consumed by Study and then t-test on bis and eah\_kcal\_consumed to see if there is study effect.

library(car)

## Loading required package: carData

##   
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':  
##   
## recode

#For bis  
leveneTest(  
bis~as.factor(Study), data=thesis\_data)

## Levene's Test for Homogeneity of Variance (center = median)  
## Df F value Pr(>F)  
## group 1 0.0027 0.9584  
## 173

#For eah\_kcal\_consumed  
leveneTest(  
eah\_kcal\_consumed~as.factor(Study), data=thesis\_data)

## Levene's Test for Homogeneity of Variance (center = median)  
## Df F value Pr(>F)  
## group 1 1.5361 0.2169  
## 176

#Assumptions for homegenity in variances are met  
  
#Conducting indepedent t-test on bis to see study effect  
t.test(thesis\_data[thesis\_data$Study == "REACH",]$bis,   
 thesis\_data[thesis\_data$Study == "FOOD\_BRAIN",]$bis,  
 alternative = "two.sided", var.equal = TRUE)

##   
## Two Sample t-test  
##   
## data: thesis\_data[thesis\_data$Study == "REACH", ]$bis and thesis\_data[thesis\_data$Study == "FOOD\_BRAIN", ]$bis  
## t = 3.6665, df = 173, p-value = 0.000327  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## 0.1057088 0.3522326  
## sample estimates:  
## mean of x mean of y   
## 2.97619 2.74722

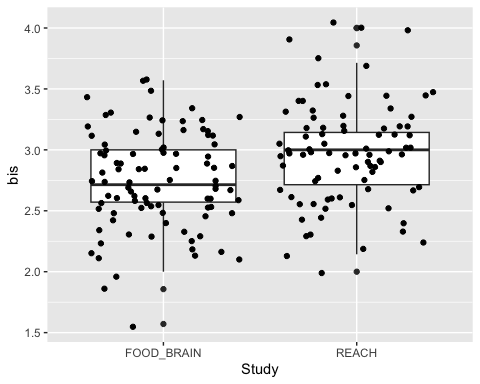
#Conducting indepedent t-test on bis to see study effect  
t.test(thesis\_data[thesis\_data$Study == "REACH",]$eah\_kcal\_consumed, thesis\_data[thesis\_data$Study == "FOOD\_BRAIN",]$eah\_kcal\_consumed,   
 alternative = "two.sided", var.equal = TRUE)

##   
## Two Sample t-test  
##   
## data: thesis\_data[thesis\_data$Study == "REACH", ]$eah\_kcal\_consumed and thesis\_data[thesis\_data$Study == "FOOD\_BRAIN", ]$eah\_kcal\_consumed  
## t = 0.23976, df = 176, p-value = 0.8108  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -39.40483 50.30346  
## sample estimates:  
## mean of x mean of y   
## 282.5406 277.0913

#Visualizing   
ggplot(thesis\_data, aes(x=Study, y=bis)) +   
geom\_boxplot() +  
geom\_jitter(height = NULL)

## Warning: Removed 4 rows containing non-finite outside the scale range  
## (`stat\_boxplot()`).

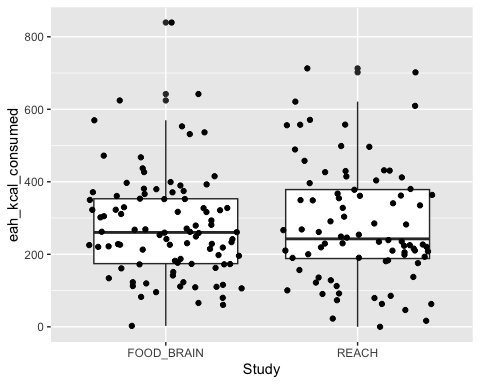
## Warning: Removed 4 rows containing missing values or values outside the scale range  
## (`geom\_point()`).



ggplot(thesis\_data, aes(x=Study, y=eah\_kcal\_consumed)) +   
 geom\_boxplot() +   
 geom\_jitter(height = NULL)

## Warning: Removed 1 row containing non-finite outside the scale range  
## (`stat\_boxplot()`).

## Warning: Removed 1 row containing missing values or values outside the scale range  
## (`geom\_point()`).



thesis\_data$Age.in.years

## [1] 8.30 9.60 9.80 7.30 8.50 8.80 8.10 8.00 7.60 9.40 7.70 7.60 7.80 7.30 9.60  
## [16] 9.10 8.20 8.80 8.50 8.40 9.20 7.40 9.70 8.20 7.70 8.70 8.10 7.60 8.80 7.70  
## [31] 9.90 8.50 8.90 9.50 7.50 7.30 8.00 8.40 8.60 7.20 8.80 8.80 7.70 7.70 NA  
## [46] 9.30 7.70 7.80 9.80 7.10 7.30 8.20 7.70 8.00 7.60 8.70 8.10 8.30 7.20 9.20  
## [61] 9.60 9.50 7.20 9.40 8.20 7.30 8.60 8.80 8.80 9.90 7.30 8.30 8.00 8.40 7.20  
## [76] 9.20 8.90 7.40 7.80 8.50 9.20 7.10 9.80 7.70 8.84 7.46 7.07 7.38 7.82 7.03  
## [91] 8.65 7.18 7.68 7.00 7.48 8.22 7.67 7.39 7.18 7.77 8.81 7.68 7.79 8.32 7.25  
## [106] 7.26 8.12 7.47 7.06 7.22 7.25 8.66 8.99 7.40 7.36 7.47 7.53 7.02 8.81 8.48  
## [121] 8.14 7.34 7.86 8.92 8.26 7.79 8.47 8.33 7.05 8.91 7.17 8.24 7.33 7.41 7.24  
## [136] 7.86 8.30 8.50 7.53 7.73 7.97 8.50 8.41 8.41 8.58 8.32 7.86 7.23 7.17 8.44  
## [151] 8.71 8.61 7.44 8.51 8.07 7.33 7.26 7.33 7.42 7.80 8.44 8.63 7.36 8.51 7.84  
## [166] 7.14 8.30 8.79 8.91 7.25 7.99 8.16 7.22 7.03 7.93 7.04 7.51 8.96 7.58

Based on these results, BIS scores are higher in REACH study and EAH consumption in kcal was similar in both the studies.

1. Linear regressions predicting EAH with covariates [sex + child bmi + age in years+ pre eah fullness, income] (no interactions) – no effects

model1 <- lm(eah\_kcal\_consumed ~ bis + Sex + Age.in.years + Child.BMI   
 + Income + pre\_eah\_fullness, data = thesis\_data)  
summary(model1)

##   
## Call:  
## lm(formula = eah\_kcal\_consumed ~ bis + Sex + Age.in.years + Child.BMI +   
## Income + pre\_eah\_fullness, data = thesis\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -323.69 -104.78 -21.01 86.86 510.66   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -45.4120 202.0066 -0.225 0.8224   
## bis -59.3086 28.3446 -2.092 0.0380 \*  
## SexMale 23.8666 23.8026 1.003 0.3175   
## Age.in.years 38.7347 17.2203 2.249 0.0259 \*  
## Child.BMI 7.4366 8.2491 0.902 0.3687   
## Income>$100,000 110.8061 108.2938 1.023 0.3078   
## Income$20,000-$35,000 99.4185 125.0848 0.795 0.4279   
## Income$36,000-$50,000 162.0122 115.3090 1.405 0.1620   
## Income$51,000-$75,000 110.9349 110.5712 1.003 0.3172   
## Income$76,000-$100,000 90.7284 109.3554 0.830 0.4080   
## pre\_eah\_fullness -0.6637 0.3435 -1.932 0.0551 .  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 149.8 on 159 degrees of freedom  
## (9 observations deleted due to missingness)  
## Multiple R-squared: 0.1077, Adjusted R-squared: 0.0516   
## F-statistic: 1.919 on 10 and 159 DF, p-value: 0.04608

Based on the summary of the model of this multiple regression model we can see that higher BIS scores predicts a lower food intake in kcal ( B=-60, p=0.04) in EAH paradigm.

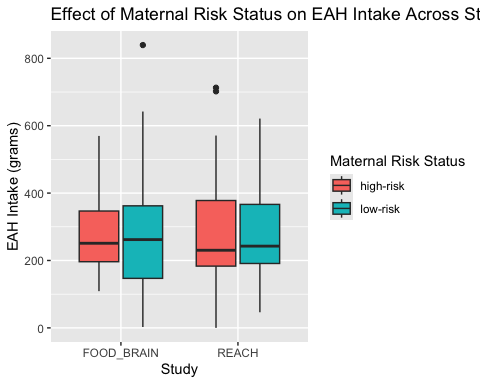
**AIM 2: Does maternal risk status moderates the relationship between BIS, BAS and EAH**

#Conducting 2 way ANOVA to see the effect of maternal risk status on EAH in kcal across both the studies  
  
thesis\_data$Maternal.risk.status <- as.factor(thesis\_data$Maternal.risk.status)  
thesis\_data$Study <- as.factor(thesis\_data$Study)  
  
anova\_model <- aov(eah\_kcal\_consumed ~ Maternal.risk.status \* Study, data = thesis\_data)  
summary(anova\_model)

## Df Sum Sq Mean Sq F value Pr(>F)  
## Maternal.risk.status 1 702 702 0.030 0.862  
## Study 1 530 530 0.023 0.880  
## Maternal.risk.status:Study 1 655 655 0.028 0.867  
## Residuals 173 4009072 23174   
## 2 observations deleted due to missingness

#Visualization  
maternal\_data <- thesis\_data %>% filter(!is.na(Study), !is.na(Maternal.risk.status))  
library(ggplot2)  
ggplot(maternal\_data, aes(x = Study, y = eah\_kcal\_consumed, fill = Maternal.risk.status)) +  
 geom\_boxplot() +  
 labs(title = "Effect of Maternal Risk Status on EAH Intake Across Studies",  
 x = "Study",  
 y = "EAH Intake (grams)",  
 fill = "Maternal Risk Status")

## Warning: Removed 1 row containing non-finite outside the scale range  
## (`stat\_boxplot()`).



There wasn’t any main effect of maternal risk status ( p=0.87) and study(p=0.89) on EAH intake. Moreover, there wasn’t any interaction effect between maternal risk status and study on EAH intake (p=0.87). Hence we can conclude that effect of maternal risk status on EAH paradigm was consistent in both the studies.

#Conducting moderation analysis adjusting for covariates  
lm\_eah\_kcal\_risk <- lm(eah\_kcal\_consumed ~ bis\*Maternal.risk.status + pre\_eah\_fullness + Study + Child.BMI + Age.in.years + Sex + Income, data = thesis\_data)  
  
summary(lm\_eah\_kcal\_risk)

##   
## Call:  
## lm(formula = eah\_kcal\_consumed ~ bis \* Maternal.risk.status +   
## pre\_eah\_fullness + Study + Child.BMI + Age.in.years + Sex +   
## Income, data = thesis\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -324.31 -93.64 -22.07 79.93 464.74   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -185.0340 222.3309 -0.832 0.4066   
## bis 5.2541 39.8523 0.132 0.8953   
## Maternal.risk.statuslow-risk 362.4266 158.3605 2.289 0.0235 \*  
## pre\_eah\_fullness -0.7023 0.3444 -2.039 0.0431 \*  
## StudyREACH -9.8158 25.7839 -0.381 0.7040   
## Child.BMI 6.6367 8.5817 0.773 0.4405   
## Age.in.years 41.6538 17.7052 2.353 0.0199 \*  
## SexMale 26.8206 23.7586 1.129 0.2607   
## Income>$100,000 66.6211 109.1398 0.610 0.5425   
## Income$20,000-$35,000 46.2477 125.7886 0.368 0.7136   
## Income$36,000-$50,000 102.8750 116.4163 0.884 0.3782   
## Income$51,000-$75,000 62.6119 111.2272 0.563 0.5743   
## Income$76,000-$100,000 40.9441 110.2610 0.371 0.7109   
## bis:Maternal.risk.statuslow-risk -131.0926 54.3772 -2.411 0.0171 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 148.3 on 155 degrees of freedom  
## (10 observations deleted due to missingness)  
## Multiple R-squared: 0.1424, Adjusted R-squared: 0.07048   
## F-statistic: 1.98 on 13 and 155 DF, p-value: 0.02573

After adjusting for sex, child age, child bmi, parent income, Pre EAH fullness scores and study, we conducted moderation analysis. The results revealed a significant interaction between BIS\_total and maternal risk status but only for children with low-risk of obesity (B= -131.1, p=0.02), indicating that children at low risk for obesity, a 1 unit increase in BIS corresponds to 131 less kcal consumed during EAH , while children at high risk for obesity, the association between BIS and EAH is not significant.

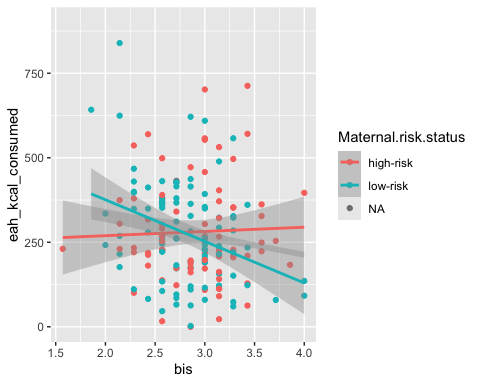
Making plots

# remove rows with missing values for model variables -- will make it easier to save predicted values to model dataset  
MISSING <- is.na(thesis\_data$eah\_kcal\_consumed) |  
 is.na(thesis\_data$bis) |  
 is.na(thesis\_data$pre\_eah\_fullness) |  
 is.na(thesis\_data$Study) |  
 is.na(thesis\_data$Child.BMI) |  
 is.na(thesis\_data$Age.in.years) |   
 is.na(thesis\_data$Sex) | is.na(thesis\_data$Maternal.risk.status)  
  
thesis\_data\_no\_na <- subset(thesis\_data,   
 subset = !MISSING)  
  
#Visualizations  
# plot kcal (raw values)  
ggplot(thesis\_data, aes(x = bis, y = eah\_kcal\_consumed, color = factor(Maternal.risk.status))) +  
 geom\_point() +  
 geom\_smooth(method = "lm", se = TRUE, aes(group = Maternal.risk.status)) +  
 labs(x = "bis", y = "eah\_kcal\_consumed", color = "Maternal.risk.status") + ylim(0, 900)

## `geom\_smooth()` using formula = 'y ~ x'

## Warning: Removed 5 rows containing non-finite outside the scale range  
## (`stat\_smooth()`).

## Warning: Removed 5 rows containing missing values or values outside the scale range  
## (`geom\_point()`).



#3  
ggplot(thesis\_data\_no\_na, aes(x = bis, y = eah\_kcal\_consumed, color = factor(Maternal.risk.status))) +  
 geom\_point() +  
 geom\_smooth(method = "lm", se = TRUE, aes(group = Maternal.risk.status)) +  
 labs(x = "bis", y = "eah\_kcal\_consumed (adjusted)", color = "Maternal.risk.status")

## `geom\_smooth()` using formula = 'y ~ x'

