HW6

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2024-05-06

knitr::opts\_chunk$set(echo = TRUE)  
  
library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.4 ✔ readr 2.1.5  
## ✔ forcats 1.0.0 ✔ stringr 1.5.1  
## ✔ ggplot2 3.5.0 ✔ tibble 3.2.1  
## ✔ lubridate 1.9.3 ✔ tidyr 1.3.1  
## ✔ purrr 1.0.2   
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()  
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(emmeans)  
library(psych)

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

#1. Read in the data and assign it to an object called depress.   
depress <- read.csv("depress.csv")   
  
#2. Describe the data  
support\_mean <- mean(depress$support)  
support\_sd <- sd(depress$support)  
support\_upper <- support\_mean + support\_sd  
support\_down <- support\_mean - support\_sd  
support\_mean

## [1] 5.37

support\_sd

## [1] 2.809274

support\_upper

## [1] 8.179274

support\_down

## [1] 2.560726

#4.Configure the linear regression   
XZinteraction <- lm(depress ~ stress\*support,data=depress)  
  
#5. Get the summary of XZinteraction  
summary(XZinteraction)

##   
## Call:  
## lm(formula = depress ~ stress \* support, data = depress)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -3.7322 -0.9035 -0.1127 0.8542 3.6089   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 29.2583 0.6909 42.351 <2e-16 \*\*\*  
## stress 1.9956 0.1161 17.185 <2e-16 \*\*\*  
## support -0.2356 0.1109 -2.125 0.0362 \*   
## stress:support -0.3902 0.0188 -20.754 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 1.39 on 96 degrees of freedom  
## Multiple R-squared: 0.9638, Adjusted R-squared: 0.9627   
## F-statistic: 853 on 3 and 96 DF, p-value: < 2.2e-16

options(scipen =999)  
  
#6.Bind the coefficients with the confidence interval at the 95% level and report them  
cbind(coef(XZinteraction), confint(XZinteraction, level = 0.95))

## 2.5 % 97.5 %  
## (Intercept) 29.2583381 27.8869911 30.62968519  
## stress 1.9956136 1.7651133 2.22611397  
## support -0.2356282 -0.4557743 -0.01548208  
## stress:support -0.3902390 -0.4275633 -0.35291479

#7a. create three levels - have got them! create new for stress  
m\_Stress<- mean(depress$stress, na.rm = TRUE)  
sd\_Stress<- sd(depress$stress, na.rm = TRUE)  
m\_Stress

## [1] 5.39

sd\_Stress

## [1] 2.635787

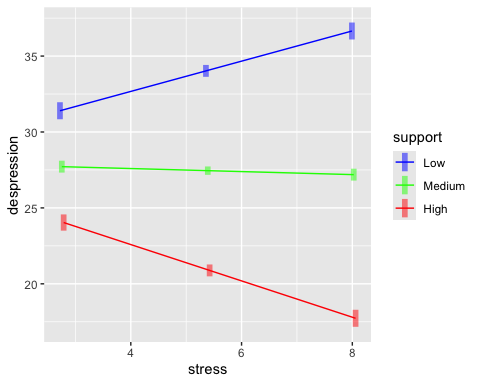
#7b.  
emm <- emmeans(XZinteraction, ~ stress\*support,  
 cov.keep = 3, at = list(  
 stress = c(m\_Stress-sd\_Stress, m\_Stress, m\_Stress+sd\_Stress),  
 support = c(support\_down, support\_mean, support\_upper)), level = 0.95)  
summary(emm)

## stress support emmean SE df lower.CL upper.CL  
## 2.75 2.56 31.4 0.282 96 30.8 32.0  
## 5.39 2.56 34.0 0.197 96 33.6 34.4  
## 8.03 2.56 36.7 0.281 96 36.1 37.2  
## 2.75 5.37 27.7 0.197 96 27.3 28.1  
## 5.39 5.37 27.5 0.139 96 27.2 27.7  
## 8.03 5.37 27.2 0.197 96 26.8 27.6  
## 2.75 8.18 24.0 0.269 96 23.5 24.6  
## 5.39 8.18 20.9 0.197 96 20.5 21.3  
## 8.03 8.18 17.7 0.283 96 17.2 18.3  
##   
## Confidence level used: 0.95

#It assesses the levels of the DV (depression) at 3 levels of the moderator (support) and 3 levels of IV (stress)  
  
#7c.  
simpleSlope <- emtrends(XZinteraction, pairwise~support, var='stress',cov.keep=3, at = list(support = c(support\_down, support\_mean, support\_upper)),level = 0.95)  
summary(simpleSlope)

## $emtrends  
## support stress.trend SE df lower.CL upper.CL  
## 2.56 0.996 0.0765 96 0.844 1.14818  
## 5.37 -0.100 0.0531 96 -0.205 0.00535  
## 8.18 -1.196 0.0732 96 -1.342 -1.05096  
##   
## Confidence level used: 0.95   
##   
## $contrasts  
## contrast estimate SE df t.ratio  
## support2.56072603649623 - support5.37 1.10 0.0528 96 20.754  
## support2.56072603649623 - support8.17927396350377 2.19 0.1056 96 20.754  
## support5.37 - support8.17927396350377 1.10 0.0528 96 20.754  
## p.value  
## <.0001  
## <.0001  
## <.0001  
##   
## P value adjustment: tukey method for comparing a family of 3 estimates

#Simple slopes show the slopes for each level of the Moderator (low, medium, high) It shows change in depression for each unit increase in stress when social support is low/medium/high  
# t tests tells if the observed slopes for a given level of the support is different from zero significantly.  
  
#8. Plot /visualize the interaction  
emmip(XZinteraction, support ~ stress,  
 cov.keep = 3, at = list(  
 stress = c(m\_Stress-sd\_Stress, m\_Stress, m\_Stress+sd\_Stress),  
 support = c(support\_down, support\_mean, support\_upper)),   
 CIs = TRUE, level = 0.95, position = "jitter")+ ylab("despression")+ scale\_color\_manual(labels = c("Low","Medium","High"), values = c( "blue", "green","red"))



#9. Explain the results for the moderation  
  
#Social Support was examined as a moderator of the relation between depression (DV) and stress (IV). Stress and social support were entered in the first step of the regression analysis. In the second step of the regression analysis, the interaction term between stress and social support was entered, and it explained a significant increase in variance in depression, R squared = .96, p < .001. Thus, social support was a significant moderator of the relationship between stress and depression. The unstandardized simple slope for individuals 1 SD below the mean of social support was .996, the unstandardized simple slope for individuals with a mean level of social support was -.10, and the unstandardized simple slope for individuals 1 SD above the mean of social support was -.1.196."