

Project Proposal

due October 11, 2021 by 11:59 PM

Mihika Rajvanshi, Bhavika Garg, Michelle Huang

10/11/2021

Load Packages

```
library(tidyverse)
library(tidymodels)
library(infer)
library(readxl)
library(skimr)
library(dplyr)
```

Load Data

Introduction and Data, including Research Questions

After two on-campus suicides in the past month, students at the University of North Carolina at Chapel Hill have spoken out about the mental health crisis that has arisen alongside the COVID-19 pandemic, comparing declining mental health to “a second pandemic”. Mental health crises so close to home highlight how COVID-19 is not merely a medical phenomenon, but also how institutional organizations failed to target socio-psychological consequences that arose from restrictions during this global health crisis (Javed et. al, 2020, Yamada et. al 2021). In particular, evidence indicates that the mental health impacts will be the greatest and longest-lasting globally in under-served populations of LMICs, emphasizing a need for a solution that identifies and addresses the social determinants of mental health during this pandemic (Kola, 2021). Because of the pertinence of this issue, our team has proposed the research question: How does age, gender, and level of isolation affect global mental health outcomes during COVID-19? To explore our question, we will reference data from the COVIDiStress Global Survey focused on the psychological and behavioural impact of the coronavirus crisis from the Open Science Framework database. The collection efforts for this data spanned from March to May of 2020, and used survey forms across 179 countries. In total, the data represents 125,306 people with demographic characteristics for countries with over 200 responses who met the survey inclusion criteria (over 18 years of age providing informed consent) and accessed the online survey link over a period of 62 days. A variety of adults with varying demographics provided self-reports about the proximate psychological effects of the COVID-19 pandemic, which were translated as indicators for mental health outcomes. A wide range of variables were collected during this study, demographic data, psychological effects of COVID-19, risk taking intention, personality characteristics, loneliness levels, stress levels, levels of trust, and willingness to comply with COVID-19 regulations. More specific variables observed include experiences of distress from COVID-19 restrictions, coping mechanisms during quarantine, and availability of social support. To respond to the survey questions, participants typically supplied their answers on a 6-point scale ranging from ‘Strongly disagree’ to ‘Strongly agree,’ and added text to explain their choices (Yamada, 2021).

References

Javed, B., Sarwer, A., Soto, E. B., & Mashwani, Z. U. (2020). The coronavirus (COVID-19) pandemic's impact on mental health. *The International journal of health planning and management*, 35(5), 993–996. <https://doi.org/10.1002/hpm.3008>

L. Kola, B.A. Kohrt, C. Hanlon, J.A. Naslund, S. Sikander, M. Balaji, C. Benjet, E.Y. Cheung, J. Eaton, P. Gonsalves, M. Hailemariam, N.P. Luitel, D.B. Machado, E.Misganow, O. Omigbodun, T. Roberts, T.T. Salisbury, R. Shidhaye, V. Su. (2021). COVID-19 mental health impact and responses in low-income and middle-income countries: Reimagining global mental health, *Lancet Psychiatry* (8) pp. 535-550, [https://doi.org/10.1016/S2215-0366\(21\)00025-0](https://doi.org/10.1016/S2215-0366(21)00025-0).

Yamada, Y., Ćepulić, DB., Coll-Martín, T. et al. COVIDiSTRESS Global Survey dataset on psychological and behavioural consequences of the COVID-19 outbreak. *Sci Data* 8, 3 (2021). <https://doi.org/10.1038/s41597-020-00784-9>

Glimpse

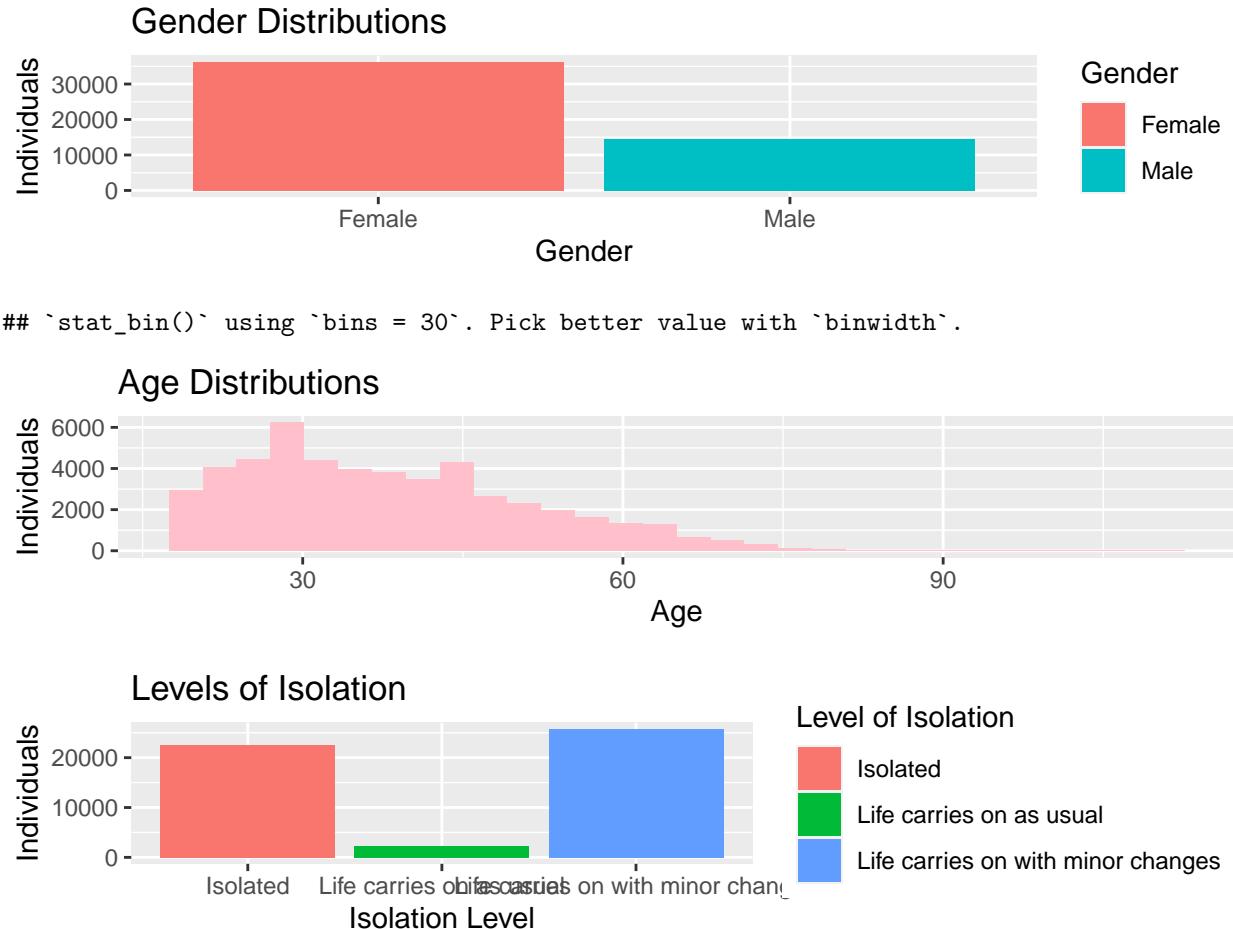
This is the condensed glimpse because there are 154 variables. We have selected the first 13, but the full list can be found in the readme file. The data was joined via full_join. Code not shown in output file.

```
clean covid <- subset (covidstressdata, select = -c(AD_gain, AD_loss, RecordedDate, Duration..in.seconds  
#removed because of LaTeX incompatible but will use this for analysis  
  
filter(Dem_gender %in% c("Male", "Female"), answered_all == "Yes", Dem_isolation %in% c("Isolated", "Li  
  
mutate(Dem_dependentsgrouped = cut(Dem_dependents, breaks = c(-Inf,0,1,2,3,4,Inf)))  
  
glimpsecovid <- subset (covidstressdata, select = -c(Dem_maritalstatus:Scale_UCLA_TRI_avg)) #condensed
```

Data Analysis Plan

Our main change to the proposal resubmission was removing the t-tests and adding the more appropriate ANOVA tests for our data analysis plan. We also added more predictor variables to get a more holistic view of the data. These changes are incorporated within the following section. In order to answer our research question, our predictor variables (x) are age, gender, level of isolation, marital status, dependents, employment status, while the outcome variables (y) are the results of several measures of psychological well-being during COVID-19. We will pick the three most relevant measures in the study: PSS10, SPS-15, and SLON-3 scales. The PSS scale measures perceived stress in an individual. SPS measures an individual's social connectedness to others. Finally, the SLON-3 scale measures loneliness in individuals. Together, we take these three scales to represent a quantitative measure of psychological well-being. The comparison groups that will be used will be two groupings of ages, the two genders, the levels of isolation, married or single, number of dependents, and unemployed or employed. We will then consider if the relationship between our factors and the various psychological well-being scales is statistically significant in each of our cases. Because this dataset is extremely large with over 125,000 observations, we will first examine the dataset by understanding the demographics of the data (the visualizations are below). Then we will calculate the mean levels of the PSS-10, SPS-15, and SLON-3 scales in different age groups, gender, levels of isolation, marital status, dependents, employment status. We will also create sets of histograms and barplots that visualize the distribution of these scales. Finally, we will create a series of visualizations just to see the overall geographic distributions with the spatial mapping method. The statistical methods that will be useful in answering our research question would be the ANOVA test. The ANOVA test will be used because we want to find out which one of these factors has a significant effect on the measures of depression we chose. We will primarily focus on age, gender, and levels of isolation as we are most interested in those three and are the factors we made visualizations for. For the age analysis, the age groups will be collapsed into children and adults. For the gender analysis, only female and male individuals will be used while those that answered NA will be discarded. Finally, for the level of isolation, we will collapse the four values of isolation into two groups of isolated or not isolated. We will

compare the mean values of our three scales of psychological well-being via ANOVA tests to see which factor is most significantly correlated. Our null hypothesis is that no factor has a statistically significant correlation on any scale of psychological well-being in a global population. Our alternate hypothesis for each of our tests is that age, gender, or level of isolation (or other factors) will have a more significant correlation than other factors with our various scales of psychological well-being, PSS-10, SPS-15, and SLON-3. In order for our hypothesized answer to be correct, the mean levels of the well-being scales must be statistically different ($p\text{-value} < 0.05$) when comparing mean values of the PSS-10, SPS-15, or SLON-3 scales across each of our two different scenarios of three explanatory variables (age, gender, or isolation).



```
covidforanalysis <- subset (cleancovid, select = c(13:22)) %>%
filter(Scale_PSS10_UCLA_1 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_2 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_3 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_4 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_5 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_6 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_7 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_8 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_9 %in% c(1, 2, 3, 4, 5)) %>%
filter(Scale_PSS10_UCLA_10 %in% c(1, 2, 3, 4, 5))
```

```
covidforanalysis$Scale_PSS10_UCLA_1 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_1))
```

```

covidforanalysis$Scale_PSS10_UCLA_2 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_2))

covidforanalysis$Scale_PSS10_UCLA_3 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_3))

covidforanalysis$Scale_PSS10_UCLA_4 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_4))

covidforanalysis$Scale_PSS10_UCLA_5 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_5))

covidforanalysis$Scale_PSS10_UCLA_6 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_6))

covidforanalysis$Scale_PSS10_UCLA_7 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_7))

covidforanalysis$Scale_PSS10_UCLA_8 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_8))

covidforanalysis$Scale_PSS10_UCLA_9 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_9))

covidforanalysis$Scale_PSS10_UCLA_10 <- as.numeric(as.character(covidforanalysis$Scale_PSS10_UCLA_10))

covidforanalysis <- covidforanalysis %>%
  select(Scale_PSS10_UCLA_1:Scale_PSS10_UCLA_10) %>%
  mutate(PSSmeans = rowMeans(across(where(is.numeric)))))

covidforanalysis2 <- subset(cleancovid, select = c(23:25)) %>%
filter(Scale_SLON_1 %in% c(1, 2, 3, 4, 5))%>%
filter(Scale_SLON_2 %in% c(1, 2, 3, 4, 5))%>%
filter(Scale_SLON_3 %in% c(1, 2, 3, 4, 5))

covidforanalysis2$Scale_SLON_1 <- as.numeric(as.character(covidforanalysis2$Scale_SLON_1))

covidforanalysis2$Scale_SLON_2 <- as.numeric(as.character(covidforanalysis2$Scale_SLON_2))

covidforanalysis2$Scale_SLON_3 <- as.numeric(as.character(covidforanalysis2$Scale_SLON_3))

covidforanalysis2 <- covidforanalysis2 %>%
  select(Scale_SLON_1: Scale_SLON_3) %>%
  mutate(SLONmeans = rowMeans(across(where(is.numeric)))))

covidforanalysis3 <- subset(cleancovid, select = c(101:110)) %>%
filter(SPS_1 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_2 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_3 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_4 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_5 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_6 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_7 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_8 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_9 %in% c(1, 2, 3, 4, 5, 6))%>%
filter(SPS_10 %in% c(1, 2, 3, 4, 5, 6))

covidforanalysis3$SPS_1 <- as.numeric(as.character(covidforanalysis3$SPS_1))

covidforanalysis3$SPS_2 <- as.numeric(as.character(covidforanalysis3$SPS_2))

covidforanalysis3$SPS_3 <- as.numeric(as.character(covidforanalysis3$SPS_3))

covidforanalysis3$SPS_4 <- as.numeric(as.character(covidforanalysis3$SPS_4))

```

```

covidforanalysis3$SPS_5 <- as.numeric(as.character(covidforanalysis3$SPS_5))
covidforanalysis3$SPS_6 <- as.numeric(as.character(covidforanalysis3$SPS_6))
covidforanalysis3$SPS_7 <- as.numeric(as.character(covidforanalysis3$SPS_7))
covidforanalysis3$SPS_8 <- as.numeric(as.character(covidforanalysis3$SPS_8))
covidforanalysis3$SPS_9 <- as.numeric(as.character(covidforanalysis3$SPS_9))
covidforanalysis3$SPS_10 <- as.numeric(as.character(covidforanalysis3$SPS_10))

covidforanalysis3 <- covidforanalysis3 %>%
  select(SPS_1:SPS_10) %>%
  mutate(SPSmeans = rowMeans(across(where(is.numeric)))))

genderPSStest <- t.test(covidforanalysis$PSSmeans~cleancovid$Dem_gender, var.equal=FALSE)
genderSLONtest <- t.test(covidforanalysis2$SLONmeans~cleancovid$Dem_gender, var.equal=FALSE)
genderSPSttest <- t.test(covidforanalysis3$SPSmeans~cleancovid$Dem_gender, var.equal=FALSE)

ttesttab <- matrix(c(1.75*10^-309, 1.16*10^-135, 1.98*10^-278, 0.114, 0.221, 0.3, 0.16, 0.259, 0.335), nrow=5, byrow=TRUE)
colnames(ttesttab) <- c('PSS', 'SLON', 'SPS')
rownames(ttesttab) <- c('P values', 'Confidence Intervals Low', 'Confidence Intervals High')
ttesttab <- as.table(ttesttab)
knitr::kable(ttesttab, digits=10, caption="T-Test Results for Gender and PSS, SLON, and SPS Scales") #where

```

Table 1: T-Test Results for Gender and PSS, SLON, and SPS Scales

	PSS	SLON	SPS
P values	0.000	0.000	0.000
Confidence Intervals Low	0.114	0.221	0.300
Confidence Intervals High	0.160	0.259	0.335

```

print(ttesttab)

##                                     PSS        SLON        SPS
## P values                  1.75e-309 1.16e-135 1.98e-278
## Confidence Intervals Low 1.14e-01  2.21e-01  3.00e-01
## Confidence Intervals High 1.60e-01  2.59e-01  3.35e-01

anovaPSSisolation <- summary(aov(covidforanalysis$PSSmeans~cleancovid$Dem_isolation))
anovaSLONisolation <- summary(aov(covidforanalysis2$SLONmeans~cleancovid$Dem_isolation))
anovaSPSisolation <- summary(aov(covidforanalysis3$SPSmeans~cleancovid$Dem_isolation))

anovaPSSmarital <- summary(aov(covidforanalysis$PSSmeans~cleancovid$Dem_maritalstatus))
anovaSLONmarital <- summary(aov(covidforanalysis2$SLONmeans~cleancovid$Dem_maritalstatus))
anovaSPSmarital <- summary(aov(covidforanalysis3$SPSmeans~cleancovid$Dem_maritalstatus))

anovaPSSemploy <- summary(aov(covidforanalysis$PSSmeans~cleancovid$Dem_employment))
anovaSLONemploy <- summary(aov(covidforanalysis2$SLONmeans~cleancovid$Dem_employment))
anovaSPSemploy <- summary(aov(covidforanalysis3$SPSmeans~cleancovid$Dem_employment))

anovaPSSdepend <- summary(aov(covidforanalysis$PSSmeans~cleancovid$Dem_dependentsgrouped))
anovaSLONdepend <- summary(aov(covidforanalysis2$SLONmeans~cleancovid$Dem_dependentsgrouped))
anovaSPSdepend <- summary(aov(covidforanalysis3$SPSmeans~cleancovid$Dem_dependentsgrouped))

```

```

anovatab <- matrix(c(0, 0, 0,
                     1.22*10^-10, 1.48*10^-298, 0,
                     3.52*10^-135, 6.02*10^-160, 2.14*10^-123,
                     8.79*10^-21, 4.12*10^-63, 6.11*10^-27), ncol=3, byrow=TRUE)
colnames(anovatab) <- c('PSS','SLON','SPS')
rownames(anovatab) <- c('Isolation Status', 'Marital Status', 'Employment', 'Dependents')
anovatab <- as.table(anovatab)
knitr::kable(anovatab,digits=10,caption="P Values for ANOVA Results") #when we knit, see if the title s

```

Table 2: P Values for ANOVA Results

	PSS	SLON	SPS
Isolation Status	0e+00	0	0
Marital Status	1e-10	0	0
Employment	0e+00	0	0
Dependents	0e+00	0	0

```
print(anovatab)
```

```

##          PSS      SLON      SPS
## Isolation Status 0.00e+00 0.00e+00 0.00e+00
## Marital Status   1.22e-10 1.48e-298 0.00e+00
## Employment       3.52e-135 6.02e-160 2.14e-123
## Dependents        8.79e-21 4.12e-63 6.11e-27

covid_PSSage <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~cleancovid$Dem_age, data = cleancovid)
  covid_PSSage_tidy <- tidy(covid_PSSage, conf.int=TRUE)
  print(covid_PSSage_tidy)

## # A tibble: 2 x 7
##   term            estimate std.error statistic p.value conf.low conf.high
##   <chr>           <dbl>     <dbl>     <dbl>     <dbl>     <dbl>
## 1 (Intercept)    3.16      0.00533    594.     0       3.15      3.17
## 2 cleancovid$Dem_age -0.00465  0.000133    -35.1   7.42e-267 -0.00491 -0.00439

covid_SLONage <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis2$SLONmeans~cleancovid$Dem_age, data = cleancovid)
  covid_SLONage_tidy <- tidy(covid_SLONage, conf.int = TRUE)
  print(covid_SLONage_tidy)

## # A tibble: 2 x 7
##   term            estimate std.error statistic p.value conf.low conf.high
##   <chr>           <dbl>     <dbl>     <dbl>     <dbl>     <dbl>
## 1 (Intercept)    3.07      0.0132     232.      0       3.05      3.10
## 2 cleancovid$Dem_age -0.0128  0.000329    -39.0     0     -0.0135   -0.0122

covid_SPSage <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis3$SPSmeans~cleancovid$Dem_age, data = cleancovid)
  covid_SPSage_tidy <- tidy(covid_SPSage, conf.int = TRUE)
  print(covid_SPSage_tidy)

```

```

## # A tibble: 2 x 7
##   term          estimate std.error statistic p.value conf.low conf.high
##   <chr>        <dbl>     <dbl>      <dbl>    <dbl>     <dbl>
## 1 (Intercept)  4.95     0.0114     435.     0       4.93     4.97
## 2 cleancovid$Dem_age -0.000805  0.000283    -2.84  0.00446 -0.00136 -0.000250
lin_reg_table <- matrix(c(-0.0047, -0.0128, -0.0008,
                           7.41*10^-267, 0, 0.0045,
                           -0.0049, -0.0135, -0.0014
                           -0.0044, -0.0122, -0.0003),
                           ncol=3, byrow=TRUE)

## Warning in matrix(c(-0.0047, -0.0128, -8e-04, 7.41 * 10^-267, 0, 0.0045, : data
## length [11] is not a sub-multiple or multiple of the number of rows [4]
colnames(lin_reg_table) <- c('PSS', 'SLON', 'SPS')
rownames(lin_reg_table) <- c('Estimate', 'P values', 'Confidence Intervals Low', 'Confidence Intervals High')
lin_reg_table <- as.table(lin_reg_table)
knitr::kable(lin_reg_table, digits=10, caption="Linear Regression Results for Age and PSS, SLON, and SPS Scales")

```

Table 3: Linear Regression Results for Age and PSS, SLON, and SPS Scales

	PSS	SLON	SPS
Estimate	-0.0047	-0.0128	-0.0008
P values	0.0000	0.0000	0.0045
Confidence Intervals Low	-0.0049	-0.0135	-0.0058
Confidence Intervals High	-0.0122	-0.0003	-0.0047

```

print(lin_reg_table)

##                                     PSS           SLON           SPS
## Estimate                  -4.70e-03  -1.28e-02  -8.00e-04
## P values                   7.41e-267   0.00e+00   4.50e-03
## Confidence Intervals Low -4.90e-03  -1.35e-02  -5.80e-03
## Confidence Intervals High -1.22e-02  -3.00e-04  -4.70e-03
lin_reg_equations_table <- matrix(c('y_expected = 3.1628 - 0.00465(age)',
                                      'y_expected = 3.0734 - 0.01281(age)',
                                      'y_expected = 4.9504 - 0.000805(age)'),
                                      ncol=3, byrow=TRUE)
colnames(lin_reg_equations_table) <- c('PSS', 'SLON', 'SPS')
rownames(lin_reg_equations_table) <- c('Equation')
lin_reg_equations_table <- as.table(lin_reg_equations_table)
knitr::kable(lin_reg_equations_table, digits=10, caption="Linear Regression Results for Age and PSS, SLON, and SPS Scales")

```

Table 4: Linear Regression Results for Age and PSS, SLON, and SPS Scales

	PSS	SLON	SPS
Equation	y_expected = 3.1628 - 0.00465(age)	y_expected = 3.0734 - 0.01281(age)	y_expected = 4.9504 - 0.000805(age)

```

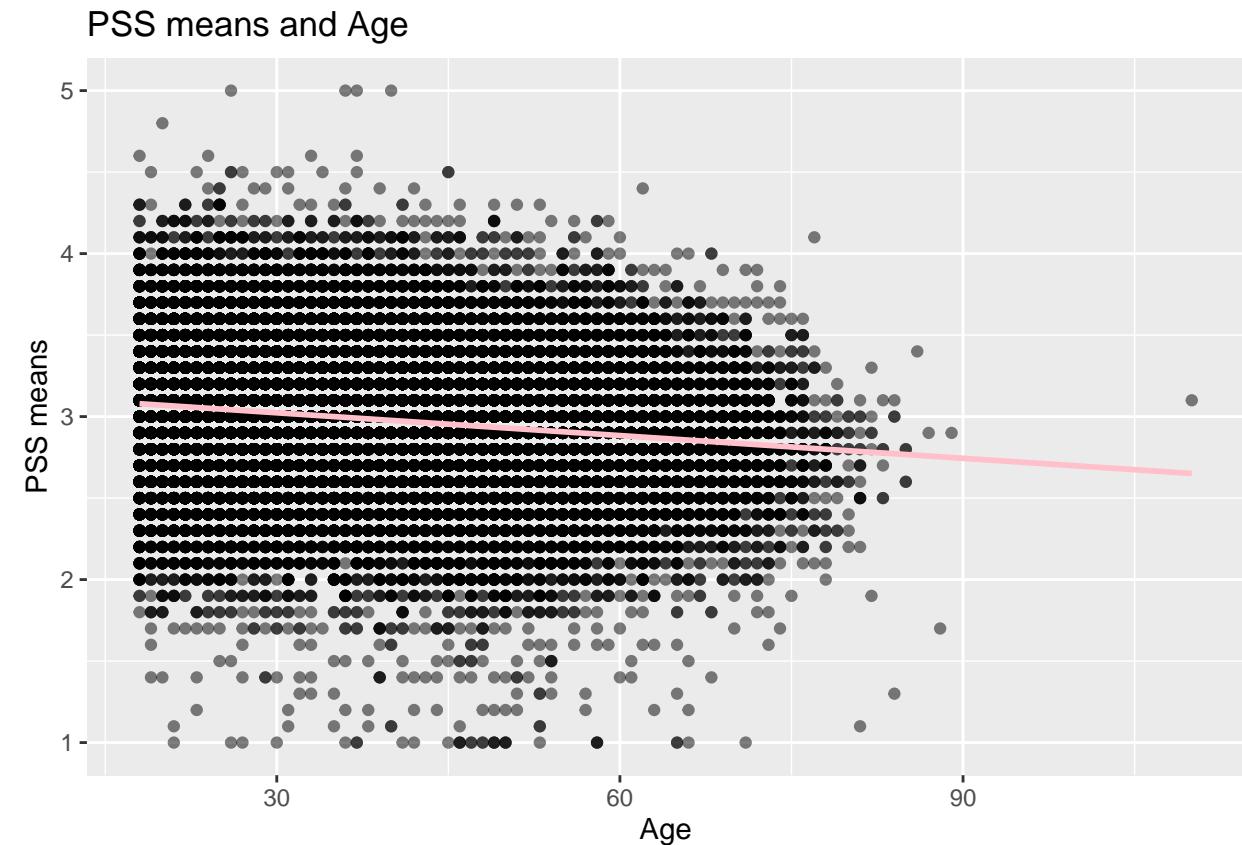
print(lin_reg_equations_table)

##          PSS                      SLON
## Equation y_expected = 3.1628 - 0.00465(age) y_expected = 3.0734 - 0.01281(age)
##          SPS
## Equation y_expected = 4.9504 - 0.000805(age)

#PSSmeans
ggplot(data = cleancovid,
       aes(x = Dem_age,
           y = covidforanalysis$PSSmeans)) +
  geom_point(alpha=.5) +
  geom_smooth(method = "lm",
              se = FALSE,
              color = "pink") +
  labs(
    title = "PSS means and Age",
    x = "Age",
    y = "PSS means"
  )

```

`geom_smooth()` using formula 'y ~ x'



```

#SLONmeans
ggplot(data = cleancovid,
       aes(x = Dem_age,
           y = covidforanalysis2$SLONmeans)) +

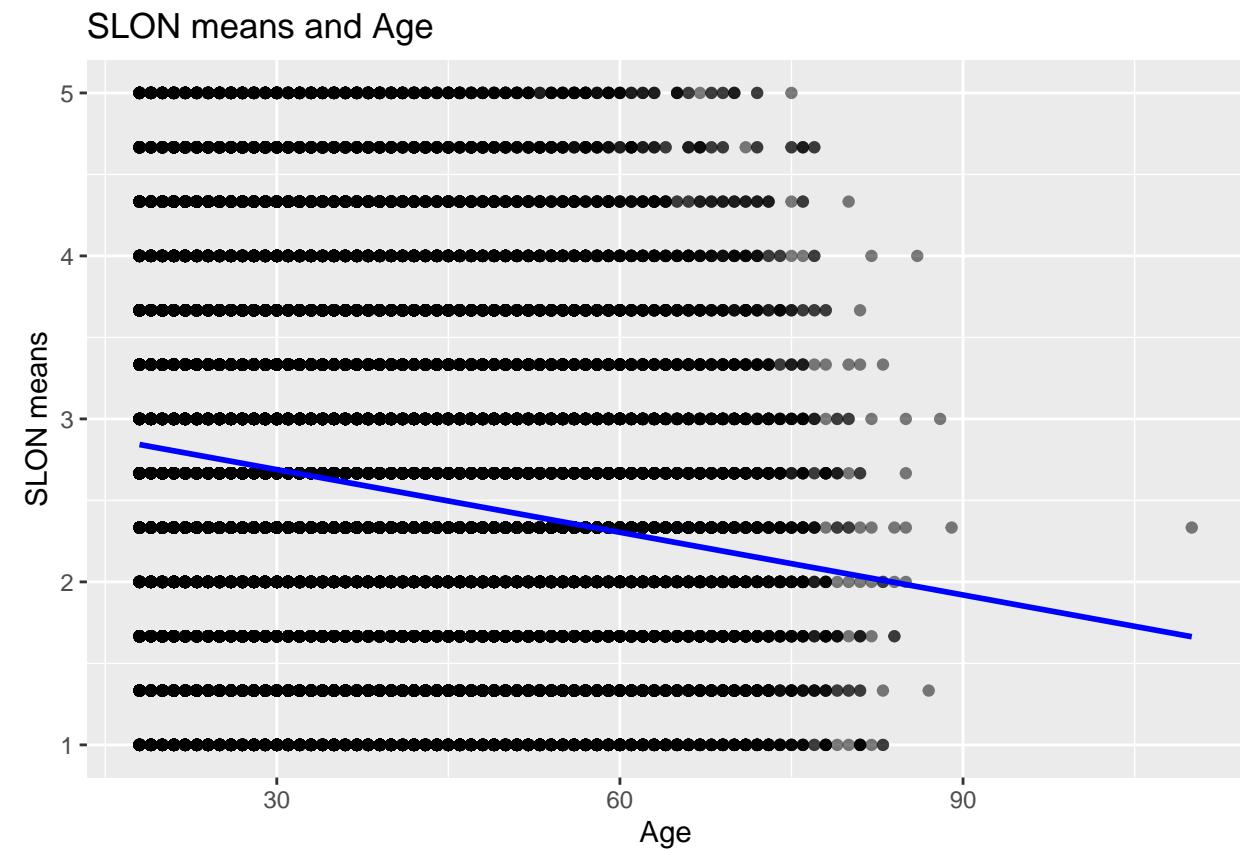
```

```

geom_point(alpha=.5) +
geom_smooth(method = "lm",
            se = FALSE,
            color = "blue") +
labs(
  title = "SLON means and Age",
  x = "Age",
  y = "SLON means"
)

```

`geom_smooth()` using formula 'y ~ x'



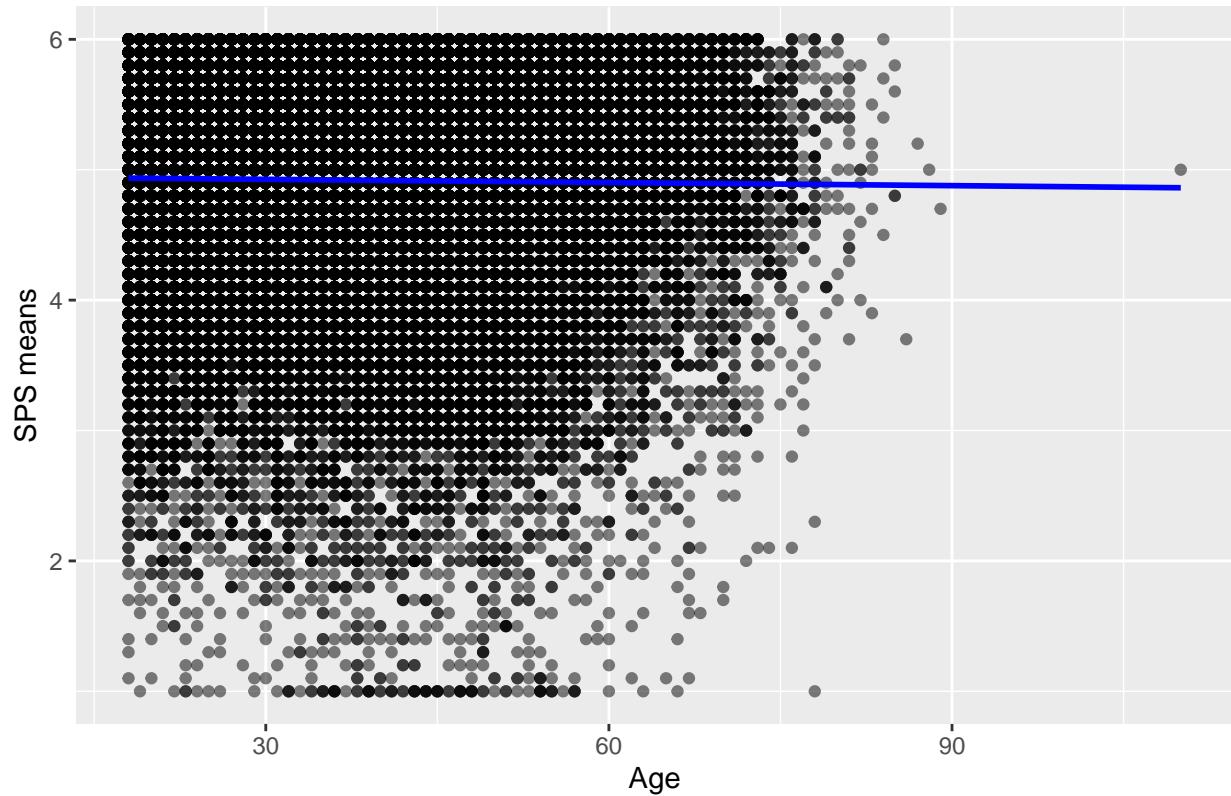
```

#SPSmeans
ggplot(data = cleancovid,
       aes(x = Dem_age,
            y = covidforanalysis3$SPSmeans)) +
geom_point(alpha=.5) +
geom_smooth(method = "lm",
            se = FALSE,
            color = "blue") +
labs(
  title = "SPS means and Age",
  x = "Age",
  y = "SPS means"
)

```

`geom_smooth()` using formula 'y ~ x'

SPS means and Age



```
covid_PSS <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
covid_PSS_tidy <- tidy(covid_PSS, conf.int=TRUE)
print(covid_PSS_tidy)
```

term	estimate	std.error	statistic	p.value	conf.low	conf.high
<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1 (Intercept)	3.26	0.0108	302.	0	3.24	3.28
2 Dem_genderMale	-0.123	0.00380	-32.5	5.04e-229	-0.131	-0.116
3 Dem_age	-0.00459	0.000171	-26.8	3.77e-157	-0.00492	-0.00425
4 Dem_maritalstatusM~	-0.0348	0.00692	-5.03	4.94e- 7	-0.0484	-0.0213
5 Dem_maritalstatusS~	-0.0280	0.00768	-3.65	2.62e- 4	-0.0431	-0.0130
6 Dem_isolationLife ~	-0.349	0.00834	-41.8	0	-0.365	-0.332
7 Dem_isolationLife ~	-0.120	0.00347	-34.6	8.47e-259	-0.127	-0.113
8 Dem_employmentNot ~	0.0300	0.00618	4.86	1.18e- 6	0.0179	0.0422
9 Dem_employmentPart~	0.0168	0.00606	2.78	5.43e- 3	0.00497	0.0287
10 Dem_employmentReti~	0.0114	0.00832	1.37	1.70e- 1	-0.00490	0.0277
11 Dem_employmentSelf~	0.0469	0.00568	8.26	1.52e- 16	0.0358	0.0580
12 Dem_employmentStud~	0.0362	0.00520	6.96	3.56e- 12	0.0260	0.0463
13 Dem_dependentsgrou~	0.0614	0.00496	12.4	4.35e- 35	0.0517	0.0711
14 Dem_dependentsgrou~	0.0624	0.00517	12.1	1.46e- 33	0.0523	0.0726
15 Dem_dependentsgrou~	0.0766	0.00765	10.0	1.41e- 23	0.0616	0.0915
16 Dem_dependentsgrou~	0.0644	0.0130	4.96	7.05e- 7	0.0389	0.0898
17 Dem_dependentsgrou~	0.106	0.0192	5.53	3.15e- 8	0.0686	0.144

```

covid_SLON <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis2$SLONmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
covid_SLON_tidy <- tidy(covid_SLON, conf.int=TRUE)
print(covid_SLON_tidy)

## # A tibble: 17 x 7
##   term      estimate std.error statistic  p.value conf.low conf.high
##   <chr>     <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept) 3.45     0.0269    128.     0       3.39     3.50 
## 2 Dem_genderMale -0.195    0.00947   -20.6    1.66e- 93    -0.213   -0.176
## 3 Dem_age      -0.00997   0.000427   -23.4    4.68e-120   -0.0108  -0.00913
## 4 Dem_maritalstatusM-0.321     0.0173    -18.6    3.71e- 77    -0.355   -0.288
## 5 Dem_maritalstatusS-0.0922    0.0191    -4.82    1.47e- 6     -0.130   -0.0547
## 6 Dem_isolationLife ~ -0.586    0.0208    -28.2    8.89e-174   -0.627   -0.545
## 7 Dem_isolationLife ~ -0.399    0.00865   -46.1     0       -0.416   -0.382
## 8 Dem_employmentNot ~ 0.159     0.0154     10.3    5.93e- 25    0.129    0.189
## 9 Dem_employmentPart~ 0.0122    0.0151     0.805   4.21e- 1     -0.0174  0.0417
## 10 Dem_employmentReti~ 0.0370    0.0207     1.79    7.39e- 2     -0.00358 0.0777
## 11 Dem_employmentSelf~ -0.0693    0.0142    -4.90    9.64e- 7     -0.0971  -0.0416
## 12 Dem_employmentStud~ 0.0116    0.0130     0.896   3.70e- 1     -0.0138  0.0370
## 13 Dem_dependentsgroup~ 0.0330    0.0124     2.66    7.71e- 3     0.00872 0.0572
## 14 Dem_dependentsgroup~ -0.00165   0.0129    -0.128   8.98e- 1     -0.0269  0.0236
## 15 Dem_dependentsgroup~ -0.0176    0.0191    -0.922   3.56e- 1     -0.0549  0.0198
## 16 Dem_dependentsgroup~ -0.0694    0.0323    -2.15    3.19e- 2     -0.133   -0.00600
## 17 Dem_dependentsgroup~ 0.00315   0.0479     0.0658  9.48e- 1     -0.0906  0.0969

covid_SPS <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis3$SPSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
covid_SPS_tidy <- tidy(covid_SPS, conf.int=TRUE)
print(covid_SPS_tidy)

## # A tibble: 17 x 7
##   term      estimate std.error statistic  p.value conf.low conf.high
##   <chr>     <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept) 5.19     0.0226    229.     0       5.14     5.23 
## 2 Dem_genderMale -0.268    0.00798   -33.6   3.83e-244   -0.284   -0.252
## 3 Dem_age      -0.00447   0.000360   -12.4   2.45e- 35   -0.00517  -0.00376
## 4 Dem_maritalstatusM-0.260     0.0145    17.9    1.64e- 71    0.232    0.289
## 5 Dem_maritalstatusS-0.104     0.0161    -6.45   1.11e- 10   -0.136   -0.0725
## 6 Dem_isolationLife ~ -0.765     0.0175   -43.7     0       -0.799   -0.731
## 7 Dem_isolationLife ~ -0.0485    0.00729   -6.65   2.91e- 11   -0.0628  -0.0342
## 8 Dem_employmentNot ~ -0.273     0.0130   -21.0   8.56e- 98   -0.299   -0.248
## 9 Dem_employmentPart~ -0.131     0.0127   -10.3   7.83e- 25   -0.156   -0.106
## 10 Dem_employmentReti~ 0.0253    0.0175     1.45   1.48e- 1     -0.00897 0.0595
## 11 Dem_employmentSelf~ 0.0475    0.0119     3.98   6.91e- 5     0.0241  0.0708
## 12 Dem_employmentStud~ -0.0439    0.0109   -4.02   5.88e- 5     -0.0653  -0.0225
## 13 Dem_dependentsgroup~ -0.0679    0.0104   -6.51   7.40e- 11   -0.0883  -0.0475
## 14 Dem_dependentsgroup~ -0.0667    0.0109   -6.15   7.91e- 10   -0.0880  -0.0455
## 15 Dem_dependentsgroup~ -0.0687    0.0161   -4.28   1.91e- 5     -0.100   -0.0372
## 16 Dem_dependentsgroup~ -0.113     0.0273   -4.16   3.20e- 5     -0.167   -0.0599
## 17 Dem_dependentsgroup~ -0.0456    0.0403   -1.13   2.58e- 1     -0.125   0.0334

```

```

PSS_R2 <- glance(covid_PSS)$adj.r.squared
SLON_R2 <- glance(covid_SLON)$adj.r.squared
SPS_R2 <- glance(covid_SPS)$adj.r.squared

#PSS: marital status and isolation
maritalstatus_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
  maritalstatus_isolation_interaction_tidy <- tidy(maritalstatus_isolation_interaction, conf.int=TRUE)
  print(maritalstatus_isolation_interaction_tidy)

## # A tibble: 21 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>      <dbl>    <dbl>     <dbl>     <dbl>
## 1 (Intercept)  3.25      0.0126     258.     0       3.22      3.27
## 2 Dem_genderMale -0.123    0.00380    -32.4   1.24e-228 -0.131     -0.116
## 3 Dem_age      -0.00459   0.000171    -26.8   7.67e-157 -0.00492     -0.00425
## 4 Dem_maritalstatusM -0.0251   0.00998    -2.52   1.18e- 2 -0.0447     -0.00557
## 5 Dem_maritalstatusS -0.00931  0.0106     -0.878  3.80e- 1 -0.0301      0.0115
## 6 Dem_isolationLife ~ -0.348    0.0302     -11.5   1.40e- 30 -0.407     -0.288
## 7 Dem_isolationLife ~ -0.0939   0.0130     -7.24   4.50e- 13 -0.119     -0.0685
## 8 Dem_employmentNot ~  0.0303   0.00618     4.89   9.94e- 7  0.0181      0.0424
## 9 Dem_employmentPart ~  0.0171   0.00606     2.83   4.71e- 3  0.00525     0.0290
## 10 Dem_employmentReti ~  0.0117   0.00832     1.40   1.61e- 1 -0.00463     0.0280
## # ... with 11 more rows
  maritalstatus_isolation_R2 <- glance(maritalstatus_isolation_interaction)$adj.r.squared
  print(maritalstatus_isolation_R2)

## [1] 0.1045528

#PSS: age and isolation
age_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
  age_isolation_interaction_tidy <- tidy(age_isolation_interaction, conf.int=TRUE)
  print(age_isolation_interaction_tidy)

## # A tibble: 19 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>      <dbl>    <dbl>     <dbl>     <dbl>
## 1 (Intercept)  3.27      0.0123     266.     0       3.24e+0  3.29
## 2 Dem_genderMale -0.123    0.00380    -32.3   1.07e-226 -1.30e-1 -0.115
## 3 Dem_age      -0.00475   0.000228    -20.8   1.05e- 95 -5.20e-3 -0.00431
## 4 Dem_maritalstatusM -0.0350   0.00693     -5.05  4.54e- 7 -4.85e-2 -0.0214
## 5 Dem_maritalstatusS -0.0286   0.00768     -3.72  2.02e- 4 -4.36e-2 -0.0135
## 6 Dem_isolationLife ~ -0.268    0.0258     -10.4   2.81e- 25 -3.18e-1 -0.217
## 7 Dem_isolationLife ~ -0.140    0.0105     -13.3   2.19e- 40 -1.60e-1 -0.119
## 8 Dem_employmentNot ~  0.0305   0.00618     4.93   8.30e- 7  1.84e-2  0.0426
## 9 Dem_employmentPar ~  0.0171   0.00606     2.82   4.81e- 3  5.21e-3  0.0289
## 10 Dem_employmentReti ~  0.0108   0.00832     1.30   1.93e- 1 -5.47e-3  0.0272
## 11 Dem_employmentSel ~  0.0470   0.00568     8.27   1.32e- 16 3.58e-2  0.0581
## 12 Dem_employmentStu ~  0.0365   0.00520     7.01   2.37e- 12 2.63e-2  0.0466
## 13 Dem_dependentsgro ~  0.0613   0.00496     12.4   4.89e- 35 5.16e-2  0.0711
## 14 Dem_dependentsgro ~  0.0621   0.00517     12.0   3.48e- 33 5.19e-2  0.0722

```

```

## 15 Dem_dependentsgroup ~ 0.0762 0.00765 9.96 2.28e- 23 6.12e-2 0.0912
## 16 Dem_dependentsgroup ~ 0.0641 0.0130 4.94 7.77e- 7 3.87e-2 0.0895
## 17 Dem_dependentsgroup ~ 0.106 0.0192 5.51 3.65e- 8 6.81e-2 0.143
## 18 Dem_age:Dem_isolation ~ -0.00192 0.000592 -3.25 1.17e- 3 -3.08e-3 -0.000761
## 19 Dem_age:Dem_isolation ~ 0.000519 0.000263 1.97 4.84e- 2 3.70e-6 0.00103

age_isolation_R2 <- glance(age_isolation_interaction)$adj.r.squared
print(age_isolation_R2)

## [1] 0.1046692

#PSS: gender and isolation
gender_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans ~ Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
gender_isolation_interaction_tidy <- tidy(gender_isolation_interaction, conf.int=TRUE)
print(gender_isolation_interaction_tidy)

## # A tibble: 19 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept) 3.26e+0  0.0109    300.      0       3.24    3.28
## 2 Dem_genderMale -1.21e-1 0.00587   -20.6    4.05e- 94 -0.133   -0.110
## 3 Dem_age      -4.57e-3 0.000171   -26.7    8.63e-156 -0.00491   -0.00424
## 4 Dem_maritalstatusM -3.46e-2 0.00692   -5.00    5.76e- 7 -0.0482   -0.0210
## 5 Dem_maritalstatusS -2.77e-2 0.00768   -3.61    3.06e- 4 -0.0428   -0.0127
## 6 Dem_isolationLife ~ -3.25e-1 0.0116   -27.9    2.73e-170 -0.348   -0.302
## 7 Dem_isolationLife ~ -1.20e-1 0.00406   -29.6    1.58e-191 -0.128   -0.112
## 8 Dem_employmentNot ~ 2.98e-2 0.00618    4.82    1.46e- 6 0.0177    0.0419
## 9 Dem_employmentPart ~ 1.64e-2 0.00606    2.70    6.92e- 3 0.00449    0.0282
## 10 Dem_employmentRetired ~ 1.10e-2 0.00832    1.32    1.87e- 1 -0.00532   0.0273
## 11 Dem_employmentSelf ~ 4.69e-2 0.00568    8.26    1.55e- 16 0.0357    0.0580
## 12 Dem_employmentStudent ~ 3.62e-2 0.00520    6.96    3.45e- 12 0.0260    0.0464
## 13 Dem_dependentsgroup ~ 6.17e-2 0.00497    12.4    1.94e- 35 0.0520    0.0715
## 14 Dem_dependentsgroup ~ 6.27e-2 0.00517    12.1    8.42e- 34 0.0525    0.0728
## 15 Dem_dependentsgroup ~ 7.69e-2 0.00765    10.1    9.27e- 24 0.0619    0.0919
## 16 Dem_dependentsgroup ~ 6.48e-2 0.0130     5.00    5.82e- 7 0.0394    0.0903
## 17 Dem_dependentsgroup ~ 1.06e-1 0.0192     5.53    3.27e- 8 0.0685    0.144
## 18 Dem_genderMale:Dem_isolation ~ -4.69e-2 0.0167   -2.80    5.06e- 3 -0.0797   -0.0141
## 19 Dem_genderMale:Dem_isolation ~ 6.05e-4 0.00780    0.0776 9.38e- 1 -0.0147   0.0159

gender_isolation_R2 <- glance(gender_isolation_interaction)$adj.r.squared
print(gender_isolation_R2)

## [1] 0.104491

#PSS: dependents and isolation
dependents_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans ~ Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
dependents_isolation_interaction_tidy <- tidy(dependents_isolation_interaction, conf.int=TRUE)
print(dependents_isolation_interaction_tidy)

## # A tibble: 27 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept) 3.26     0.0109    299.      0       3.24    3.28

```

```

## 2 Dem_genderMale      -0.123  0.00380      -32.4  2.58e-228 -0.131      -0.116
## 3 Dem_age             -0.00459 0.000171     -26.8  8.37e-157 -0.00492      -0.00425
## 4 Dem_maritalstatusM~ -0.0346  0.00693      -5.00  5.86e- 7 -0.0482      -0.0210
## 5 Dem_maritalstatusS~ -0.0279  0.00768      -3.64  2.78e- 4 -0.0430      -0.0129
## 6 Dem_isolationLife ~ -0.344   0.0103       -33.2  1.40e-239 -0.364      -0.323
## 7 Dem_isolationLife ~ -0.122   0.00454      -26.8  5.26e-157 -0.131      -0.113
## 8 Dem_employmentNot ~  0.0300  0.00619       4.84  1.28e- 6  0.0178      0.0421
## 9 Dem_employmentPart~  0.0168  0.00606       2.78  5.46e- 3  0.00496      0.0287
## 10 Dem_employmentReti~ 0.0114  0.00832      1.37  1.70e- 1 -0.00489      0.0277
## # ... with 17 more rows

dependents_isolation_R2 <- glance(dependents_isolation_interaction)$adj.r.squared
print(dependents_isolation_R2)

## [1] 0.1043242

#PSS: employment and isolation
employment_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
employment_isolation_interaction_tidy <- tidy(employment_isolation_interaction, conf.int=TRUE)
print(employment_isolation_interaction_tidy)

## # A tibble: 27 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept)    3.26     0.0110    296.     0        3.24     3.28
## 2 Dem_genderMale -0.124    0.00380   -32.5    7.58e-230 -0.131    -0.116
## 3 Dem_age        -0.00456  0.000172   -26.6   1.21e-154 -0.00490   -0.00422
## 4 Dem_maritalstatusM~ -0.0354  0.00692   -5.12   3.11e- 7 -0.0490    -0.0219
## 5 Dem_maritalstatusS~ -0.0287  0.00768   -3.74   1.83e- 4 -0.0438    -0.0137
## 6 Dem_isolationLife ~ -0.350   0.0124    -28.3   4.19e-175 -0.374    -0.326
## 7 Dem_isolationLife ~ -0.116   0.00504    -23.1   1.42e-117 -0.126    -0.107
## 8 Dem_employmentNot ~  0.0541  0.00934     5.80   6.85e- 9  0.0358    0.0724
## 9 Dem_employmentPart~  0.0336  0.00928     3.62   2.98e- 4  0.0154    0.0517
## 10 Dem_employmentReti~ -0.0123  0.0116    -1.06   2.88e- 1 -0.0351    0.0104
## # ... with 17 more rows

employment_isolation_R2 <- glance(employment_isolation_interaction)$adj.r.squared
print(employment_isolation_R2)

## [1] 0.1050885

#PSS: age and gender
age_gender_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis$PSSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
age_gender_interaction_tidy <- tidy(age_gender_interaction, conf.int=TRUE)
print(age_gender_interaction_tidy)

## # A tibble: 18 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept)    3.29     0.0114    288.     0        3.27     3.31
## 2 Dem_genderMale -0.215    0.0112    -19.2   7.03e- 82 -0.237    -0.193
## 3 Dem_age        -0.00533  0.000191   -27.9   7.91e-170 -0.00570   -0.00495
## 4 Dem_maritalstatusM~ -0.0403  0.00695    -5.80   6.65e- 9 -0.0539    -0.0267

```

```

## 5 Dem_maritalstatusS~ -0.0320 0.00769 -4.16 3.13e- 5 -0.0471 -0.0169
## 6 Dem_isolationLife ~ -0.354 0.00835 -42.4 0 -0.370 -0.337
## 7 Dem_isolationLife ~ -0.120 0.00347 -34.7 2.56e-260 -0.127 -0.113
## 8 Dem_employmentNot ~ 0.0299 0.00618 4.84 1.29e- 6 0.0178 0.0420
## 9 Dem_employmentPart~ 0.0171 0.00605 2.83 4.64e- 3 0.00527 0.0290
## 10 Dem_employmentReti~ 0.0106 0.00831 1.27 2.03e- 1 -0.00572 0.0269
## 11 Dem_employmentSelf~ 0.0460 0.00568 8.10 5.49e- 16 0.0349 0.0571
## 12 Dem_employmentStud~ 0.0355 0.00520 6.83 8.79e- 12 0.0253 0.0456
## 13 Dem_dependentsgrou~ 0.0607 0.00496 12.2 2.02e- 34 0.0510 0.0705
## 14 Dem_dependentsgrou~ 0.0621 0.00516 12.0 2.85e- 33 0.0520 0.0722
## 15 Dem_dependentsgrou~ 0.0757 0.00764 9.90 4.17e- 23 0.0607 0.0907
## 16 Dem_dependentsgrou~ 0.0643 0.0130 4.96 7.07e- 7 0.0389 0.0897
## 17 Dem_dependentsgrou~ 0.105 0.0192 5.47 4.52e- 8 0.0674 0.143
## 18 Dem_genderMale:Dem~ 0.00240 0.000277 8.68 4.01e- 18 0.00186 0.00295

age_gender_R2 <- glance(age_gender_interaction)$adj.r.squared
print(age_gender_R2)

## [1] 0.1056896

#SLON: age and gender
SLON_age_gender_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis2$SLONmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employ
SLON_age_gender_interaction_tidy <- tidy(SLON_age_gender_interaction, conf.int=TRUE)
print(SLON_age_gender_interaction_tidy)

## # A tibble: 18 x 7
##   term      estimate std.error statistic p.value conf.low conf.high
##   <chr>     <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept) 3.54e+0  0.0285    124.     0       3.48     3.59
## 2 Dem_genderMale -4.49e-1  0.0279   -16.1    3.13e- 58 -0.504   -0.394
## 3 Dem_age      -1.20e-2  0.000476  -25.3    7.29e-140 -0.0130   -0.0111
## 4 Dem_maritalstatusM~-3.37e-1  0.0173   -19.4    6.53e- 84 -0.371   -0.303
## 5 Dem_maritalstatusS~-1.03e-1  0.0192   -5.39    7.07e- 8 -0.141   -0.0657
## 6 Dem_isolationLife ~-6.00e-1  0.0208   -28.9    1.24e-181 -0.641   -0.560
## 7 Dem_isolationLife ~-4.00e-1  0.00864  -46.2     0       -0.416   -0.383
## 8 Dem_employmentNot ~ 1.59e-1  0.0154    10.3    6.80e- 25 0.129    0.189
## 9 Dem_employmentPart~ 1.30e-2  0.0151    0.860   3.90e- 1 -0.0166   0.0425
## 10 Dem_employmentReti~ 3.47e-2  0.0207    1.68    9.34e- 2 -0.00584  0.0753
## 11 Dem_employmentSelf~ -7.19e-2  0.0141   -5.08    3.76e- 7 -0.0996   -0.0441
## 12 Dem_employmentStud~ 9.69e-3  0.0129    0.748   4.54e- 1 -0.0157   0.0351
## 13 Dem_dependentsgrou~ 3.11e-2  0.0124    2.52    1.18e- 2 0.00691  0.0554
## 14 Dem_dependentsgrou~ -2.56e-3  0.0129   -0.199   8.42e- 1 -0.0278   0.0227
## 15 Dem_dependentsgrou~ -2.00e-2  0.0190   -1.05    2.93e- 1 -0.0573   0.0173
## 16 Dem_dependentsgrou~ -6.95e-2  0.0323   -2.15    3.14e- 2 -0.133   -0.00621
## 17 Dem_dependentsgrou~ -4.60e-4  0.0478   -0.00962 9.92e- 1 -0.0942   0.0932
## 18 Dem_genderMale:Dem~ 6.69e-3  0.000690  9.70    3.20e- 22 0.00534  0.00804

SLON_age_gender_R2 <- glance(SLON_age_gender_interaction)$adj.r.squared
print(SLON_age_gender_R2)

## [1] 0.1043986

#SLON: employment and isolation
SLON_employment_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%

```

```

fit(covidforanalysis2$SLONmeans ~ Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment
SLON_employment_isolation_interaction_tidy <- tidy(SLON_employment_isolation_interaction, conf.int=TRUE)
print(SLON_employment_isolation_interaction_tidy)

## # A tibble: 27 x 7
##   term      estimate std.error statistic  p.value conf.low conf.high
##   <chr>     <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept)  3.45    0.0274    126.     0       3.39    3.50
## 2 Dem_genderMale -0.196   0.00947   -20.7   8.46e-95 -0.215   -0.178
## 3 Dem_age      -0.0102   0.000427   -23.8   8.91e-125 -0.0110   -0.00934
## 4 Dem_maritalstatusM~ -0.323   0.0173    -18.7   4.64e-78 -0.357   -0.289
## 5 Dem_maritalstatusS~ -0.0930   0.0191    -4.86   1.18e-6  -0.130   -0.0555
## 6 Dem_isolationLife ~ -0.528   0.0308    -17.1   1.10e-65 -0.588   -0.468
## 7 Dem_isolationLife ~ -0.386   0.0125    -30.7   1.42e-205 -0.410   -0.361
## 8 Dem_employmentNot ~  0.142   0.0233     6.10   1.08e-9   0.0963   0.187
## 9 Dem_employmentPart~  0.0247   0.0231     1.07   2.84e-1   -0.0206   0.0701
## 10 Dem_employmentReti~ 0.0518   0.0289     1.79   7.31e-2   -0.00486  0.109
## # ... with 17 more rows

SLON_employment_isolation_R2 <- glance(SLON_employment_isolation_interaction)$adj.r.squared
print(SLON_employment_isolation_R2)

## [1] 0.1039692

#SLON: marital and isolation
SLON_marital_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis2$SLONmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment
SLON_marital_isolation_interaction_tidy <- tidy(SLON_marital_isolation_interaction, conf.int=TRUE)
print(SLON_marital_isolation_interaction_tidy)

## # A tibble: 21 x 7
##   term      estimate std.error statistic  p.value conf.low conf.high
##   <chr>     <dbl>    <dbl>     <dbl>    <dbl>    <dbl>    <dbl>
## 1 (Intercept)  3.47    0.0313    111.     0       3.41    3.53
## 2 Dem_genderMale -0.196   0.00947   -20.6   2.44e-94 -0.214   -0.177
## 3 Dem_age      -0.0100   0.000427   -23.4   6.43e-121 -0.0108   -0.00917
## 4 Dem_maritalstatusM~ -0.366   0.0249    -14.7   6.20e-49 -0.415   -0.317
## 5 Dem_maritalstatusS~ -0.0891   0.0264    -3.37   7.40e-4   -0.141   -0.0373
## 6 Dem_isolationLife ~ -0.630   0.0753    -8.37   5.91e-17 -0.778   -0.483
## 7 Dem_isolationLife ~ -0.440   0.0323    -13.6   3.24e-42 -0.504   -0.377
## 8 Dem_employmentNot ~  0.160   0.0154     10.4   4.29e-25  0.129   0.190
## 9 Dem_employmentPart~  0.0130   0.0151     0.862  3.89e-1   -0.0166   0.0426
## 10 Dem_employmentReti~ 0.0378   0.0207     1.82   6.84e-2   -0.00286  0.0784
## # ... with 11 more rows

SLON_marital_isolation_R2 <- glance(SLON_marital_isolation_interaction)$adj.r.squared
print(SLON_marital_isolation_R2)

## [1] 0.1031972

#SPS: age and gender
SPS_age_gender_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis3$SPSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment
SPS_age_gender_interaction_tidy <- tidy(SPS_age_gender_interaction, conf.int=TRUE)

```

```

print(SPS_age_gender_interaction_tidy)

## # A tibble: 18 x 7
##   term            estimate std.error statistic p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>      <dbl>    <dbl>     <dbl>      <dbl>
## 1 (Intercept)    5.14     0.0240     214.     0       5.09      5.18
## 2 Dem_genderMale -0.123    0.0235    -5.23    1.72e- 7  -0.169    -0.0768
## 3 Dem_age        -0.00329  0.000401   -8.21   2.33e-16 -0.00408  -0.00251
## 4 Dem_maritalstatusMale 0.269    0.0146     18.4   1.14e-75  0.241      0.298
## 5 Dem_maritalstatusSingle -0.0978  0.0162    -6.05   1.44e- 9  -0.129    -0.0661
## 6 Dem_isolationLife ~ -0.757    0.0175    -43.1     0       -0.791    -0.722
## 7 Dem_isolationLife c~ -0.0481   0.00729   -6.59   4.29e-11  -0.0623   -0.0338
## 8 Dem_employmentNot employed -0.273    0.0130    -21.0   9.83e-98  -0.298    -0.248
## 9 Dem_employmentPart ~ -0.131    0.0127    -10.3   5.14e-25  -0.156    -0.107
## 10 Dem_employmentRetired ~ 0.0266   0.0175     1.52   1.28e- 1  -0.00765  0.0608
## 11 Dem_employmentSelf-employed ~ 0.0489   0.0119     4.10   4.12e- 5  0.0255      0.0723
## 12 Dem_employmentStudent ~ -0.0428   0.0109    -3.92   8.92e- 5  -0.0642   -0.0214
## 13 Dem_dependentsgroup ~ -0.0669   0.0104    -6.42   1.41e-10 -0.0873   -0.0464
## 14 Dem_dependentsgroup c~ -0.0662   0.0108    -6.10   1.05e- 9  -0.0875   -0.0449
## 15 Dem_dependentsgroup c~ -0.0673   0.0161    -4.19   2.78e- 5  -0.0987   -0.0358
## 16 Dem_dependentsgroup c~ -0.113    0.0272    -4.16   3.22e- 5  -0.167    -0.0599
## 17 Dem_dependentsgroup c~ -0.0436   0.0403    -1.08   2.80e- 1  -0.123    0.0354
## 18 Dem_genderMale:Dem_employment ~ -0.00381  0.000582   -6.56   5.47e-11  -0.00495  -0.00267

SPS_age_gender_R2 <- glance(SPS_age_gender_interaction)$adj.r.squared
print(SPS_age_gender_R2)

## [1] 0.113947

#SPS: employment and isolation
SPS_employment_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(covidforanalysis3$SPSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_employment)
SPS_employment_isolation_interaction_tidy <- tidy(SPS_employment_isolation_interaction, conf.int=TRUE)
print(SPS_employment_isolation_interaction_tidy)

## # A tibble: 27 x 7
##   term            estimate std.error statistic p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>      <dbl>    <dbl>     <dbl>      <dbl>
## 1 (Intercept)    5.19     0.0231     225.     0       5.14      5.23
## 2 Dem_genderMale -0.267    0.00798   -33.5   8.31e-244 -0.283    -0.252
## 3 Dem_age        -0.00421  0.000360   -11.7   1.37e- 31 -0.00491  -0.00350
## 4 Dem_maritalstatusMale 0.261    0.0145     18.0   3.23e- 72  0.233      0.290
## 5 Dem_maritalstatusSingle -0.105   0.0161    -6.50   8.27e- 11 -0.136    -0.0731
## 6 Dem_isolationLife ~ -0.863    0.0259    -33.3   2.18e-240 -0.914    -0.812
## 7 Dem_isolationLife c~ -0.0585   0.0106    -5.54   3.06e- 8  -0.0792   -0.0378
## 8 Dem_employmentNot employed ~ -0.255   0.0196   -13.0   9.63e- 39 -0.294    -0.217
## 9 Dem_employmentPart ~ -0.0908  0.0195    -4.67   3.09e- 6  -0.129    -0.0526
## 10 Dem_employmentRetired ~ -0.0347  0.0243    -1.42   1.55e- 1  -0.0824   0.0131
## # ... with 17 more rows

SPS_employment_isolation_R2 <- glance(SPS_employment_isolation_interaction)$adj.r.squared
print(SPS_employment_isolation_R2)

## [1] 0.1168304

```

```

#SPS: marital and isolation
SPS_marital_isolation_interaction <- linear_reg() %>%
  set_engine("lm") %>%
  fit(log(covidforanalysis3)$SPSmeans~Dem_gender + Dem_age + Dem_maritalstatus + Dem_isolation + Dem_em
SPS_employment_isolation_interaction_tidy <- tidy(SPS_employment_isolation_interaction, conf.int=TRUE)
print(SPS_employment_isolation_interaction_tidy)

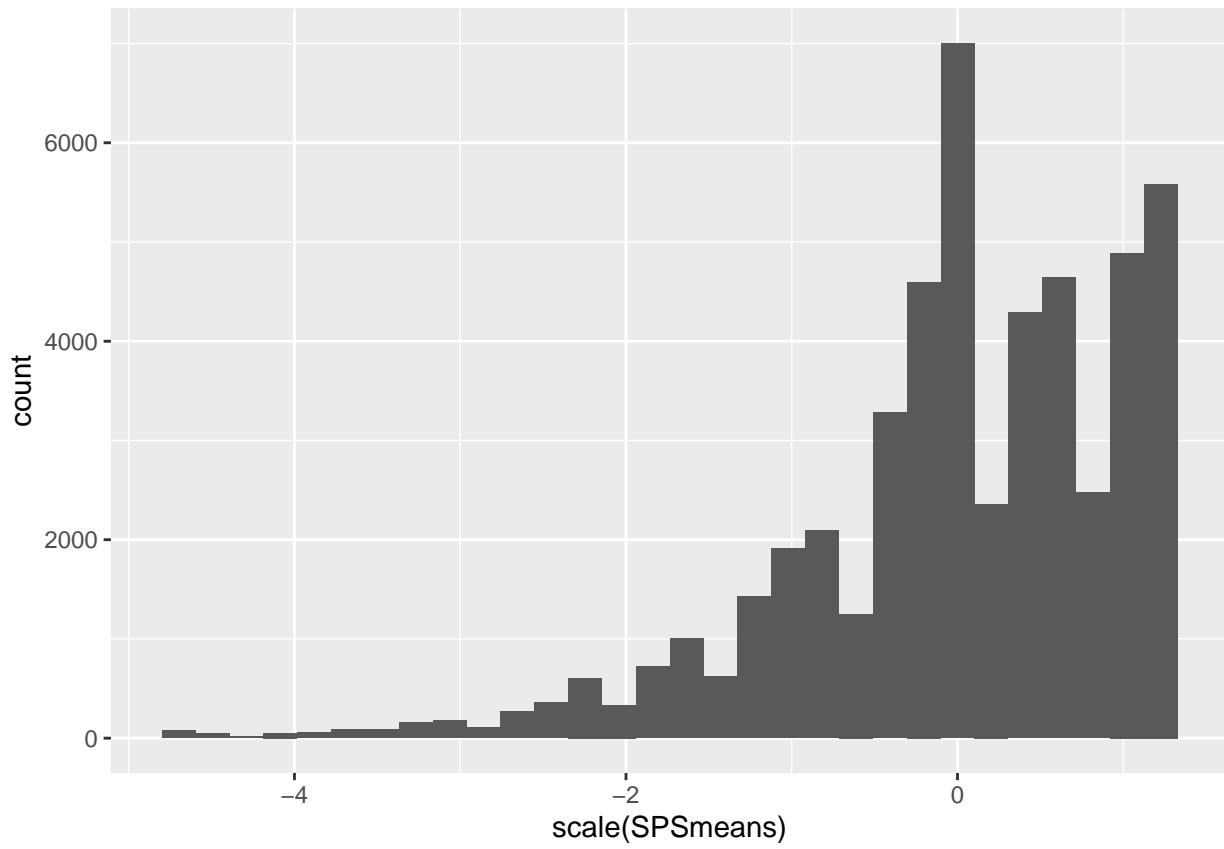
## # A tibble: 27 x 7
##   term            estimate std.error statistic  p.value conf.low conf.high
##   <chr>          <dbl>     <dbl>      <dbl>    <dbl>    <dbl>     <dbl>
## 1 (Intercept)  5.19      0.0231     225.     0       5.14      5.23
## 2 Dem_genderMale -0.267    0.00798    -33.5  8.31e-244 -0.283    -0.252
## 3 Dem_age      -0.00421   0.000360    -11.7  1.37e- 31 -0.00491   -0.00350
## 4 Dem_maritalstatusM~ 0.261      0.0145     18.0  3.23e- 72  0.233      0.290
## 5 Dem_maritalstatusS~ -0.105     0.0161     -6.50 8.27e- 11 -0.136    -0.0731
## 6 Dem_isolationLife ~ -0.863     0.0259    -33.3  2.18e-240 -0.914    -0.812
## 7 Dem_isolationLife ~ -0.0585    0.0106     -5.54 3.06e- 8  -0.0792   -0.0378
## 8 Dem_employmentNot ~ -0.255     0.0196    -13.0  9.63e- 39  -0.294    -0.217
## 9 Dem_employmentPart~ -0.0908    0.0195     -4.67 3.09e- 6   -0.129   -0.0526
## 10 Dem_employmentReti~ -0.0347    0.0243    -1.42 1.55e- 1   -0.0824   0.0131
## # ... with 17 more rows
SPS_employment_isolation_R2 <- glance(SPS_employment_isolation_interaction)$adj.r.squared
print(SPS_employment_isolation_R2)

## [1] 0.1168304

covidforanalysis3%>%
  ggplot(aes(x = scale(SPSmeans))) +
  geom_histogram()

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

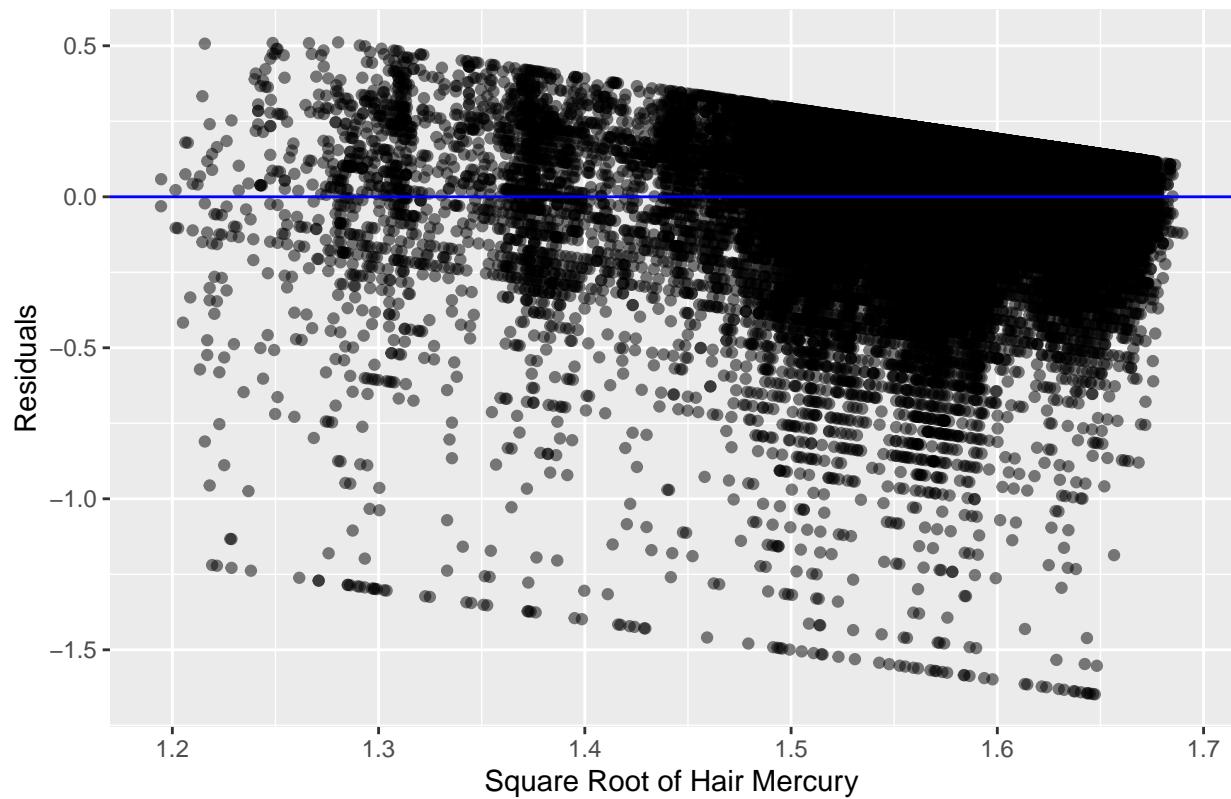
```



```
augmented_model <- augment(SPS_marital_isolation_interaction$fit)

ggplot(augmented_model, mapping = aes(x = .fitted, y = .resid)) +
  geom_point(alpha = 0.5) +
  geom_hline(yintercept=0, color = "blue") +
  labs(title = "Residuals vs Predicted Log Hair Mercury",
       x = "Square Root of Hair Mercury", y = "Residuals")
```

Residuals vs Predicted Log Hair Mercury



```
# <- matrix(c(),  
#           ncol=3, byrow=TRUE)  
#colnames(R2_table) <- c('Adjusted R^2 Value')  
#rownames(R2_table) <- c('PSS:Age+Gender', 'PSS:Employment+Isolation', 'PSS:Marital+Isolation', 'PSS:Ag  
#R2_table <- as.table(R2_table)  
#knitr::kable(R2_table,digits=10,caption="Adjusted R^2 Values for PSS, SLON, and SPS Scales") #when we  
#print(R2_table)
```