EDA: Characterizing the relationship between the religious affiliation and incidences of Covid-19 at U.S. universities.

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For this exploratory data analysis, the first step is to read our data from CSV files into R data frames. The `colleges` data frame stores the NYT data on Covid cases at universities, while the `ipeds` data frame stores the data will most of our predictor variables (university characteristics) taken from IPEDS. We then rename most of the columns in `ipeds` to make them shorter and easier to work with.

```r
# Read colleges from csv
colleges <- read.csv("data/colleges.csv")[,-c(1,9)]

# Read ipeds from csv, drop unnecessary columns
ipeds <- read.csv("data/ipeds.csv")
ipeds <- ipeds[-c(3, 8, 22)]

# Rename columns of ipeds
ipeds <- ipeds %>% rename_at('IC2021.Institutional.control.or.affiliation',
                             ~'control') %>%
             rename_at('HD2021.FIPS.state.code', ~'FIPS.state.code') %>%
             rename_at('unitid', ~'ipeds_id') %>%
             rename_at('IC2021.Religious.affiliation',
                       ~'religious.affiliation') %>%
             rename_at('DRVIC2021.Tuition.and.fees..2020.21',
                       ~'tuition') %>%
             rename_at('DRVEF122021.Total.12.month.unduplicated.headcount',
                       ~'total.headcount') %>%
             rename_at('DRVEF122021.Undergraduate.12.month.unduplicated.headcount',
             ~'undergrad.headcount') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.American
                       ~'percent.american.native') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.Asian',
                       ~'percent.asian') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.Black.or
                       ~'percent.black') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.Hispanic
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.Native.Ha
                       ~'percent.pacific.islander') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.White',
                       ~'percent.white') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.two.or.mo
                       ~'percent.two.more.races') %>%
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.race.eth
             rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.Nonreside
                       ~'percent.nonres.alien') %>%
```

```r
                         rename_at('DRVEF122021.Percent.of.12.month.unduplicated.headcount.that.are.women', ~
                         rename_at('SFA2021.Average.amount.of.grant.and.scholarship.aid.awarded..2020.21', ~
                         rename_at('DRVGR2021.Graduation.rate..total.cohort', ~'grad.rate') %>%
                         rename_at('SFA2021.Percent.of.full.time.first.time.undergraduates.awarded.any.finan
                                    ~'percent.fin.aid') %>%
                         rename_at('SFA2021.Percent.of.full.time.first.time.undergraduates.awarded.student.l
                                    ~'percent.student.loan') %>%
                         rename_at('IC2021.Occupational', ~'occupational.degree') %>%
                         rename_at('IC2021.Academic', ~'academic.degree') %>%
                         rename_at('IC2021.Adult.basic.remedial.or.high.school.equivalent',
                                    ~'hs.equivalent.degree') %>%
                         rename_at('IC2021.Percent.of.undergraduates..who.are.formally.registered.as.student
                                    ~'percent.disability') %>%
                         rename_at('IC2021.NCAA.NAIA.conference.number.football',
                                    ~'NCAA.football') %>%
                         rename_at('IC2021.Institution.provide.on.campus.housing',
                                    ~'on.campus.housing') %>%
                         rename_at('IC2021.Total.dormitory.capacity',
                                    ~'dorm.capacity') %>%
                         rename_at('IC2021.Typical.room.charge.for.academic.year',
                                    ~'dorm.room.price')

# Merge data frames, and remove duplicated "state" column
md <- merge(ipeds, colleges, by="ipeds_id")[,-32]

# Remove institutions with no ipeds data (a lot of NAs)
md <- md[!(md$control == ""),]

# Create column 'religious'
md$religious <- "Yes"
md[md$religious.affiliation == "Not applicable", ]$religious <- "No"

# Create column 'catholic'
md$catholic <- "Non-Catholic"
md[md$religious.affiliation == "Not applicable",]$catholic <- "No"
md[md$religious.affiliation == "Roman Catholic",]$catholic <- "Yes"

# Make 'control' column simpler
md[md$control == "Private not-for-profit (no religious affiliation)",]$control <- "Private not-for-prof
md[md$control == "Private not-for-profit (religious affiliation)",]$control <- "Private not-for-profit"

# Write to csv
write.csv(md,'merged_cases.csv')
```

Daniel's work

```r
mask.mandates <- read.csv("data/U.S._State_and_Territorial_Public_Mask_Mandates_From_April_8__2020_thro
factor.variables <- c("Face_Masks_Required_in_Public", "State_Tribe_Territory", "order_code")
mask.mandates[,factor.variables] <- lapply(mask.mandates[,factor.variables], as.factor)
mask.mandates$date <- as.Date(mask.mandates$date, format="%m/%d/%Y")

mandates.by.state <- data.frame(state=unique(mask.mandates$State_Tribe_Territory))
mandates.by.state$number_of_days_mandated <- 0
```

```r
for (i in 1:length(unique(mandates.by.state$state))) {
  dummy <- mask.mandates$Face_Masks_Required_in_Public[mask.mandates$State_Tribe_Territory == mandates.l
                                                        & mask.mandates$date >= as.Date("2020/7/1")
                                                        & mask.mandates$date <= as.Date("2021/5/26")]
  dummy[is.na(dummy)] <- "No"
  mandates.by.state$number_of_days_mandated[mandates.by.state$state == mandates.by.state$state[i]] = su
}
mandates.by.state$full_state_name <- c("Alaska", "Alabama", "Arkansas",
                                       "American Samoa", "Arizona",
                                       "California", "Colorado",
                                       "District of Columbia", "Connecticut",
                                       "Florida", "Delaware", "Georgia", "Guam",
                                       "Iowa", "Hawaii", "Idaho", "Illinois",
                                       "Indiana", "Kansas", "Kentucky",
                                       "Louisiana", "Massachusetts",
                                       "Minnesota", "Maryland", "Maine",
                                       "Michigan", "Missouri",
                                       "Northern Mariana Islands",
                                       "Mississippi", "Montana",
                                       "North Carolina", "North Dakota",
                                       "Nebraska", "New Hampshire", "Nevada",
                                       "New Jersey", "New Mexico", "Ohio",
                                       "New York", "Oklahoma", "Oregon",
                                       "South Carolina", "Rhode Island",
                                       "Pennsylvania", "Puerto Rico",
                                       "South Dakota", "Tennessee", "Texas",
                                       "Utah", "Virginia", "Virgin Islands",
                                       "Vermont", "Washington", "Wisconsin",
                                       "West Virginia", "Wyoming")
mandates.by.state <- mandates.by.state[,c(3,2)]


full.cases <- merge(md, mandates.by.state, by.x="FIPS.state.code",
      by.y="full_state_name")
full.cases$total.cases <- full.cases$cases + full.cases$cases_2021

# Write to csv
write.csv(full.cases, file="data/full_cases.csv")
```
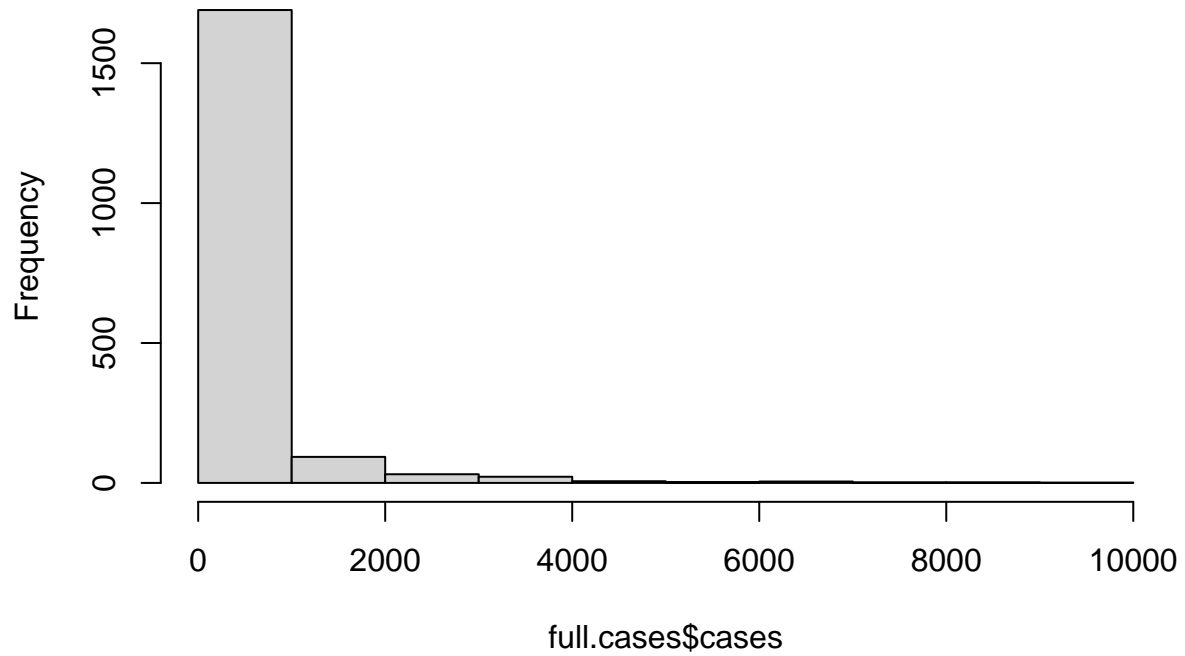
Laura's work

```r
# TODO: CONSIDER CHANGING THIS EPSILON VALUE TO GIVE BETTER PLOTS
epsilon <- 0.001

hist(full.cases$cases)
```
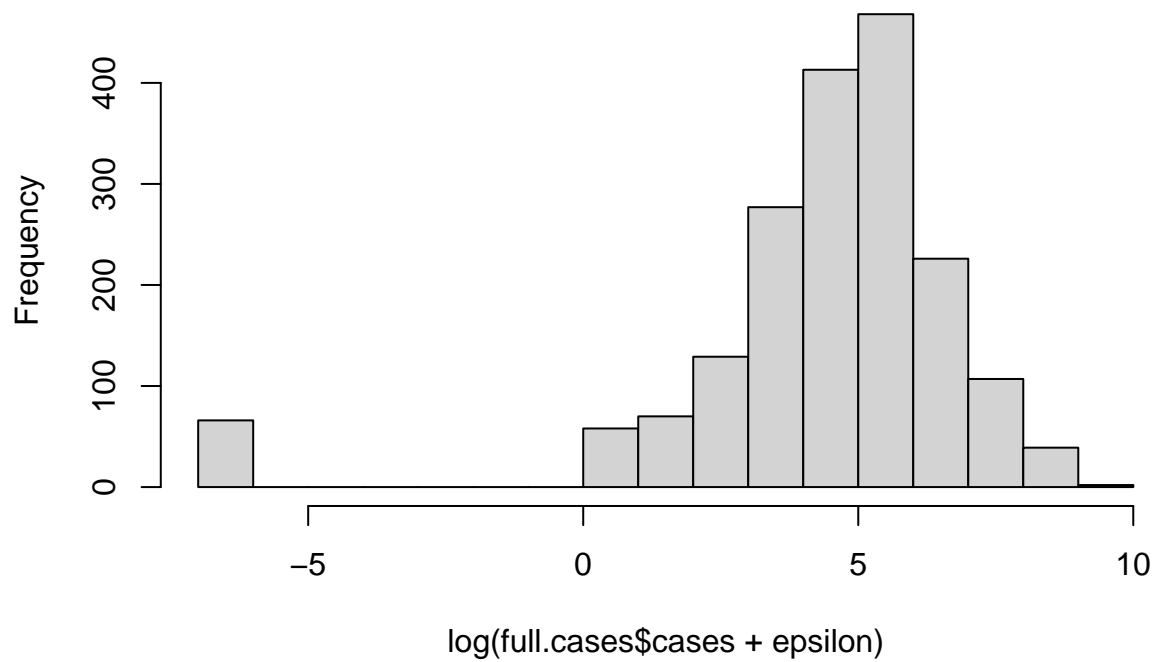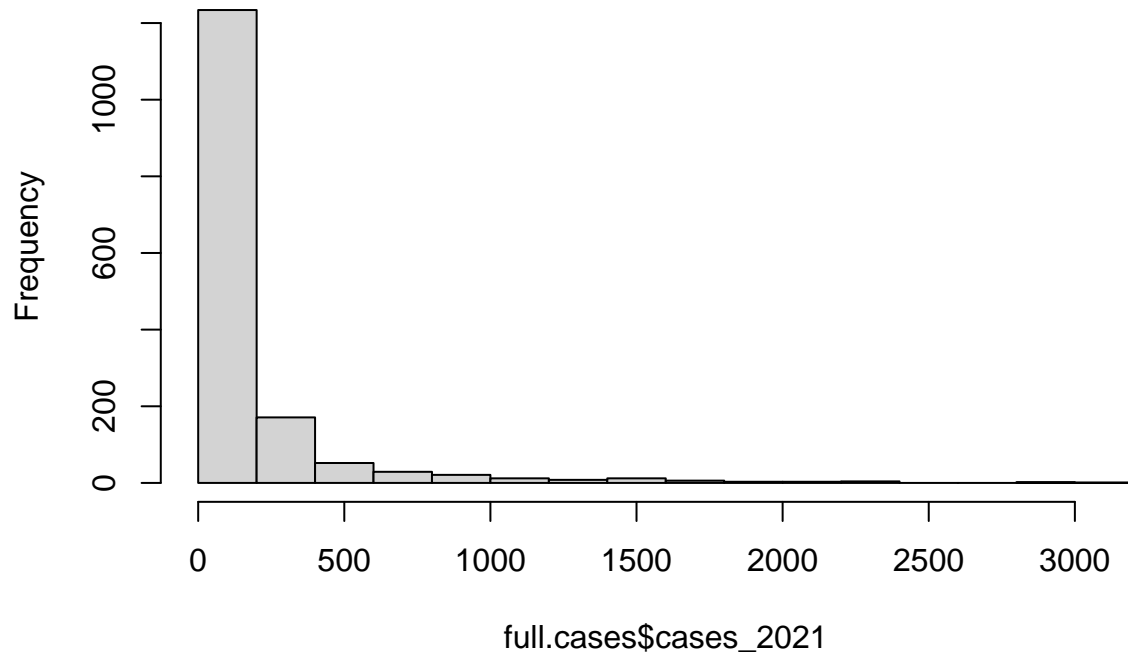
Histogram of full.cases$cases


```
hist(log(full.cases$cases + epsilon))
```

Histogram of log(full.cases$cases + epsilon)


```
hist(full.cases$cases_2021)
```

4

Histogram of full.cases$cases_2021

full.cases$cases_2021

```
hist(log(full.cases$cases_2021 + epsilon))
```

Histogram of log(full.cases$cases_2021 + epsilon)

log(full.cases$cases_2021 + epsilon)
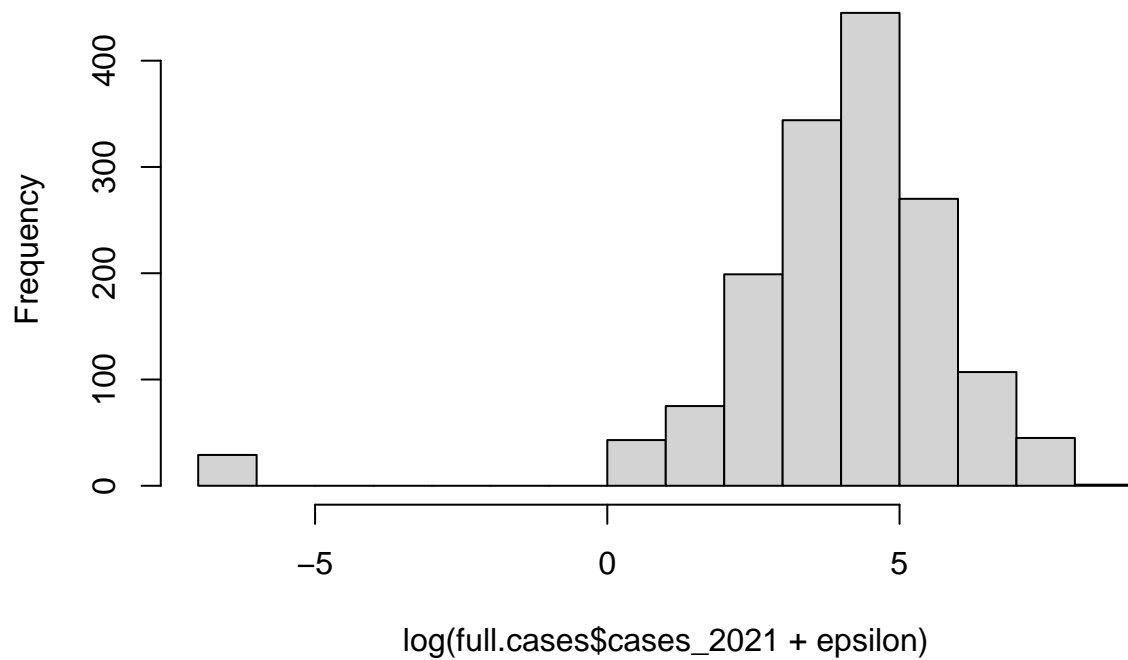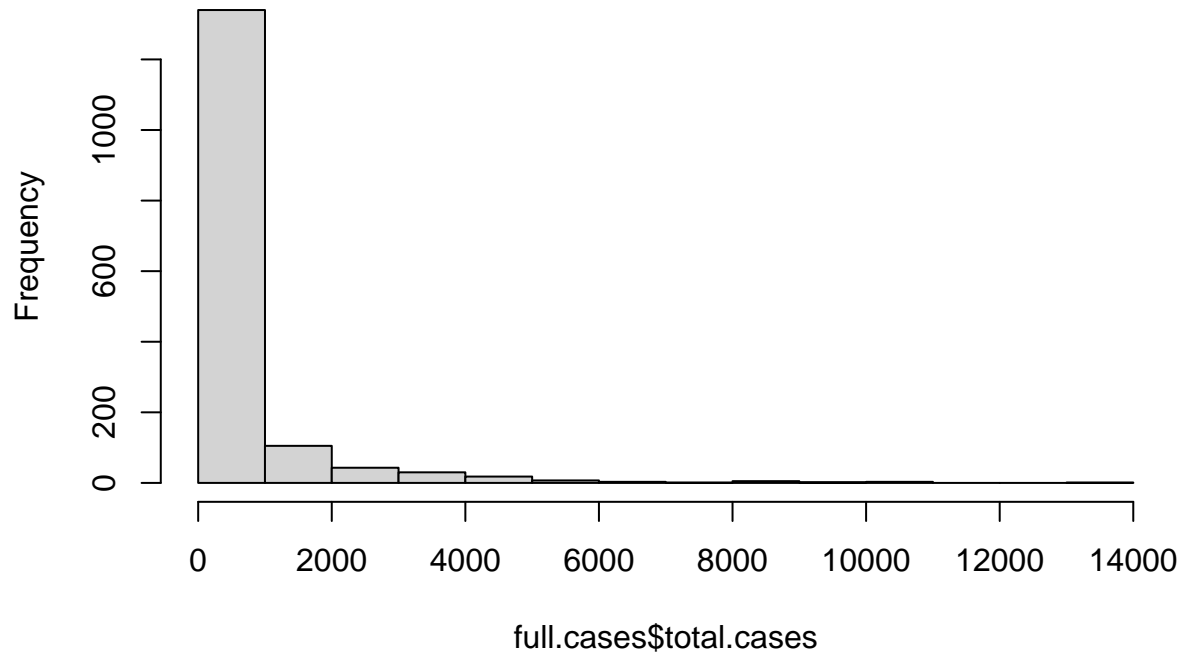
```
hist(full.cases$total.cases)
```
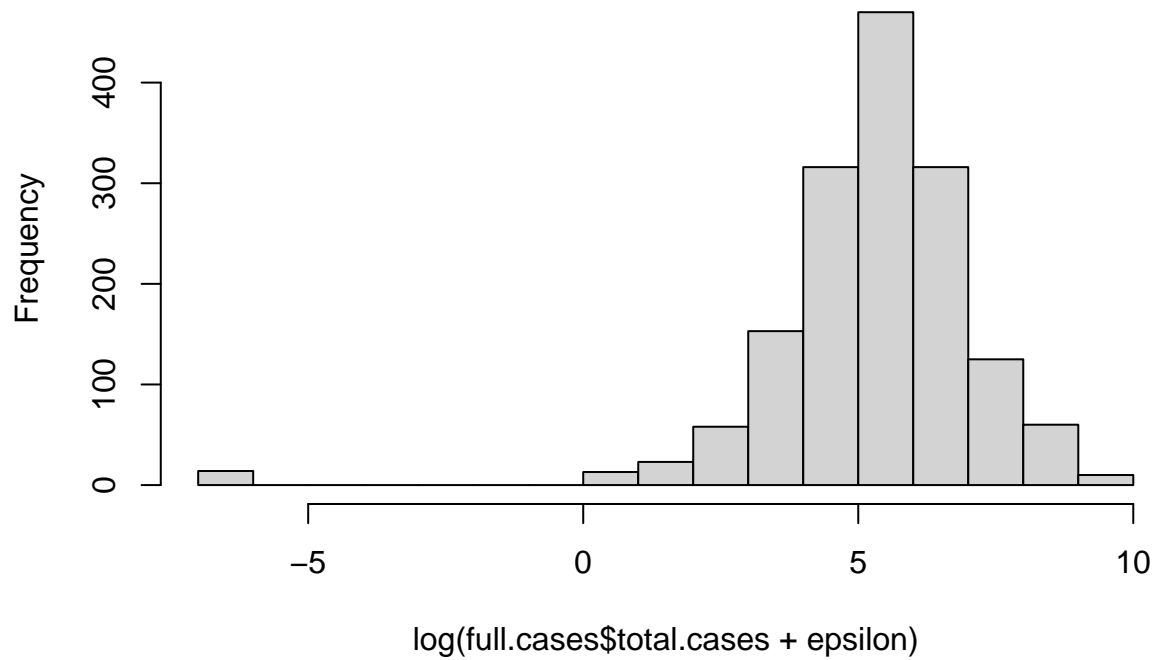
Histogram of full.cases$total.cases


```
hist(log(full.cases$total.cases + epsilon))
```

Histogram of log(full.cases$total.cases + epsilon)


```
# this shows that religious institutions are not as large as the largest non-religious
# this is because of large public non-religious schools
# once accounting for size, median case count higher for religious.
```

```
boxplot((total.cases  / total.headcount) ~ religious, data=full.cases)
```



```
# Convert necessary columns to factors
factor.variables <- c("religious", "FIPS.state.code", "control", "occupational.degree", "academic.degree
full.cases[,factor.variables] <- lapply(full.cases[,factor.variables], as.factor)
```

```
summary(lm1 <- lm(total.cases ~ religious, full.cases))
```

```
##
## Call:
## lm(formula = total.cases ~ religious, data = full.cases)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
##  -668.4  -556.4  -324.4    -9.9 12403.6
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)     668.43      34.27  19.506  < 2e-16 ***
## religiousYes   -258.06      69.48  -3.714 0.000211 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1177 on 1556 degrees of freedom
##   (297 observations deleted due to missingness)
## Multiple R-squared:  0.008788,   Adjusted R-squared:  0.008151
## F-statistic:  13.8 on 1 and 1556 DF,  p-value: 0.000211
```

```
summary(lm2 <- lm(log(total.cases + epsilon) ~ religious, full.cases))
```

```
##
## Call:
## lm(formula = log(total.cases + epsilon) ~ religious, data = full.cases)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.2374  -0.8263   0.1448   1.0112   4.2093
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   5.26892    0.05512  95.589   <2e-16 ***
## religiousYes  0.06068    0.11176   0.543    0.587
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.893 on 1556 degrees of freedom
##   (297 observations deleted due to missingness)
## Multiple R-squared:  0.0001894,  Adjusted R-squared:  -0.0004531
## F-statistic: 0.2948 on 1 and 1556 DF,  p-value: 0.5872
```
```
summary(lm3 <- lm(log(total.cases + epsilon) ~ religious + FIPS.state.code + control + percent.fin.aid
```
```
##
## Call:
## lm(formula = log(total.cases + epsilon) ~ religious + FIPS.state.code +
##     control + percent.fin.aid + tuition + number_of_days_mandated +
##     total.headcount, data = full.cases)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -10.9075  -0.5325   0.1213   0.7469   4.0895
##
## Coefficients: (1 not defined because of singularities)
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      -6.542e-02  5.662e-01  -0.116 0.908030
## religiousYes                      5.884e-01  1.196e-01   4.920 9.67e-07 ***
## FIPS.state.codeAlaska            -9.882e-01  8.346e-01  -1.184 0.236586
## FIPS.state.codeArizona           -2.410e+00  6.012e-01  -4.008 6.43e-05 ***
## FIPS.state.codeArkansas           1.696e-01  4.045e-01   0.419 0.675034
## FIPS.state.codeCalifornia        -1.847e+00  3.385e-01  -5.458 5.68e-08 ***
## FIPS.state.codeColorado          -3.483e-02  4.011e-01  -0.087 0.930820
## FIPS.state.codeConnecticut       -5.074e-02  4.322e-01  -0.117 0.906550
## FIPS.state.codeDelaware           4.311e-01  7.381e-01   0.584 0.559312
## FIPS.state.codeDistrict of Columbia -5.546e-01  5.954e-01  -0.932 0.351752
## FIPS.state.codeFlorida           -1.069e-01  3.544e-01  -0.301 0.763090
## FIPS.state.codeGeorgia            1.335e-01  3.698e-01   0.361 0.718111
## FIPS.state.codeHawaii            -2.671e+00  5.927e-01  -4.507 7.10e-06 ***
## FIPS.state.codeIdaho              7.154e-01  5.401e-01   1.325 0.185530
## FIPS.state.codeIllinois          -1.298e-01  3.562e-01  -0.364 0.715713
## FIPS.state.codeIndiana           -2.130e-03  3.816e-01  -0.006 0.995548
## FIPS.state.codeIowa              -1.057e-01  4.192e-01  -0.252 0.801026
## FIPS.state.codeKansas            -8.221e-02  4.287e-01  -0.192 0.847953
## FIPS.state.codeKentucky          -3.752e-01  3.652e-01  -1.027 0.304376
## FIPS.state.codeLouisiana         -4.425e-01  3.685e-01  -1.201 0.230017
## FIPS.state.codeMaine             -2.502e-01  5.448e-01  -0.459 0.646143
## FIPS.state.codeMaryland          -4.680e-01  4.506e-01  -1.039 0.299200
## FIPS.state.codeMassachusetts     -8.260e-01  3.534e-01  -2.337 0.019554 *
## FIPS.state.codeMichigan           3.057e-03  3.583e-01   0.009 0.993194
```

```
## FIPS.state.codeMinnesota             -3.260e-01  3.482e-01  -0.936 0.349440
## FIPS.state.codeMississippi            2.371e-01  4.772e-01   0.497 0.619333
## FIPS.state.codeMissouri               4.329e-01  3.861e-01   1.121 0.262483
## FIPS.state.codeMontana                1.204e-01  6.265e-01   0.192 0.847593
## FIPS.state.codeNebraska               5.658e-01  4.900e-01   1.155 0.248390
## FIPS.state.codeNevada                 -6.625e-01  5.909e-01  -1.121 0.262441
## FIPS.state.codeNew Hampshire          -1.342e+00  4.587e-01  -2.925 0.003501 **
## FIPS.state.codeNew Jersey             -2.636e-01  3.924e-01  -0.672 0.501864
## FIPS.state.codeNew Mexico             -1.765e+00  5.037e-01  -3.503 0.000474 ***
## FIPS.state.codeNew York               -5.597e-01  3.169e-01  -1.766 0.077540 .
## FIPS.state.codeNorth Carolina         3.683e-01  3.589e-01   1.026 0.305006
## FIPS.state.codeNorth Dakota           2.978e-01  5.037e-01   0.591 0.554528
## FIPS.state.codeOhio                   -5.220e-01  3.447e-01  -1.514 0.130215
## FIPS.state.codeOklahoma               2.592e-01  4.665e-01   0.556 0.578566
## FIPS.state.codeOregon                 -1.227e+00  4.505e-01  -2.724 0.006528 **
## FIPS.state.codePennsylvania           -2.839e-01  3.327e-01  -0.853 0.393647
## FIPS.state.codeRhode Island           3.857e-01  5.661e-01   0.681 0.495727
## FIPS.state.codeSouth Carolina         4.461e-01  4.227e-01   1.055 0.291447
## FIPS.state.codeSouth Dakota           4.076e-01  1.386e+00   0.294 0.768723
## FIPS.state.codeTennessee              1.896e-01  3.740e-01   0.507 0.612251
## FIPS.state.codeTexas                  -2.069e-01  3.413e-01  -0.606 0.544381
## FIPS.state.codeUtah                   9.930e-01  5.226e-01   1.900 0.057611 .
## FIPS.state.codeVermont                -2.092e+00  4.931e-01  -4.242 2.35e-05 ***
## FIPS.state.codeVirginia               -1.408e-01  3.698e-01  -0.381 0.703402
## FIPS.state.codeWashington             -1.616e+00  3.708e-01  -4.359 1.40e-05 ***
## FIPS.state.codeWest Virginia          -1.873e-01  4.348e-01  -0.431 0.666640
## FIPS.state.codeWisconsin              1.634e-01  3.919e-01   0.417 0.676880
## FIPS.state.codeWyoming                -4.404e-03  7.380e-01  -0.006 0.995240
## controlPrivate not-for-profit         9.282e-01  3.487e-01   2.662 0.007854 **
## controlPublic                         3.317e+00  3.337e-01   9.939  < 2e-16 ***
## percent.fin.aid                       1.482e-02  3.290e-03   4.506 7.15e-06 ***
## tuition                               7.162e-05  4.780e-06  14.984  < 2e-16 ***
## number_of_days_mandated                     NA         NA      NA       NA
## total.headcount                       5.516e-05  2.799e-06  19.706  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.352 on 1414 degrees of freedom
##   (384 observations deleted due to missingness)
## Multiple R-squared:  0.425,  Adjusted R-squared:  0.4022
## F-statistic: 18.66 on 56 and 1414 DF,  p-value: < 2.2e-16
```

```r
lm4.predictors <- c("religious", "FIPS.state.code", "control", "percent.fin.aid", "tuition", "number_of_
summary(lm4 <- lm(log(total.cases + epsilon) ~ (religious + FIPS.state.code + control + percent.fin.aid
```

```
##
## Call:
## lm(formula = log(total.cases + epsilon) ~ (religious + FIPS.state.code +
##     control + percent.fin.aid + tuition + number_of_days_mandated) *
##     total.headcount, data = full.cases[complete.cases(full.cases[,
##     lm4.predictors]), ])
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11.0682  -0.4934   0.1195   0.6797   3.7460
```

```
##
## Coefficients: (3 not defined because of singularities)
##                                       Estimate Std. Error
## (Intercept)                          -2.894e-01  6.918e-01
## religiousYes                          2.476e-01  1.546e-01
## FIPS.state.codeAlaska                -1.462e+00  1.540e+00
## FIPS.state.codeArizona               -3.411e+00  8.284e-01
## FIPS.state.codeArkansas               2.673e-01  5.276e-01
## FIPS.state.codeCalifornia            -1.640e+00  4.740e-01
## FIPS.state.codeColorado               2.860e-01  5.638e-01
## FIPS.state.codeConnecticut            8.500e-02  6.091e-01
## FIPS.state.codeDelaware               9.018e-01  1.131e+00
## FIPS.state.codeDistrict of Columbia  -2.257e-01  9.206e-01
## FIPS.state.codeFlorida                7.880e-01  4.788e-01
## FIPS.state.codeGeorgia                3.531e-01  4.848e-01
## FIPS.state.codeHawaii                -2.440e+00  9.228e-01
## FIPS.state.codeIdaho                  2.906e-01  7.357e-01
## FIPS.state.codeIllinois               3.082e-01  4.675e-01
## FIPS.state.codeIndiana                8.037e-01  4.727e-01
## FIPS.state.codeIowa                   4.160e-02  5.257e-01
## FIPS.state.codeKansas                 9.023e-02  5.791e-01
## FIPS.state.codeKentucky              -4.099e-01  4.876e-01
## FIPS.state.codeLouisiana             -3.677e-01  5.027e-01
## FIPS.state.codeMaine                 -1.260e-01  7.385e-01
## FIPS.state.codeMaryland              -3.156e-01  5.870e-01
## FIPS.state.codeMassachusetts         -4.538e-01  4.654e-01
## FIPS.state.codeMichigan               3.062e-01  4.683e-01
## FIPS.state.codeMinnesota              2.264e-01  4.549e-01
## FIPS.state.codeMississippi            3.593e-01  6.648e-01
## FIPS.state.codeMissouri               5.889e-01  5.357e-01
## FIPS.state.codeMontana               -1.150e-01  7.966e-01
## FIPS.state.codeNebraska               5.461e-01  6.783e-01
## FIPS.state.codeNevada                -5.392e-01  9.115e-01
## FIPS.state.codeNew Hampshire         -3.628e-01  5.412e-01
## FIPS.state.codeNew Jersey             2.165e-01  5.231e-01
## FIPS.state.codeNew Mexico            -2.299e+00  6.547e-01
## FIPS.state.codeNew York              -1.227e-01  4.261e-01
## FIPS.state.codeNorth Carolina         3.402e-01  4.702e-01
## FIPS.state.codeNorth Dakota           3.088e-01  6.663e-01
## FIPS.state.codeOhio                  -2.550e-01  4.483e-01
## FIPS.state.codeOklahoma               5.467e-01  6.239e-01
## FIPS.state.codeOregon                -9.703e-01  5.924e-01
## FIPS.state.codePennsylvania           8.505e-02  4.395e-01
## FIPS.state.codeRhode Island           5.764e-01  8.839e-01
## FIPS.state.codeSouth Carolina         5.728e-01  5.488e-01
## FIPS.state.codeSouth Dakota           7.548e-01  1.336e+00
## FIPS.state.codeTennessee              3.090e-01  5.293e-01
## FIPS.state.codeTexas                  4.337e-01  4.579e-01
## FIPS.state.codeUtah                   9.545e-01  9.489e-01
## FIPS.state.codeVermont               -2.310e+00  6.734e-01
## FIPS.state.codeVirginia               5.017e-01  4.706e-01
## FIPS.state.codeWashington            -1.479e+00  4.932e-01
## FIPS.state.codeWest Virginia         -7.129e-02  5.407e-01
## FIPS.state.codeWisconsin              2.266e-01  5.097e-01
```

```
## FIPS.state.codeWyoming                               -1.407e+00  1.173e+00
## controlPrivate not-for-profit                         1.391e+00  3.728e-01
## controlPublic                                         2.738e+00  3.523e-01
## percent.fin.aid                                       2.009e-02  4.259e-03
## tuition                                               4.533e-05  5.963e-06
## number_of_days_mandated                                      NA         NA
## total.headcount                                       2.357e-05  4.058e-05
## religiousYes:total.headcount                          5.288e-05  2.064e-05
## FIPS.state.codeAlaska:total.headcount                 4.816e-05  1.190e-04
## FIPS.state.codeArizona:total.headcount                6.684e-06  3.062e-05
## FIPS.state.codeArkansas:total.headcount               1.491e-05  4.704e-05
## FIPS.state.codeCalifornia:total.headcount            -2.829e-05  2.812e-05
## FIPS.state.codeColorado:total.headcount              -3.044e-05  3.482e-05
## FIPS.state.codeConnecticut:total.headcount            1.255e-06  5.279e-05
## FIPS.state.codeDelaware:total.headcount              -5.189e-05  6.795e-05
## FIPS.state.codeDistrict of Columbia:total.headcount  -6.583e-05  5.773e-05
## FIPS.state.codeFlorida:total.headcount               -5.688e-05  2.741e-05
## FIPS.state.codeGeorgia:total.headcount               -2.530e-05  3.013e-05
## FIPS.state.codeHawaii:total.headcount                -1.455e-05  8.840e-05
## FIPS.state.codeIdaho:total.headcount                  1.919e-05  3.960e-05
## FIPS.state.codeIllinois:total.headcount              -5.314e-05  3.112e-05
## FIPS.state.codeIndiana:total.headcount               -6.566e-05  2.704e-05
## FIPS.state.codeIowa:total.headcount                   8.628e-06  3.966e-05
## FIPS.state.codeKansas:total.headcount                -1.160e-05  4.160e-05
## FIPS.state.codeKentucky:total.headcount               1.862e-05  3.665e-05
## FIPS.state.codeLouisiana:total.headcount              4.139e-06  3.926e-05
## FIPS.state.codeMaine:total.headcount                  4.669e-05  9.615e-05
## FIPS.state.codeMaryland:total.headcount              -1.949e-05  3.654e-05
## FIPS.state.codeMassachusetts:total.headcount         -3.569e-05  3.272e-05
## FIPS.state.codeMichigan:total.headcount              -3.481e-05  3.053e-05
## FIPS.state.codeMinnesota:total.headcount             -5.048e-05  3.287e-05
## FIPS.state.codeMississippi:total.headcount           -4.066e-06  5.253e-05
## FIPS.state.codeMissouri:total.headcount              -1.927e-05  3.896e-05
## FIPS.state.codeMontana:total.headcount                8.614e-05  8.103e-05
## FIPS.state.codeNebraska:total.headcount               1.207e-05  5.521e-05
## FIPS.state.codeNevada:total.headcount                -1.897e-05  4.324e-05
## FIPS.state.codeNew Hampshire:total.headcount         -9.554e-06  3.615e-05
## FIPS.state.codeNew Jersey:total.headcount            -4.841e-05  3.453e-05
## FIPS.state.codeNew Mexico:total.headcount             1.172e-04  5.966e-05
## FIPS.state.codeNew York:total.headcount              -4.858e-05  2.863e-05
## FIPS.state.codeNorth Carolina:total.headcount         5.306e-06  3.158e-05
## FIPS.state.codeNorth Dakota:total.headcount           5.635e-05  7.985e-05
## FIPS.state.codeOhio:total.headcount                  -2.502e-05  2.921e-05
## FIPS.state.codeOklahoma:total.headcount              -2.125e-05  4.592e-05
## FIPS.state.codeOregon:total.headcount                -1.513e-05  3.959e-05
## FIPS.state.codePennsylvania:total.headcount          -3.065e-05  3.239e-05
## FIPS.state.codeRhode Island:total.headcount          -1.337e-06  8.648e-05
## FIPS.state.codeSouth Carolina:total.headcount        -1.437e-06  3.979e-05
## FIPS.state.codeSouth Dakota:total.headcount                  NA         NA
## FIPS.state.codeTennessee:total.headcount             -5.109e-06  4.220e-05
## FIPS.state.codeTexas:total.headcount                 -5.448e-05  2.736e-05
## FIPS.state.codeUtah:total.headcount                  -1.866e-05  3.828e-05
## FIPS.state.codeVermont:total.headcount                1.409e-04  9.397e-05
## FIPS.state.codeVirginia:total.headcount              -6.202e-05  2.907e-05
```

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## FIPS.state.codeWashington:total.headcount            4.610e-06  3.364e-05
## FIPS.state.codeWest Virginia:total.headcount         3.047e-05  5.206e-05
## FIPS.state.codeWisconsin:total.headcount             2.205e-06  3.540e-05
## FIPS.state.codeWyoming:total.headcount               2.673e-04  1.507e-04
## controlPrivate not-for-profit:total.headcount       -1.445e-05  2.586e-05
## controlPublic:total.headcount                        7.254e-05  1.642e-05
## percent.fin.aid:total.headcount                     -1.984e-07  2.732e-07
## tuition:total.headcount                              2.486e-09  5.151e-10
## number_of_days_mandated:total.headcount                     NA         NA
##                                                     t value Pr(>|t|)
## (Intercept)                                          -0.418 0.675754
## religiousYes                                          1.602 0.109491
## FIPS.state.codeAlaska                                -0.949 0.342604
## FIPS.state.codeArizona                               -4.118 4.06e-05 ***
## FIPS.state.codeArkansas                               0.507 0.612536
## FIPS.state.codeCalifornia                            -3.460 0.000557 ***
## FIPS.state.codeColorado                               0.507 0.612037
## FIPS.state.codeConnecticut                            0.140 0.889046
## FIPS.state.codeDelaware                               0.797 0.425509
## FIPS.state.codeDistrict of Columbia                  -0.245 0.806413
## FIPS.state.codeFlorida                                1.646 0.099999 .
## FIPS.state.codeGeorgia                                0.728 0.466636
## FIPS.state.codeHawaii                                -2.645 0.008272 **
## FIPS.state.codeIdaho                                  0.395 0.692890
## FIPS.state.codeIllinois                               0.659 0.509864
## FIPS.state.codeIndiana                                1.700 0.089286 .
## FIPS.state.codeIowa                                   0.079 0.936939
## FIPS.state.codeKansas                                 0.156 0.876199
## FIPS.state.codeKentucky                              -0.841 0.400728
## FIPS.state.codeLouisiana                             -0.731 0.464623
## FIPS.state.codeMaine                                 -0.171 0.864604
## FIPS.state.codeMaryland                              -0.538 0.590933
## FIPS.state.codeMassachusetts                         -0.975 0.329753
## FIPS.state.codeMichigan                               0.654 0.513257
## FIPS.state.codeMinnesota                              0.498 0.618839
## FIPS.state.codeMississippi                            0.540 0.588965
## FIPS.state.codeMissouri                               1.099 0.271790
## FIPS.state.codeMontana                               -0.144 0.885221
## FIPS.state.codeNebraska                               0.805 0.420906
## FIPS.state.codeNevada                                -0.592 0.554213
## FIPS.state.codeNew Hampshire                         -0.670 0.502668
## FIPS.state.codeNew Jersey                             0.414 0.679057
## FIPS.state.codeNew Mexico                            -3.511 0.000461 ***
## FIPS.state.codeNew York                              -0.288 0.773458
## FIPS.state.codeNorth Carolina                         0.724 0.469452
## FIPS.state.codeNorth Dakota                           0.463 0.643103
## FIPS.state.codeOhio                                  -0.569 0.569535
## FIPS.state.codeOklahoma                               0.876 0.381019
## FIPS.state.codeOregon                                -1.638 0.101687
## FIPS.state.codePennsylvania                           0.194 0.846559
## FIPS.state.codeRhode Island                           0.652 0.514435
## FIPS.state.codeSouth Carolina                         1.044 0.296824
## FIPS.state.codeSouth Dakota                           0.565 0.572175
## FIPS.state.codeTennessee                              0.584 0.559497
```

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## FIPS.state.codeTexas                                 0.947 0.343777
## FIPS.state.codeUtah                                  1.006 0.314683
## FIPS.state.codeVermont                              -3.431 0.000619 ***
## FIPS.state.codeVirginia                              1.066 0.286607
## FIPS.state.codeWashington                           -2.999 0.002756 **
## FIPS.state.codeWest Virginia                        -0.132 0.895123
## FIPS.state.codeWisconsin                             0.445 0.656726
## FIPS.state.codeWyoming                              -1.200 0.230302
## controlPrivate not-for-profit                        3.731 0.000198 ***
## controlPublic                                        7.772 1.51e-14 ***
## percent.fin.aid                                      4.715 2.66e-06 ***
## tuition                                              7.603 5.39e-14 ***
## number_of_days_mandated                                 NA       NA
## total.headcount                                      0.581 0.561449
## religiousYes:total.headcount                         2.563 0.010489 *
## FIPS.state.codeAlaska:total.headcount                0.405 0.685723
## FIPS.state.codeArizona:total.headcount               0.218 0.827207
## FIPS.state.codeArkansas:total.headcount              0.317 0.751369
## FIPS.state.codeCalifornia:total.headcount           -1.006 0.314519
## FIPS.state.codeColorado:total.headcount             -0.874 0.382192
## FIPS.state.codeConnecticut:total.headcount           0.024 0.981038
## FIPS.state.codeDelaware:total.headcount             -0.764 0.445199
## FIPS.state.codeDistrict of Columbia:total.headcount -1.140 0.254367
## FIPS.state.codeFlorida:total.headcount              -2.076 0.038127 *
## FIPS.state.codeGeorgia:total.headcount              -0.840 0.401221
## FIPS.state.codeHawaii:total.headcount               -0.165 0.869262
## FIPS.state.codeIdaho:total.headcount                 0.484 0.628112
## FIPS.state.codeIllinois:total.headcount             -1.707 0.087987 .
## FIPS.state.codeIndiana:total.headcount              -2.429 0.015286 *
## FIPS.state.codeIowa:total.headcount                  0.218 0.827784
## FIPS.state.codeKansas:total.headcount               -0.279 0.780308
## FIPS.state.codeKentucky:total.headcount              0.508 0.611493
## FIPS.state.codeLouisiana:total.headcount             0.105 0.916034
## FIPS.state.codeMaine:total.headcount                 0.486 0.627330
## FIPS.state.codeMaryland:total.headcount             -0.533 0.593807
## FIPS.state.codeMassachusetts:total.headcount        -1.091 0.275672
## FIPS.state.codeMichigan:total.headcount             -1.140 0.254357
## FIPS.state.codeMinnesota:total.headcount            -1.536 0.124811
## FIPS.state.codeMississippi:total.headcount          -0.077 0.938307
## FIPS.state.codeMissouri:total.headcount             -0.495 0.620857
## FIPS.state.codeMontana:total.headcount               1.063 0.287961
## FIPS.state.codeNebraska:total.headcount              0.219 0.827029
## FIPS.state.codeNevada:total.headcount               -0.439 0.660908
## FIPS.state.codeNew Hampshire:total.headcount        -0.264 0.791593
## FIPS.state.codeNew Jersey:total.headcount           -1.402 0.161085
## FIPS.state.codeNew Mexico:total.headcount            1.964 0.049749 *
## FIPS.state.codeNew York:total.headcount             -1.697 0.089933 .
## FIPS.state.codeNorth Carolina:total.headcount        0.168 0.866599
## FIPS.state.codeNorth Dakota:total.headcount          0.706 0.480467
## FIPS.state.codeOhio:total.headcount                 -0.857 0.391720
## FIPS.state.codeOklahoma:total.headcount             -0.463 0.643647
## FIPS.state.codeOregon:total.headcount               -0.382 0.702280
## FIPS.state.codePennsylvania:total.headcount         -0.946 0.344198
## FIPS.state.codeRhode Island:total.headcount         -0.015 0.987668
```

```
## FIPS.state.codeSouth Carolina:total.headcount       -0.036 0.971205
## FIPS.state.codeSouth Dakota:total.headcount             NA       NA
## FIPS.state.codeTennessee:total.headcount            -0.121 0.903657
## FIPS.state.codeTexas:total.headcount                -1.992 0.046620 *
## FIPS.state.codeUtah:total.headcount                 -0.487 0.625999
## FIPS.state.codeVermont:total.headcount               1.500 0.133888
## FIPS.state.codeVirginia:total.headcount             -2.134 0.033061 *
## FIPS.state.codeWashington:total.headcount            0.137 0.891020
## FIPS.state.codeWest Virginia:total.headcount         0.585 0.558433
## FIPS.state.codeWisconsin:total.headcount             0.062 0.950345
## FIPS.state.codeWyoming:total.headcount               1.774 0.076211 .
## controlPrivate not-for-profit:total.headcount       -0.559 0.576421
## controlPublic:total.headcount                        4.417 1.08e-05 ***
## percent.fin.aid:total.headcount                     -0.726 0.467767
## tuition:total.headcount                              4.825 1.55e-06 ***
## number_of_days_mandated:total.headcount                NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.284 on 1360 degrees of freedom
##   (237 observations deleted due to missingness)
## Multiple R-squared:  0.5008, Adjusted R-squared:  0.4604
## F-statistic:  12.4 on 110 and 1360 DF,  p-value: < 2.2e-16

# NA predictors b/c of singularities: FIPS.state.code and number_of_days_mandated are highly collinear,
# as the latter depends on the former
```