DATA608_Story3

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Story 3 Assignment

Instructions The CDC publishes firearm mortality for each State per 100,000 persons https://www.cdc.gov/nchs/pressroom/sosmap/firearm_mortality/firearm.htm. Each State' firearm control laws can be categorized as very strict to very lax. The purpose of this Story is to answer the question, " Do stricter firearm control laws help reduce firearm mortality?"

For this assignment you will need to: - Access the firearm mortality data from the CDC using an available API (https://open.cdc.gov/apis.html) - Create a 5 point Likert scale categorizing gun control laws from most lax to strictest and assign each state to the most appropriate Likert bin. - Determine wether stricter gun control laws result in reduced gun violence deaths - Present your story using heat maps

Notes: - You may not use the same desktop application that you have used for a previous story. - If you use color in your visuals you must use an accessible color palette. - This assignment is due at the end of the week six of the semester

Beginning of Work

NOTE: The CDC Apis do not seem to be functional, I dont know if it is a result of the government shut down or the Trump administration's data scrubbing efforts. I will be doing my best to source and leverage data from whateversources I can find on this topic.

Reading in data

```
## Pulling in the manually downloaded FireArm Death Data because of the WONDER API being down. (https:/
# cdc_deaths_file <- "C:/Users/johnf/Documents/Github/CUNY_SPS_WORK/FALL2025/DATA608/Story3/cdc_gundeat
cdc_deaths_file <-"https://raw.githubusercontent.com/jhnboyy/CUNY_SPS_WORK/refs/heads/main/FALL2025/DAT
deaths    <- read_csv(cdc_deaths_file)

# head(deaths)

## Everytown Gun Law Ranking Data (https://everytownresearch.org/rankings/) 2025
# everytown_gun_data <- "C:/Users/johnf/Documents/Github/CUNY_SPS_WORK/FALL2025/DATA608/Story3/everytow
everytown_gun_data <-"https://raw.githubusercontent.com/jhnboyy/CUNY_SPS_WORK/refs/heads/main/FALL2025/
everytown <- read_csv(everytown_gun_data)

# head(everytown)

## Giffords Law Center (https://giffords.org/lawcenter/resources/scorecard/) 2025, its their latest sco
# gifford_gun_data <- "C:/Users/johnf/Documents/Github/CUNY_SPS_WORK/FALL2025/DATA608/Story3/giffords_g
```

```
gifford_gun_data <-"https://raw.githubusercontent.com/jhnboyy/CUNY_SPS_WORK/refs/heads/main/FALL2025/DA
giffords  <- read_csv(gifford_gun_data)

#head(giffords)

## Shapefile for Mapping
states_sf <- tigris::states(cb = TRUE, year = 2023, class = "sf") |> select(STUSPS, NAME, GEOID, geomet
   filter(!NAME %in% c("Puerto Rico", "Guam", "American Samoa",
                       "Commonwealth of the Northern Mariana Islands",
                       "United States Virgin Islands")) |>
  # Additional projection shifts for aesthetics
  tigris::shift_geometry() |>  st_transform(5070)
```

```
##   |                                                                              |
```

```
# print(unique(states_sf$NAME)) ## 51 values because of DC

## Testing Map Plot
# ggplot(states_sf) +  geom_sf() +
#   theme_minimal()
```

Processing Data to Work with Visuals

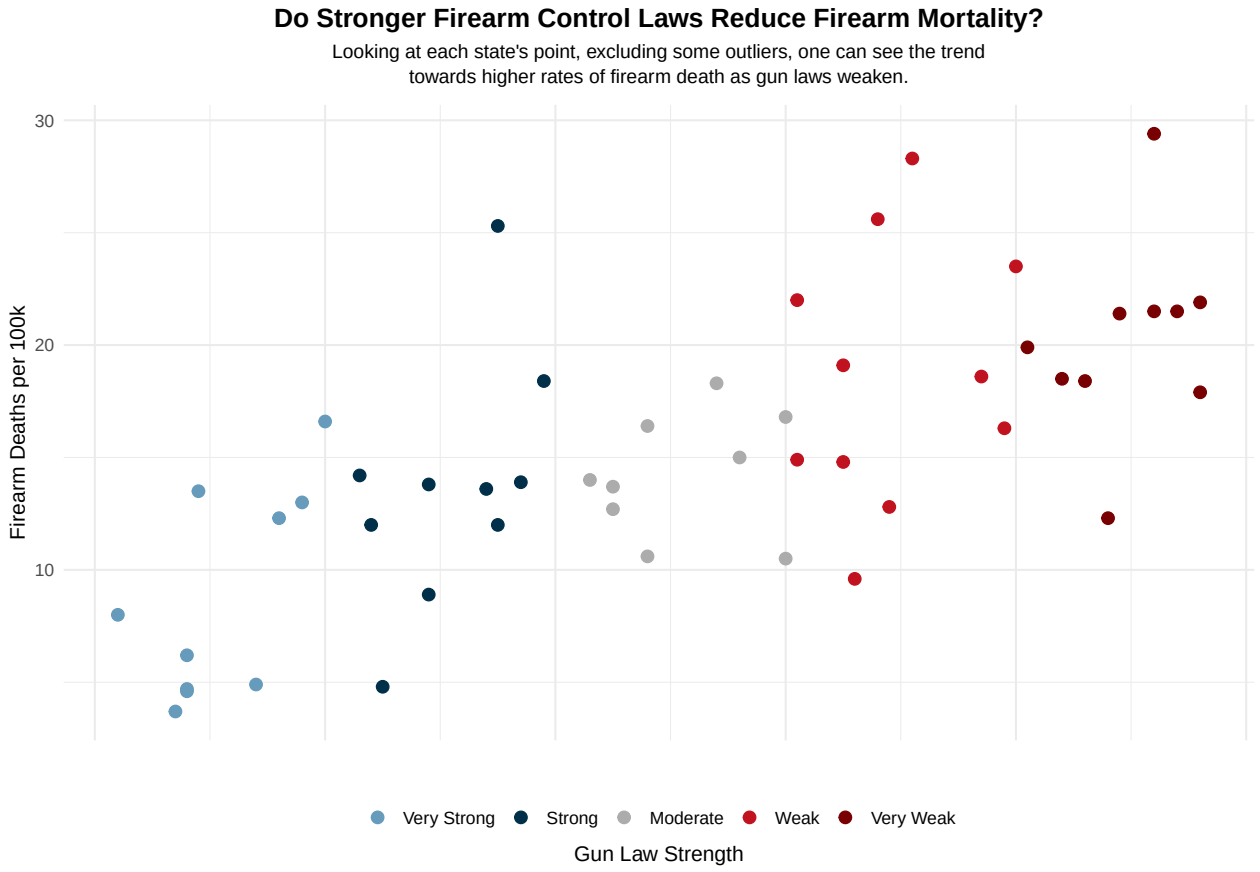
```
## Limiting the CDC Death data to latest year.
## Latest year is 2023, which is not 2025. However, with the status of the CDC website and API, I dont

deaths_latest <- subset(deaths,YEAR == 2023)

## Joining everytown and giffords. Giffords data has no year, however it's their latest annual ranking,

## limiting and renaming
everytown <- everytown %>%
  rename(EverytownLawStrengthRank = `Gun Law Strength Rank`) %>%
  select(-Category)

# head(everytown)

## Only interested in the gun law strength rank
giffords <- giffords %>%
  select(State, `Gun Law Strength Rank`) %>%
  rename(GiffordsLawStrengthRank = `Gun Law Strength Rank`)

# head(giffords)

## Joining them, and adding another column for both rank scores for a custom score. Points out of 100
gun_law_strgth <- giffords %>%  left_join(everytown, by = "State") |> mutate(AverageRank = (GiffordsLaw

# print(unique(gun_law_strgth$AverageRank))

## making this scale simple, 50 states so brackets of 10
```

```r
gun_law_strgth <- gun_law_strgth %>%  mutate(StrengthScale =  case_when(AverageRank <= 10 ~ "Very Strong
                                                                       AverageRank <= 30 ~ "Moderate",
```

```r
### Joining both of these into the shapefile map for plotting.

map_sf <- states_sf |>
  left_join(gun_law_strgth, by = c("NAME" = "State")) |>
  left_join(deaths_latest, by =c("STUSPS" = "STATE"))

## Creating another custom index for heat map

## ordering them
levels_strength <- c("Very Strong","Strong","Moderate","Weak","Very Weak")
levels_score <- c("Best (Top 20%)","Good (Upper-Middle 20%)","Neutral (Middle 20%)","Bad (Lower-Middle 2

map_sf <- map_sf %>%  mutate(GunScoreIndex = (AverageRank+RATE)/100) |>
  mutate( GunScoreCategory = ntile(GunScoreIndex, 5),
            GunScoreCategory = case_when(
      GunScoreCategory == 1 ~ "Best (Top 20%)",
      GunScoreCategory == 2 ~ "Good (Upper-Middle 20%)",
      GunScoreCategory == 3 ~ "Neutral (Middle 20%)" ,
      GunScoreCategory == 4 ~ "Bad (Lower-Middle 20%)",
      GunScoreCategory == 5 ~ "Worst (Bottom 20%)",
      TRUE ~ NA_character_)) |>
    mutate( StrengthScale = factor(StrengthScale, levels = levels_strength, ordered = TRUE)) |>
    mutate( GunScoreCategory = factor(GunScoreCategory, levels = levels_score, ordered = TRUE))

## check Breakdown of the scoring
# map_sf
```

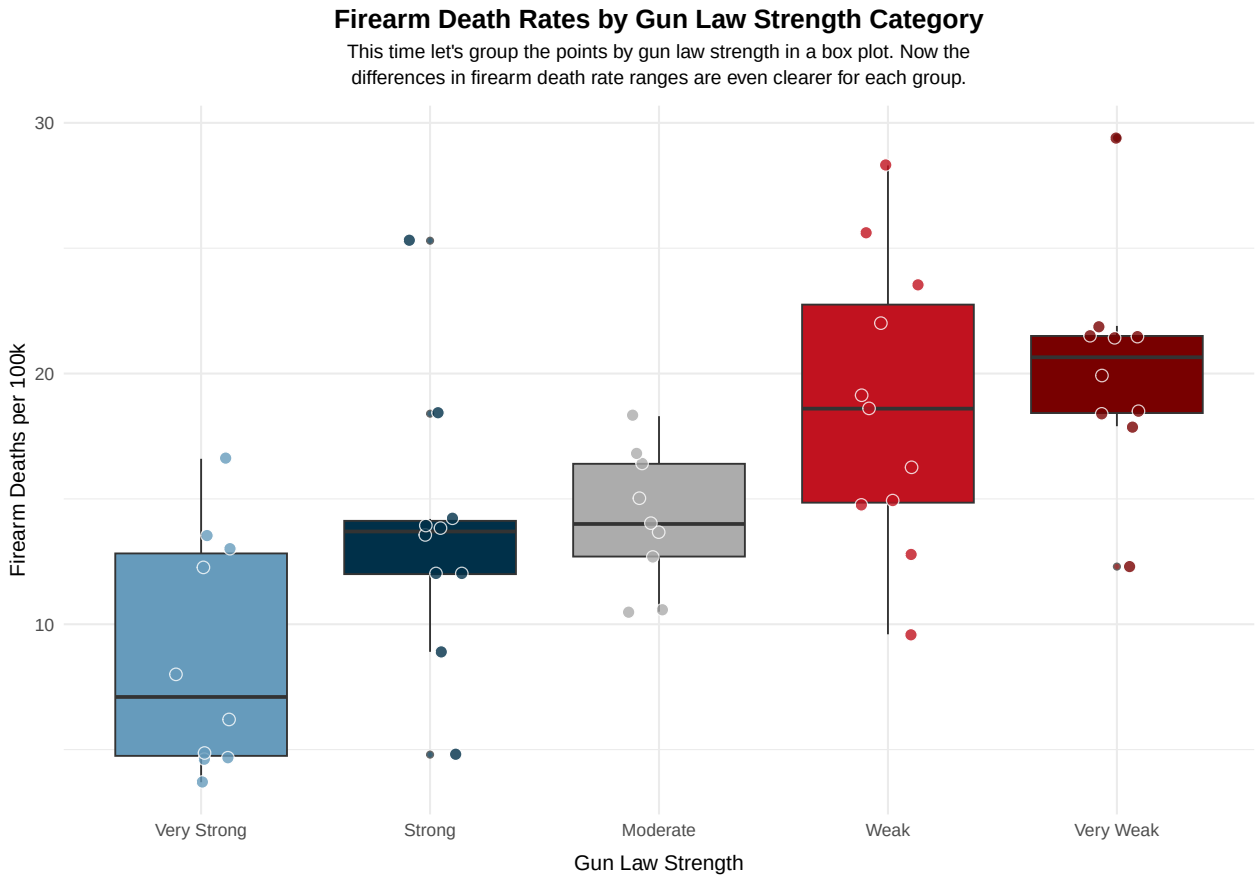
```r
sub_txt <- str_wrap(
  "Looking at each state's point, excluding some outliers, one can see the trend towards higher rates o
  width = 80
)

ggplot(st_drop_geometry(map_sf), aes(x = AverageRank, y = RATE)) +
  geom_point(aes(color = StrengthScale), size = 3)+
  scale_x_continuous(name ='')+
  scale_y_continuous(name = "Firearm Deaths per 100k") +
  scale_color_manual(values = c("Very Weak" = "#780000",
                                "Weak" = "#C1121F",
                                "Moderate" = "#ACACAC",
                                "Strong" = "#003049",
                                "Very Strong" = "#669BBC"
                                ),
                           name = "Gun Law Strength",
                           na.translate = FALSE ,
                           guide = guide_legend(
                           title.position = "bottom",
                           title.hjust = 0.5
                           )

  ) +
```

```
  labs(
    title = "Do Stronger Firearm Control Laws Reduce Firearm Mortality?",
    subtitle = sub_txt
  ) +
  theme_minimal(base_size = 12) +
  theme(
    legend.position = "bottom",
    plot.title = element_text(face = "bold", size = 15,hjust=0.5),
    plot.subtitle = element_text(size = 11, lineheight = 1.1,hjust=0.5, margin = margin(b = 10)),
    axis.text.x = element_blank(),
    axis.ticks.x = element_blank()
  )
```




```
sub_txt2 <- str_wrap(
  "This time let's group the points by gun law strength in a box plot. Now the differences in firearm d
  width = 80
)

# Confirming no Na, DC is a problem here so just removing for box.
map_sf_box <-  map_sf %>%   filter(!is.na(StrengthScale))

## Box plot
ggplot(map_sf_box, aes(x = StrengthScale, y = RATE, fill = StrengthScale)) +
  geom_boxplot(width = 0.75, outlier.shape = 21, outlier.alpha = 0.75) +
  geom_jitter(aes(fill = StrengthScale),color = "white",  width = 0.15,  alpha = 0.8,  size = 3, shape =
```

```
  scale_fill_manual(values = c( "Very Weak"   = "#780000","Weak"        = "#C1121F","Moderate"    = "#A
                                "Strong"      = "#003049","Very Strong" = "#669BBC"),  guide = "none",na
  labs(x = "Gun Law Strength",y = "Firearm Deaths per 100k", title = "Firearm Death Rates by Gun Law Str
  theme_minimal(base_size = 12) +
  theme(axis.title.x = element_text(margin = margin(t = 8)),
        plot.title = element_text(face = "bold", size = 15,hjust=0.5),
        plot.subtitle = element_text(size = 11, lineheight = 1.1,hjust=0.5, margin = margin(b = 10)),)
```

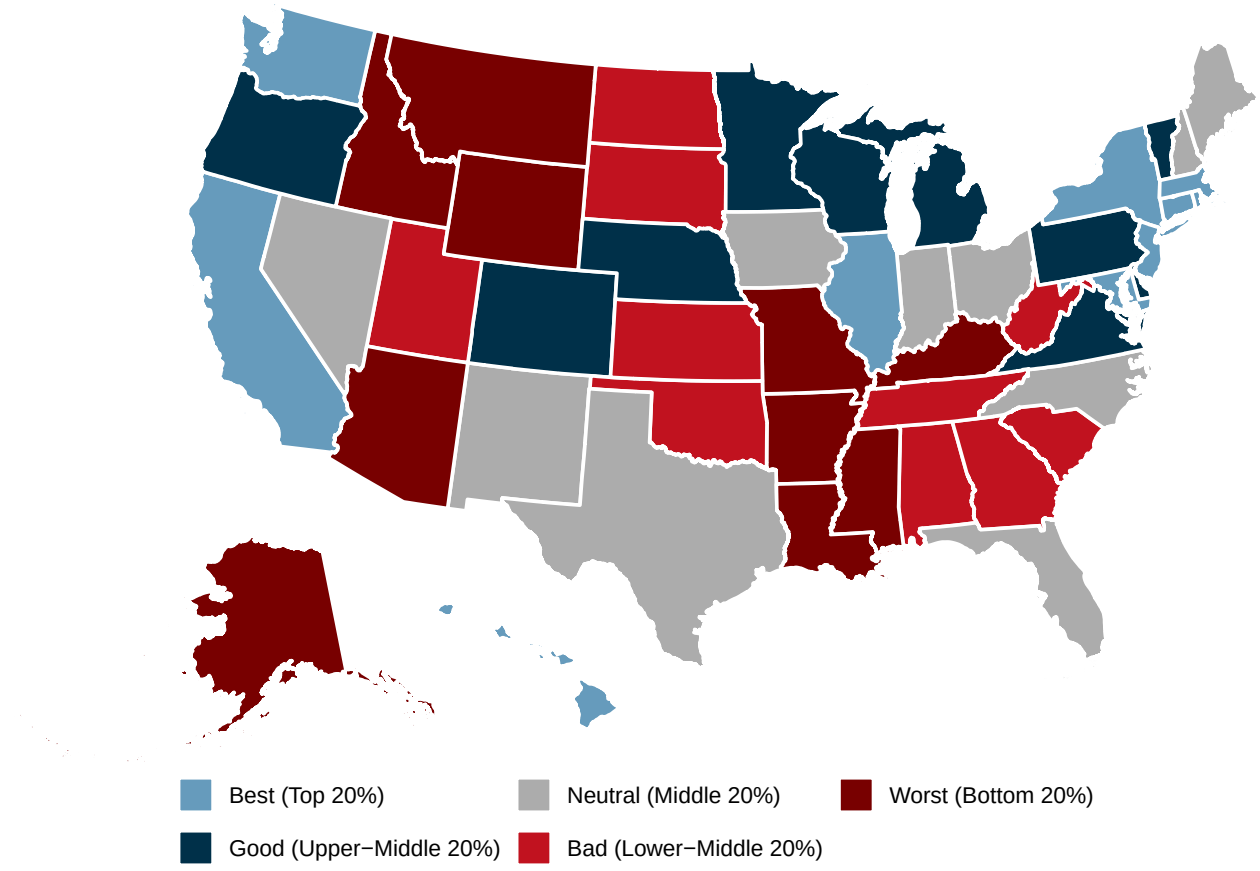



```
sub_txt3 = str_wrap(
  "It's clear that stronger state gun laws, yield lower firearm death rates on average. Let's put it al
  width = 85
)

ggplot(map_sf) +
  geom_sf(aes(fill = GunScoreCategory), color = "white", linewidth = 0.75, hjust =0.5) +
  coord_sf(expand = FALSE)+
  scale_fill_manual(
    values = c(  "Best (Top 20%)"    = "#669BBC",  "Good (Upper-Middle 20%)"   = "#003049",  "Neutral (
   guide = guide_legend(title.position = "bottom",   title.hjust = 0.5, nrow = 2,)
  ) +
  labs(
    title = "Gun Score Index by State",
    subtitle = sub_txt3,
    caption = "* GunScoreIndex = (Gun Law Strength Rank + Firearm Death Rate)/100)"
  ) +
```

```
theme_void(base_size = 12) +
theme(
  legend.position = "bottom",
  axis.title.x = element_text(margin = margin(t = 8)),
  plot.title = element_text(face = "bold", size = 15,hjust=0.5),
  plot.subtitle = element_text(size = 11, lineheight = 1.1, hjust=0.5, margin = margin(t=10,b = 10)),
  plot.caption = element_text(size = 9, , hjust=0.5, margin = margin(t=10, b = 10)),)
```

Gun Score Index by State

It's clear that stronger state gun laws, yield lower firearm death rates on average. Let's put it all together. This map considers both metrics to calculate a Gun Score Index showing each state's standing.



* GunScoreIndex = (Gun Law Strength Rank + Firearm Death Rate)/100)