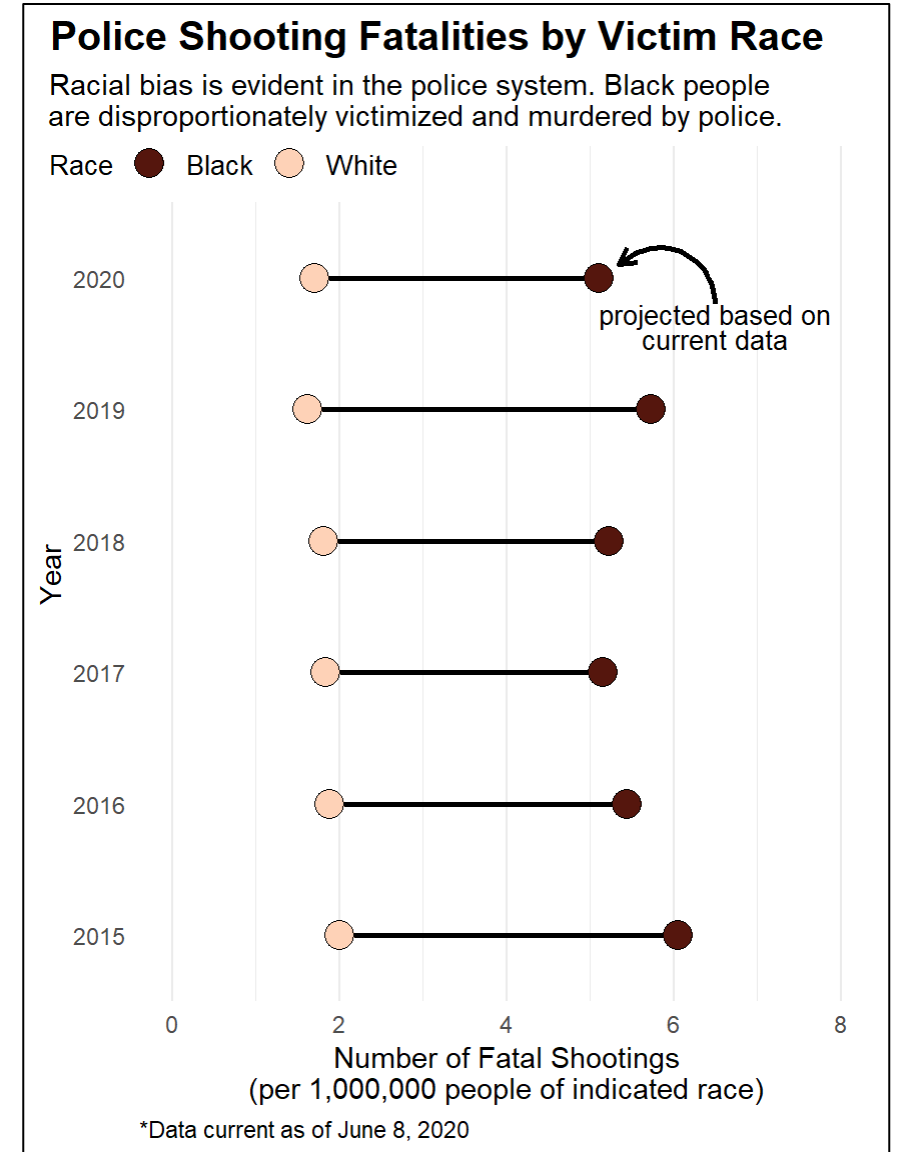


Racial Bias in Fatal Police Shootings

2015-2020

- About the data
- About the visualization
 - About dumbbell plots
 - Intended audience
 - How to read it, what to look for, intended message
 - Presentation
 - Methods



The Data: Fatal Police Shootings

In 2015, The Washington Post created a database cataloging every fatal shooting nationwide by a police officer in the line of duty, collecting data on those who were killed and details of the shootings. The effort began because data compiled by the federal government was unreliable and incomplete. This database is based on news reports, public records, social media and other sources.

```
## # A tibble: 5,401 x 12
##   name    date    armed  age gender race  city  state threat_level flee
##   <chr> <date>    <fct> <dbl> <fct> <fct> <chr> <fct> <fct>    <fct>
## 1 Tim ~ 2015-01-02 gun      53 M      A   Shel~ WA   attack   Not ~
## 2 Lewi~ 2015-01-02 gun      47 M      W   Aloha OR   attack   Not ~
## 3 John~ 2015-01-03 unar~    23 M      H   Wich~ KS   other    Not ~
## 4 Matt~ 2015-01-04 toy ~    32 M      W   San ~ CA   attack   Not ~
## 5 Mich~ 2015-01-04 nail~    39 M      H   Evans CO   attack   Not ~
## 6 Kenn~ 2015-01-04 gun      18 M      W   Guth~ OK   attack   Not ~
## 7 Kenn~ 2015-01-05 gun      22 M      H   Chan~ AZ   attack   Car
## 8 Broc~ 2015-01-06 gun      35 M      W   Assa~ KS   attack   Not ~
## 9 Autu~ 2015-01-06 unar~    34 F      W   Burl~ IA   other    Not ~
## 10 Lesl~ 2015-01-06 toy ~    47 M      B   Knox~ PA   attack   Not ~
## # ... with 5,391 more rows, and 2 more variables: body_camera <lgl>,
## #   signs_of_mental_illness <lgl>
```

The Data: Fatal Police Shootings

```
# Count W/B shootings per year
shootings <- shootings_raw %>%
  group_by(Year, race) %>%
  summarise(fatalshootings = n()) %>%
  filter(race == "W" | race == "B")

shootings %>% head(12)
```

```
## # A tibble: 12 x 3
## # Groups:   Year [6]
##   Year race fatalshootings
##   <dbl> <fct>         <int>
## 1  2015 W             497
## 2  2015 B             258
## 3  2016 W             468
## 4  2016 B             234
## 5  2017 W             459
## 6  2017 B             224
## 7  2018 W             454
## 8  2018 B             229
## 9  2019 W             405
## 10 2019 B             249
## 11 2020 W             185
## 12 2020 B              97
```

```
# How many B/W people are in America from 2015-2020?
census_raw <- read_xlsx("census-data.xlsx")
# Convert units from millions
census <- census_raw %>%
  mutate(W_pop = White * 1000000,
         B_pop = Black * 1000000)

census
```

```
## # A tibble: 21 x 5
##   Year White Black      W_pop      B_pop
##   <dbl> <dbl> <dbl>      <dbl>      <dbl>
## 1  2020  250.  43.6 249726667. 43577778.
## 2  2019  249.  43.4 249420000. 43433333.
## 3  2018  250.  43.8 250140000. 43800000.
## 4  2017  250.  43.5 249620000. 43500000.
## 5  2016  248.  43.  248500000. 43000000.
## 6  2015  248.  42.6 247780000. 42630000.
## 7  2014  247.  42.2 246660000. 42160000.
## 8  2013  246.  41.7 245590000. 41710000.
## 9  2012  245.  41.3 244510000. 41260000.
## 10 2011  243.  40.8 243380000. 40810000.
## # ... with 11 more rows
```

The Data: Fatal Police Shootings

Year	Total Number of Fatal Shootings		Total Population (in Millions)		Deaths per 1 Million People of Indicated Race	
	White	Black	White	Black	White	Black
2015	497.00	258.00	247.78	42.63	2.01	6.05
2016	468.00	234.00	248.50	43.00	1.88	5.44
2017	459.00	224.00	249.62	43.50	1.84	5.15
2018	454.00	229.00	250.14	43.80	1.81	5.23
2019	405.00	249.00	249.42	43.43	1.62	5.73
2020	424.69	222.67	249.73	43.58	1.70	5.11

* 2020 data is projected based on current data.

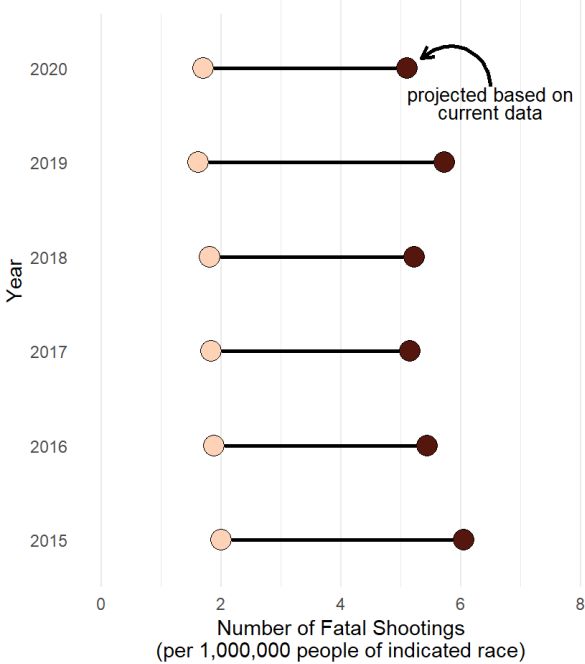
† Data is current as of June 8, 2020.

About Dumbbell Plots

Police Shooting Fatalities by Victim Race

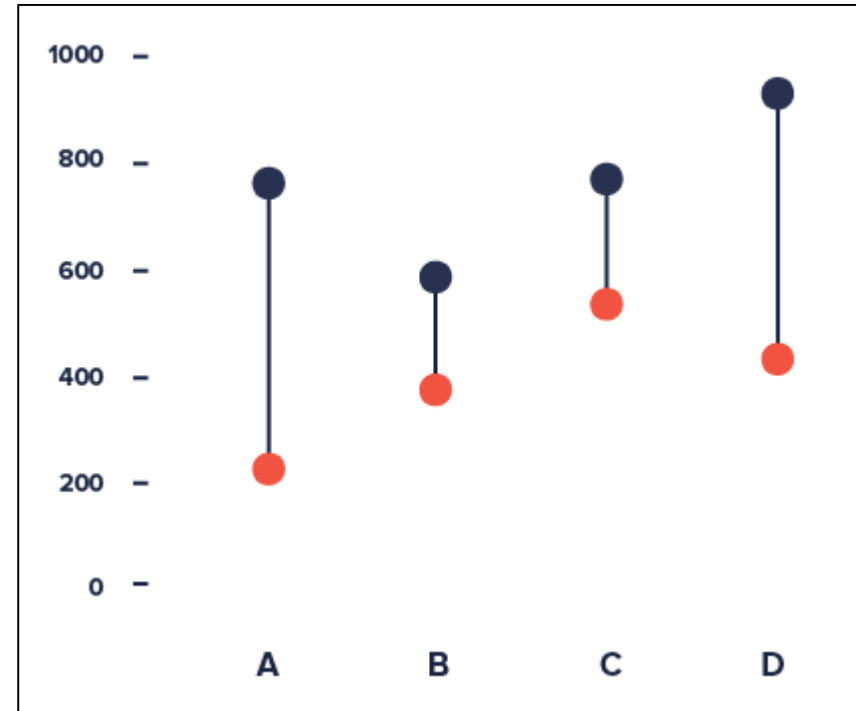
Racial bias is evident in the police system. Black people are disproportionately victimized and murdered by police.

Race ● Black ● White

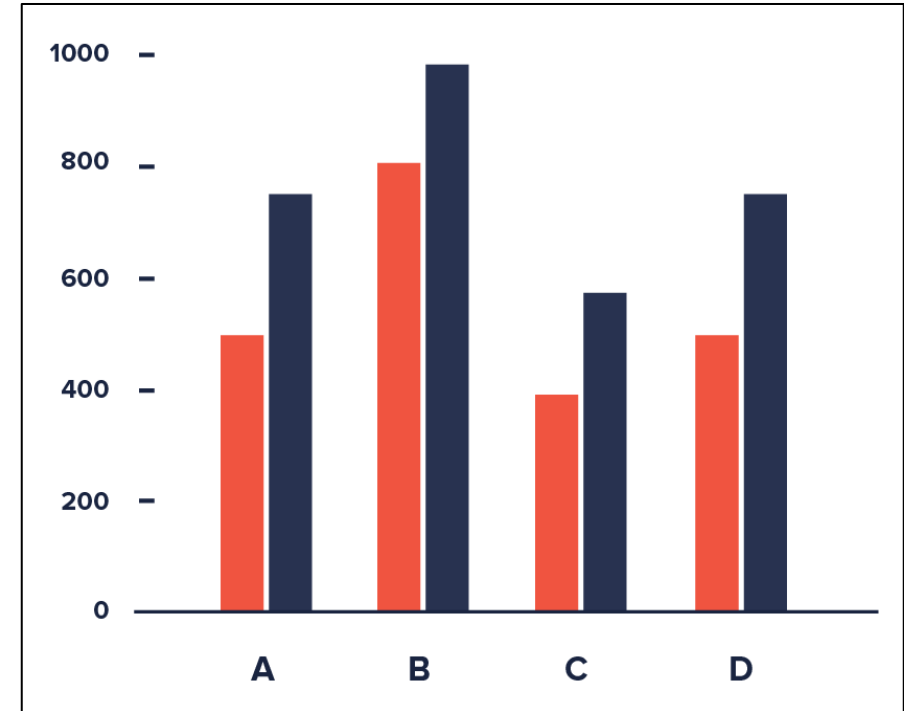


*Data current as of June 8, 2020

Dumbbell Plot



Grouped Bar Chart



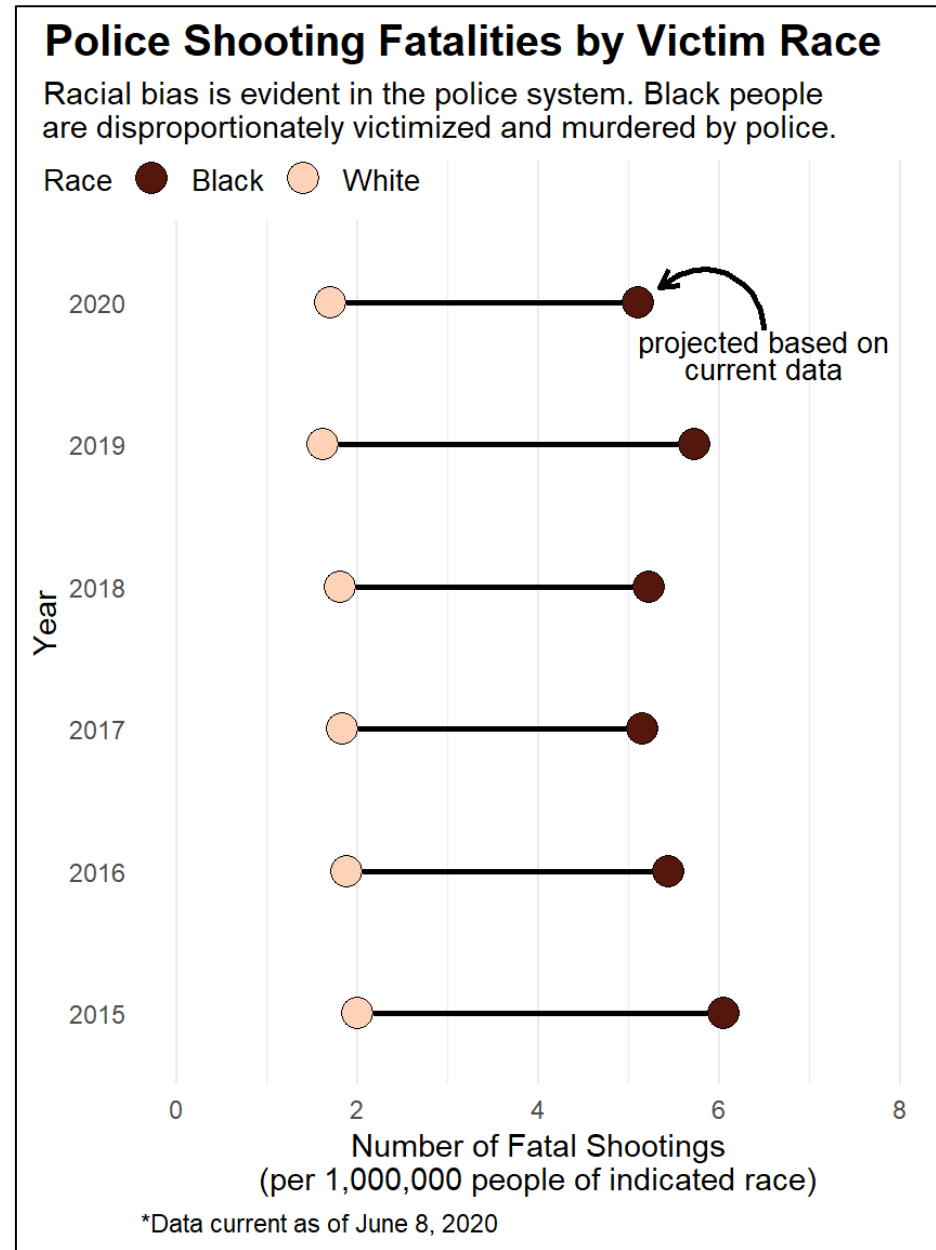
<https://datavizproject.com/data-type/dumbbell-plot/>

<https://datavizproject.com/data-type/grouped-bar-chart/>

Intended Audience:
Everyone!!

How to read it:
x-axis = # of fatalities/million people
y-axis = year

What I'm trying to convey:
The proportion of fatalities in the Black community is consistently significantly higher than for white people.

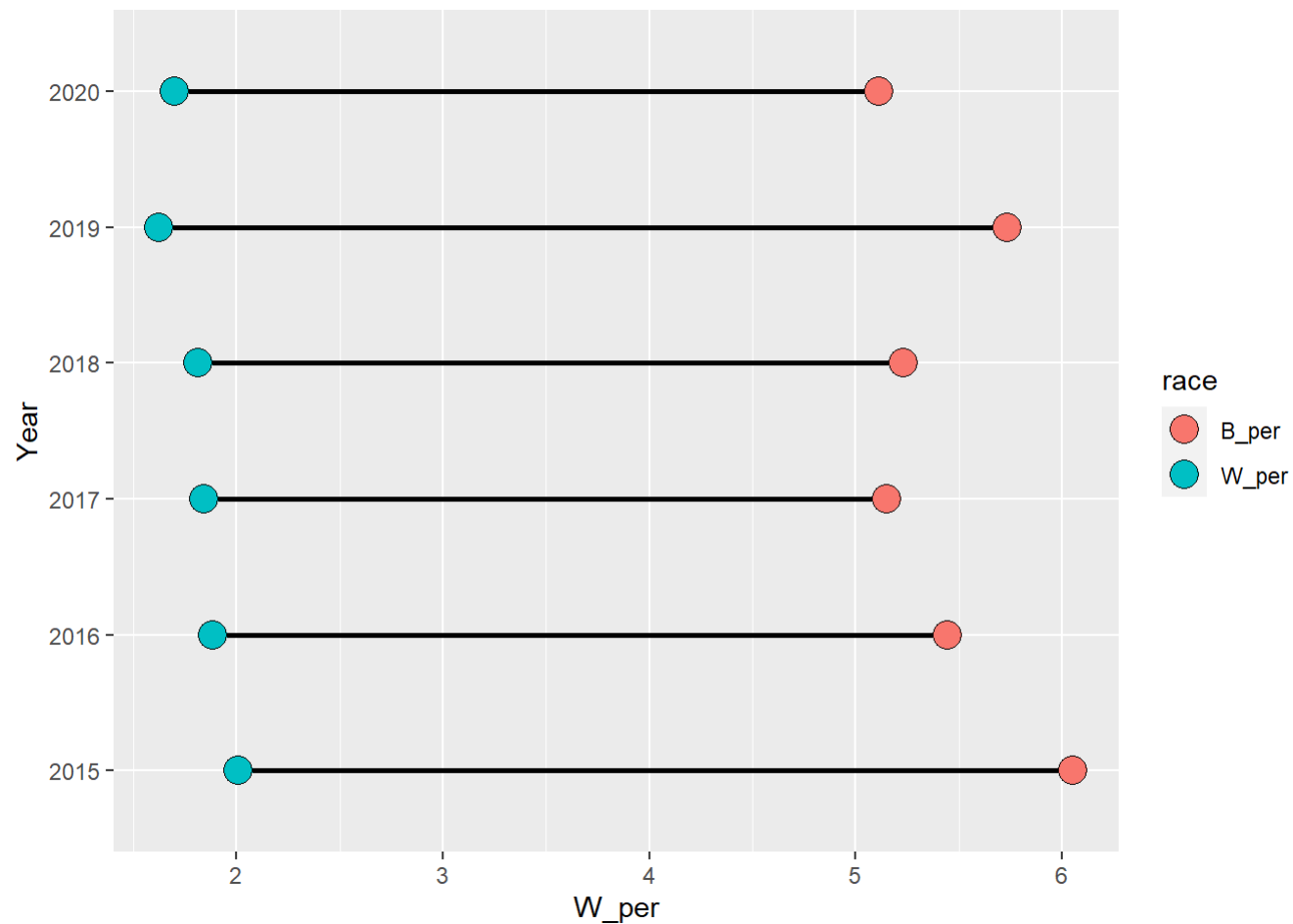


Presentation:

- Portrait orientation (vs landscape)
- No gridlines on y-axis (remove distracting details)
- Color represents skin color
- Text and arrow annotation to indicate projected data
- Footnote communicates the status of the current data
- Deliberate use of bold face font to better separate the title from the subtitle

How was it made?

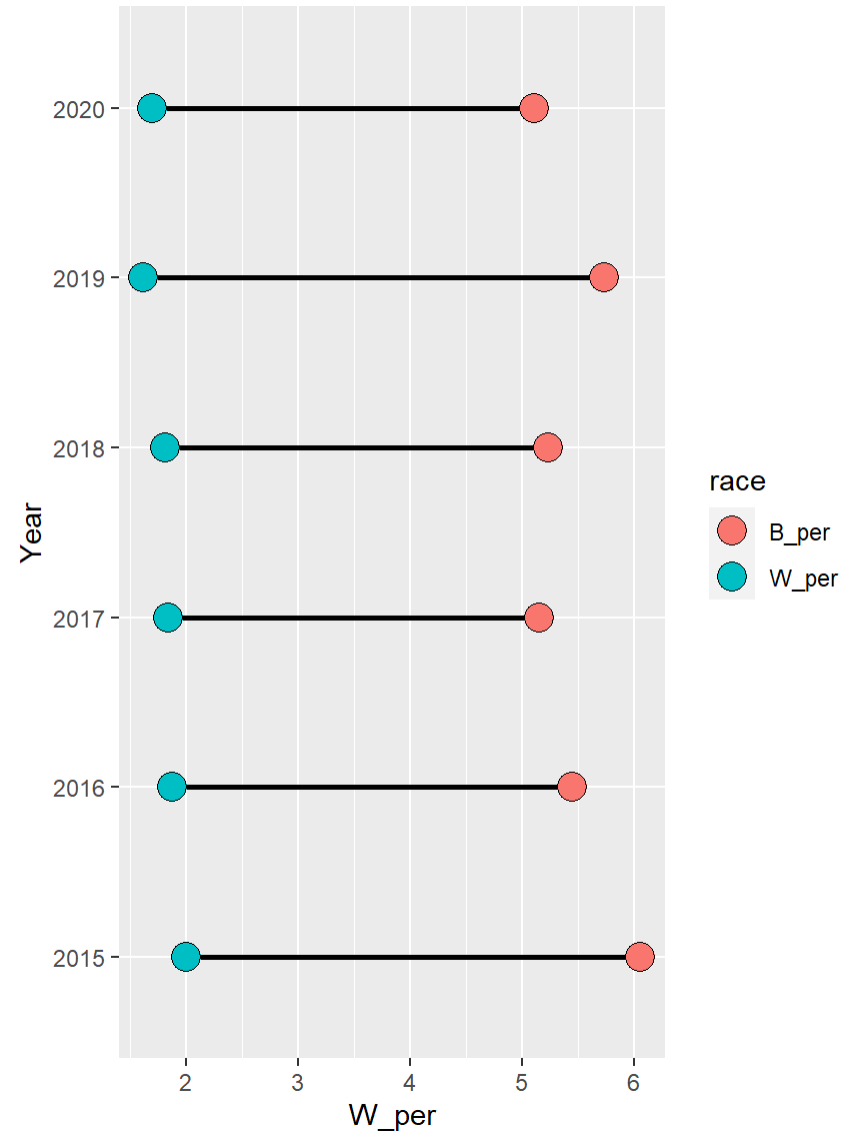
```
ggplot() +  
  geom_segment(data = shootings,  
              mapping = aes(x=W_per, xend=B_per, y=Year, yend=Year),  
              size = 1) +  
  geom_point(data = shootings_long,  
            mapping = aes(x = fatal_per, y = Year, group = race, fill = race),  
            size=5, shape = 21, color = "black")
```



How was it made?

Change the dimensions using chunk options

```
{r fig.height = 6, fig.width = 4.5}
ggplot() +
  geom_segment(data = shootings,
              mapping = aes(x=W_per, xend=B_per, y=Year, yend=Year),
              size = 1) +
  geom_point(data = shootings_long,
            mapping = aes(x = fatal_per, y = Year, group = race, fill = race),
            size=5, shape = 21, color = "black")
...
```



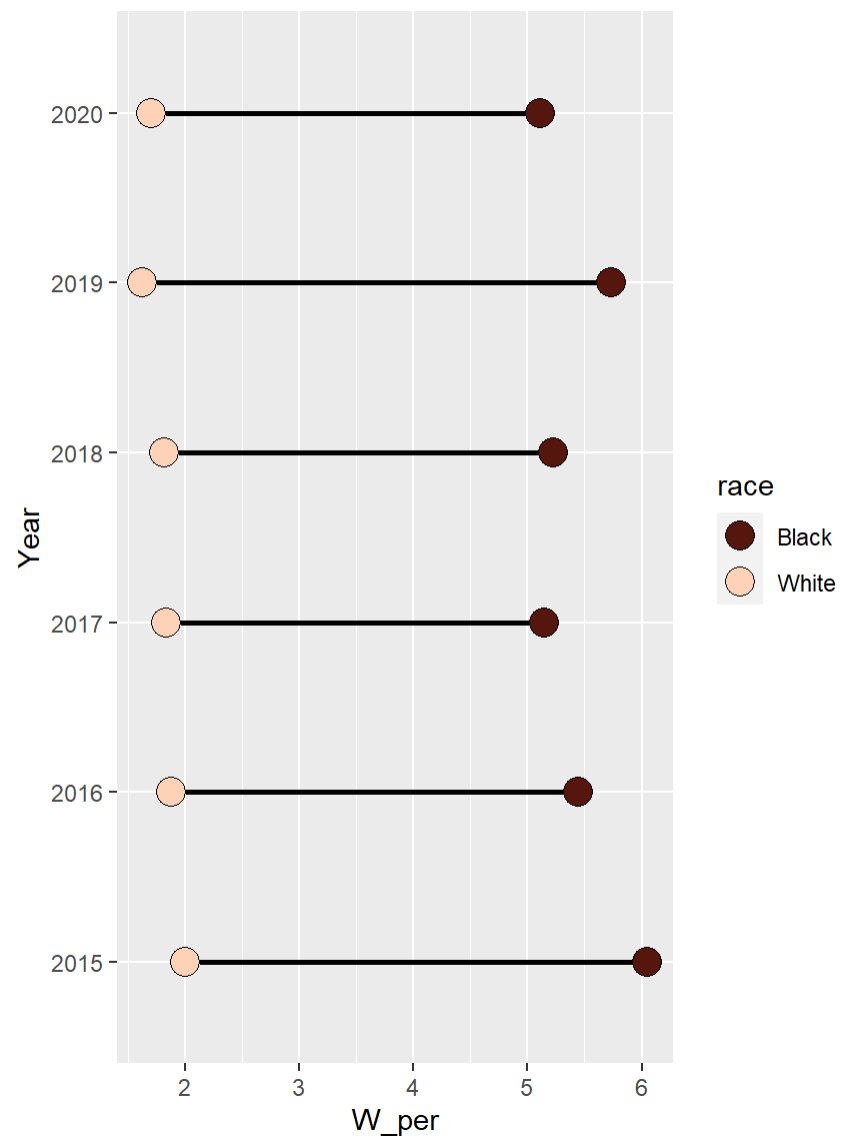
How was it made?

Define custom colors

```
mycolors <- c("W_per" = "#fed2b7", "B_per" = "#55160d")

ggplot() +
  geom_segment(data = shootings,
              mapping = aes(x=W_per, xend=B_per, y=Year, yend=Year),
              size = 1) +
  geom_point(data = shootings_long,
            mapping = aes(x = fatal_per, y = Year, group = race, fill = race),
            size=5, shape = 21, color = "black") +

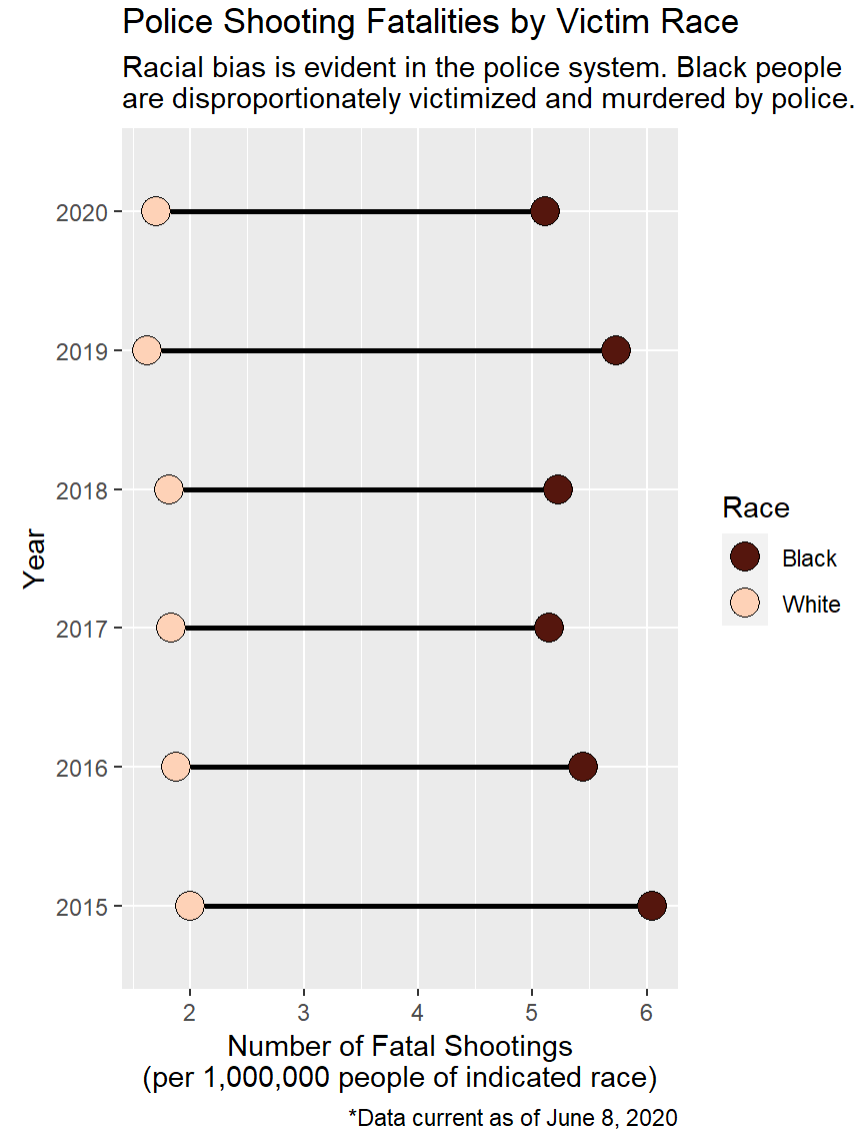
  # Customize color
  scale_fill_manual(values = mycolors,
                  labels = c("Black", "White"))
```



How was it made?

Add labels, title, subtitle

```
# Customize Labels
labs(title = "Police Shooting Fatalities by Victim Race",
     subtitle = "Racial bias is evident in the police system. Black people \nare disproportionately victimized and murdered by police.",
     fill = "Race",
     y = "Year",
     x = "Number of Fatal Shootings\n(per 1,000,000 people of indicated race)",
     caption = "*Data current as of June 8, 2020")
```



How was it made?

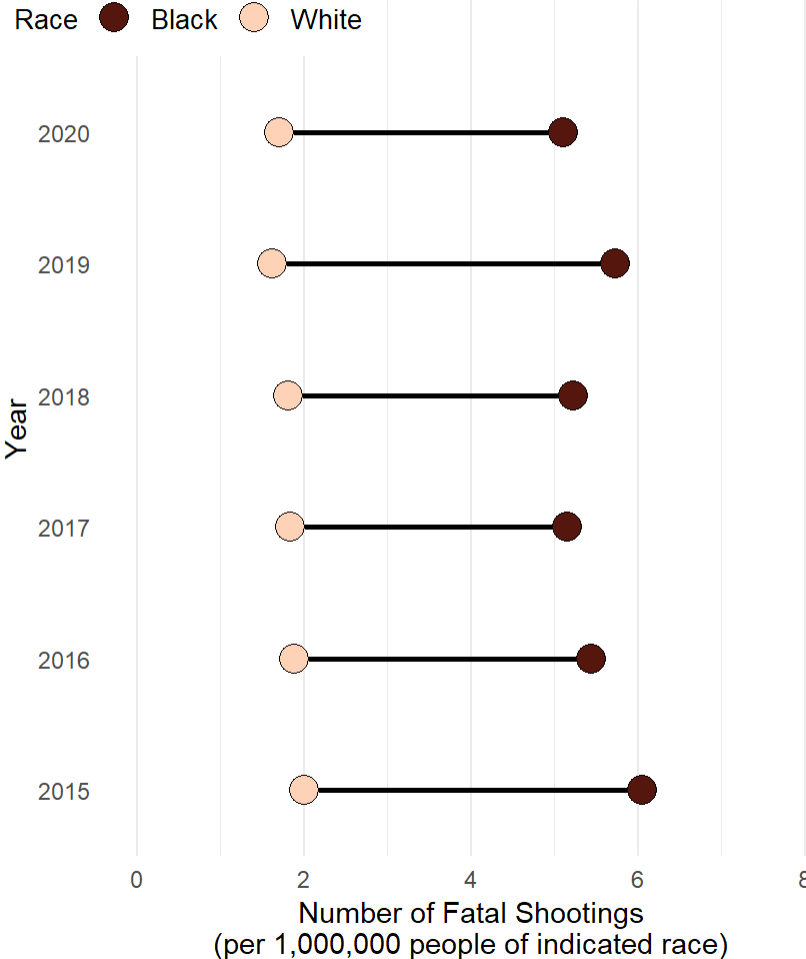
Customize appearance

```
# Customize appearance
coord_cartesian(xlim = c(0,8)) +
scale_y_discrete(expand = c(0.1,0,0,1)) + # Expand margins on top and bottom of plot

theme_minimal() +
theme(legend.position = c(0.115,0.98),
      legend.background = element_rect(fill = "white", color = "white"),
      legend.text = element_text(size = 10),
      legend.title = element_text(size = 10),
      legend.direction = "horizontal",
      plot.title = element_text(face = "bold", size = 15, hjust=0.2),
      plot.title.position = "plot",
      plot.subtitle = element_text(hjust = 0.1),
      plot.caption = element_text(hjust = 0),
      panel.grid.major.y = element_blank())
```

Police Shooting Fatalities by Victim Race

Racial bias is evident in the police system. Black people are disproportionately victimized and murdered by police.



*Data current as of June 8, 2020

How was it made?

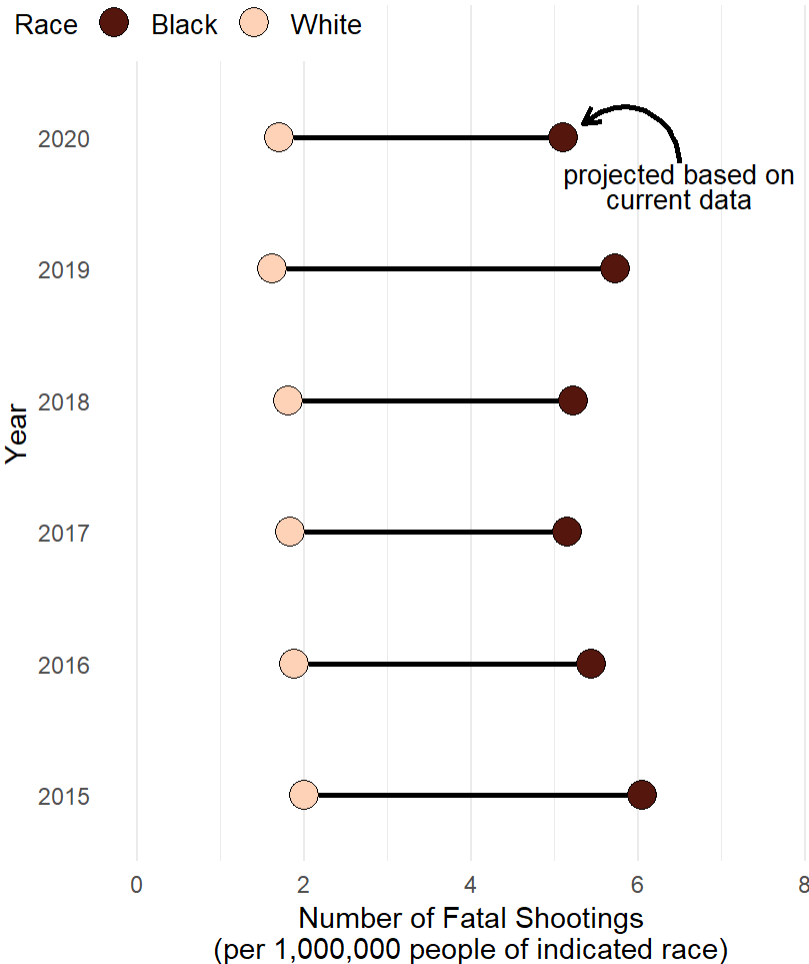
Add annotations

```
# Arrow annotation to projected data
annotate(geom = "curve", size = 1, color = "black",
  x = 6.5, y = 5.8, xend = 5.35, yend = 6.1, curvature = 0.7,
  arrow = arrow(length = unit(2.5, "mm")) +

# Text annotation to projected data
annotate(geom = "text", x = 6.5, y = 5.63,
  label = "projected based on\ncurrent data", color = "black",
  size = 3.5, lineheight = 0.8, hjust = 0.5)
```

Police Shooting Fatalities by Victim Race

Racial bias is evident in the police system. Black people are disproportionately victimized and murdered by police.



*Data current as of June 8, 2020

That's it!

```
mycolors <- c("W_per" = "#fed2b7", "B_per" = "#55160d")

ggplot() +
  geom_segment(data = shootings,
              mapping = aes(x=W_per, xend=B_per, y=Year, yend=Year),
              size = 1) +
  geom_point(data = shootings_long,
            mapping = aes(x = fatal_per, y = Year, group = race, fill = race),
            size=5, shape = 21, color = "black") +

  # Customize color
  scale_fill_manual(values = mycolors,
                  labels = c("Black", "White")) +

  # Customize labels
  labs(title = "Police Shooting Fatalities by Victim Race",
       subtitle = "Racial bias is evident in the police system. Black people \nare disproportionately victimized and murdered by police.",
       fill = "Race",
       y = "Year",
       x = "Number of Fatal Shootings\n(per 1,000,000 people of indicated race)",
       caption = "*Data current as of June 8, 2020") +

  # Customize appearance
  coord_cartesian(xlim = c(0,8)) +
  scale_y_discrete(expand = c(0.1,0,0.1)) + # Expand margins on top and bottom of plot

  theme_minimal() +
  theme(legend.position = c(0.115,0.98),
        legend.background = element_rect(fill = "white", color = "white"),
        legend.text = element_text(size = 10),
        legend.title = element_text(size = 10),
        legend.direction = "horizontal",
        plot.title = element_text(face = "bold", size = 15, hjust=0.2),
        plot.title.position = "plot",
        plot.subtitle = element_text(hjust = 0.1),
        plot.caption = element_text(hjust = 0),
        panel.grid.major.y = element_blank()) +

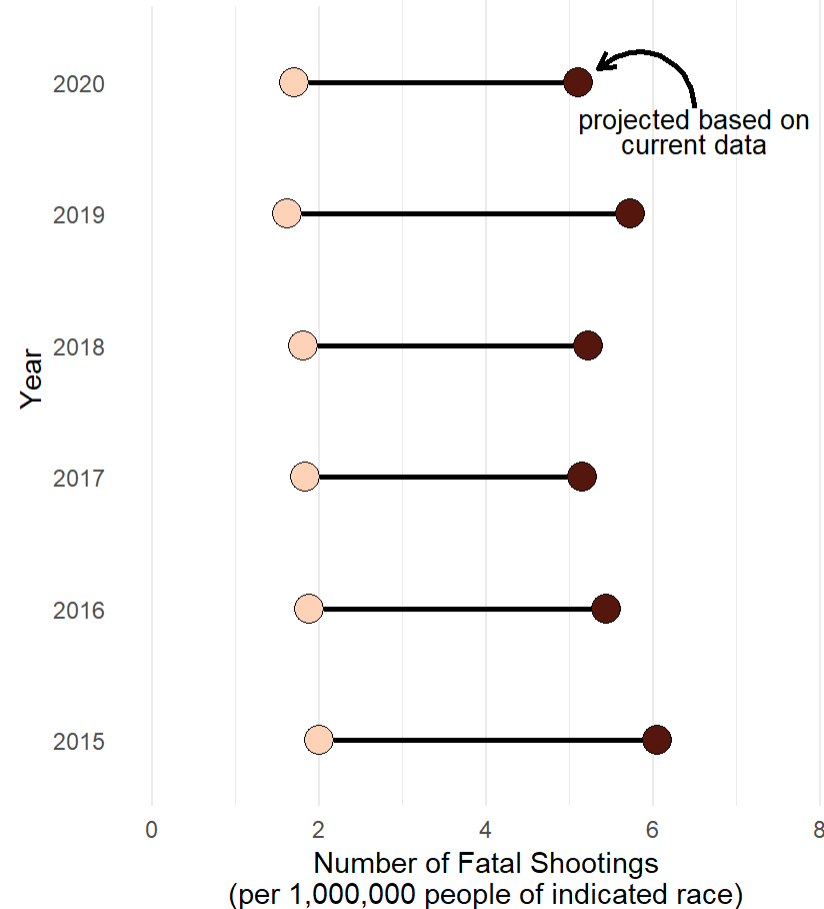
  # Arrow annotation to projected data
  annotate(geom = "curve", size = 1, color = "black",
         x = 6.5, y = 5.8, xend = 5.35, yend = 6.1, curvature = 0.7,
         arrow = arrow(length = unit(2.5, "mm")) +

  # Text annotation to projected data
  annotate(geom = "text", x = 6.5, y = 5.63,
         label = "projected based on\ncurrent data", color = "black",
         size = 3.5, lineheight = 0.8, hjust = 0.5)
```

Police Shooting Fatalities by Victim Race

Racial bias is evident in the police system. Black people are disproportionately victimized and murdered by police.

Race ● Black ○ White



*Data current as of June 8, 2020