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Data considerations:

[Github repo w/ Jupyter Notebooks + data](#)

Gun Violence Archive

- The list of incidents from 2013 is not exhaustive; only 279 incidents from that year were catalogued.
- 2 incidents were manually added to the dataset because of issues with the scraper: the Las Vegas massacre and incident 1081885.
 - The Las Vegas mass shooting had to be removed because information about the incident was stored in a PDF, which caused scraping to fail since the scraper expects an HTML webpage.
 - Incident 1081885 had to be removed because the location details were not parsing nicely.
- Known issue: the address field should be required, but is missing for ~16k incidents.

[NICS data \(via Buzzfeed\)](#), [Population data by state \(via census\)](#)

- NICS goes back until 1999; population data goes back until 2010

[Mother Jones](#)

- Added prev_fatalities, grouped_legally_obtained columns

All aforementioned datasets excluded suicides.

[CDC](#)

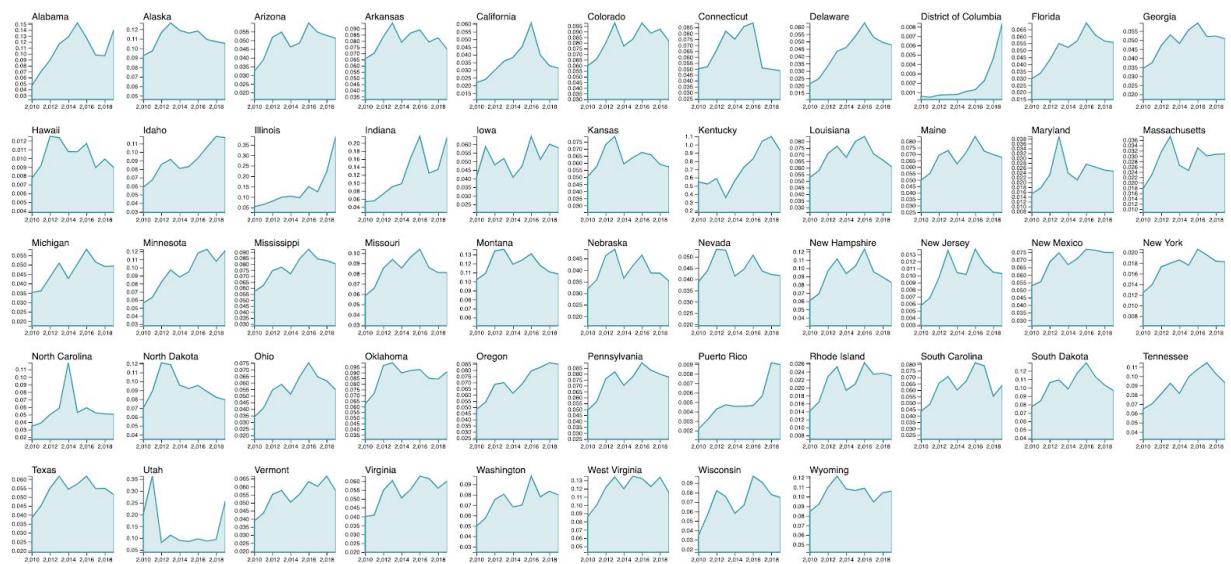
- “Suicide” dataset consists of deaths with ICD-10 codes X72 (Intentional self-harm by handgun discharge), X73 (Intentional self-harm by rifle, shotgun and larger firearm discharge), and X74 (Intentional self-harm by other and unspecified firearm discharge)
- “Homicide” dataset consists of deaths with ICD-10 codes U01.4 (Terrorism involving firearms), W32 (Handgun discharge), W33 (Rifle, shotgun and larger firearm discharge), W34 (Discharge from other and unspecified firearms), Y22 (Handgun discharge, undetermined intent), Y23 (Rifle, shotgun and larger firearm discharge, undetermined intent), Y24 (Other and unspecified firearm discharge, undetermined intent)
- “Legal” dataset includes deaths with ICD-10 code Y35 (Legal intervention involving firearm discharge)
- Total dataset is combined suicide, homicide, legal.
- Legal not included in charts because data points are negligible (<10 per year, almost zero after normalizing by population)

Red Flag Law status obtained from [The Trace](#); PTP status obtained from [Giffords Law Center](#)

Summarized Findings

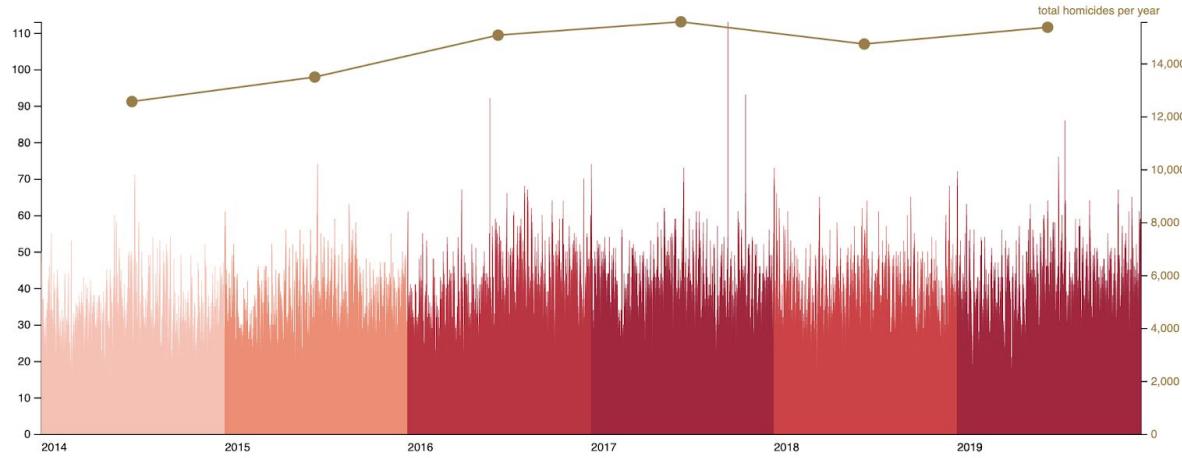
[1] Federal background checks on prospective gun buyers have increased in most states since 2010.

National Instant Criminal Background Check System (NICS) queries normalized by population for each state (2010-19)

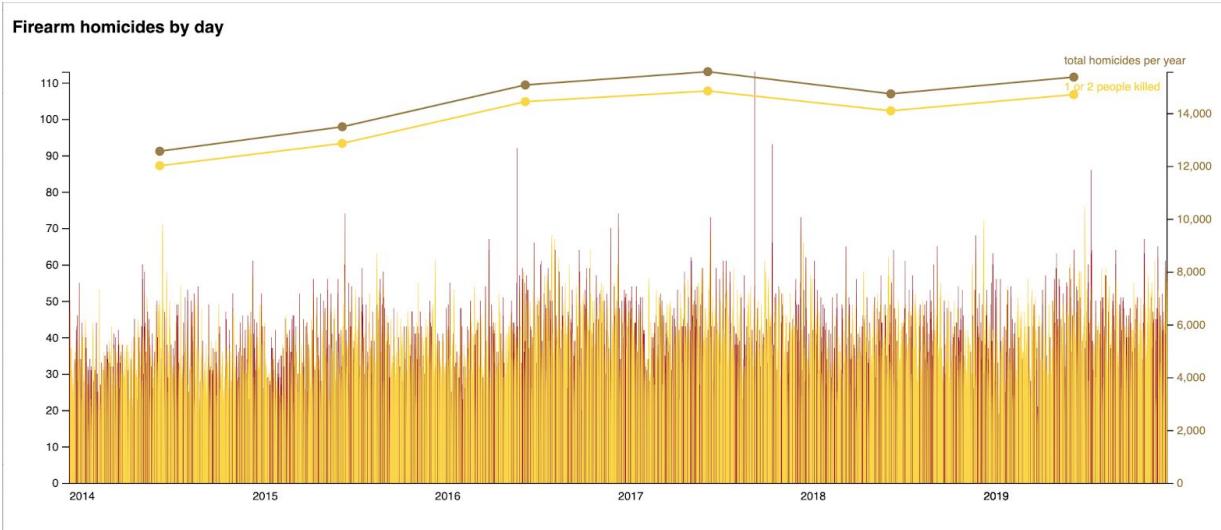


[2] Firearm homicides have increased since 2014.

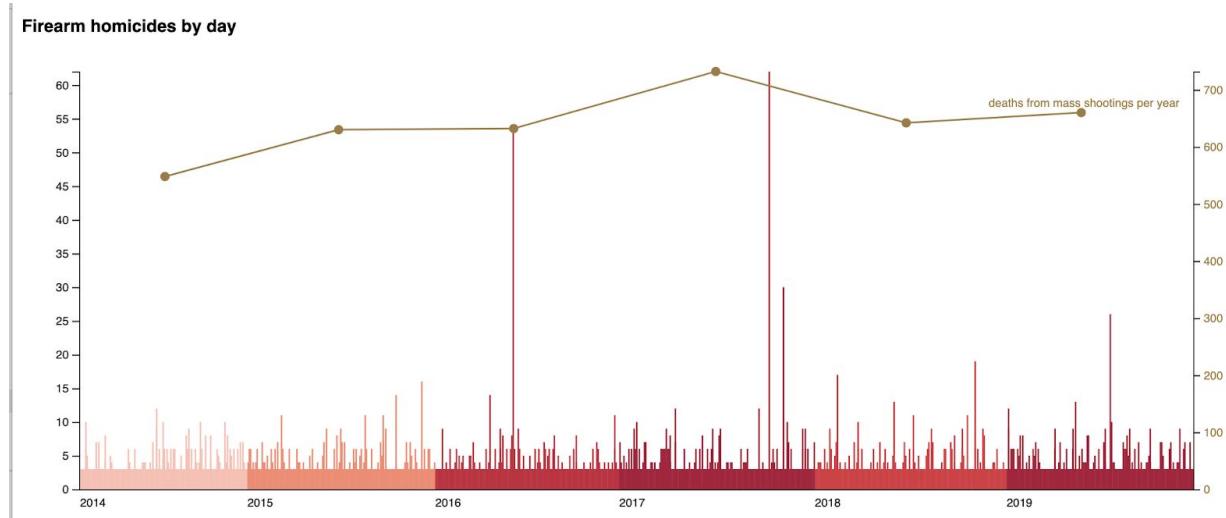
Firearm homicides by day



- a. Shootings in which 1 or 2 people were killed represent the vast majority of daily firearm homicides

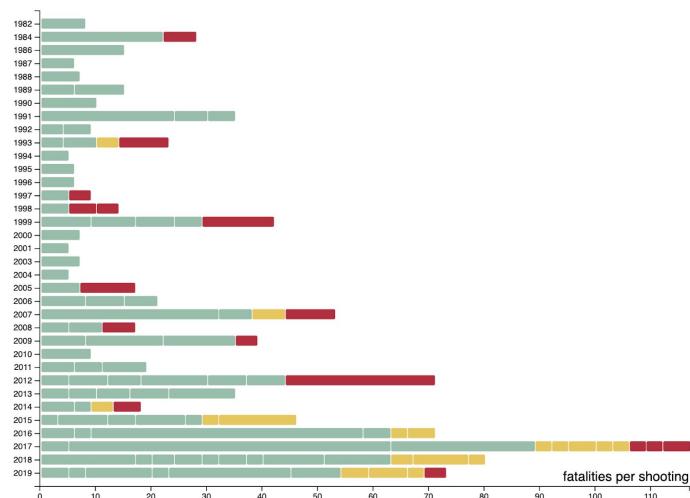


b. But the number of people killed in mass shootings per year has also increased.



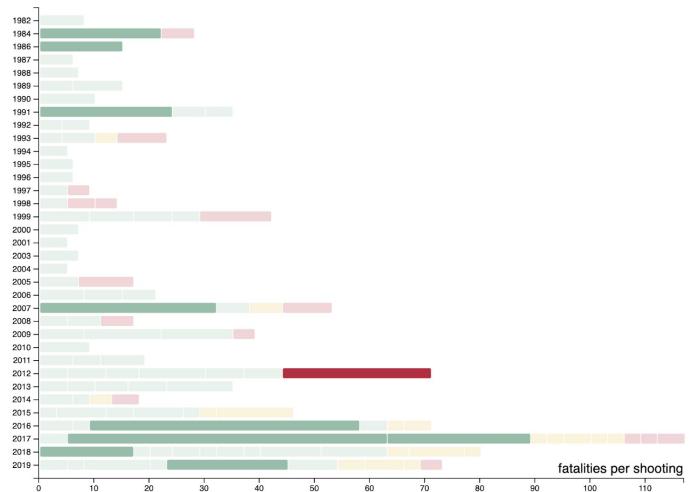
[3] Most firearms used in mass shootings were legally obtained.

Legally purchased, illegally purchased, or unknown weapons used in mass shootings



a. Legally obtained weapons were used in 9/10 of the deadliest mass shootings since 1982

Legally purchased, illegally purchased, or unknown weapons used in mass shootings

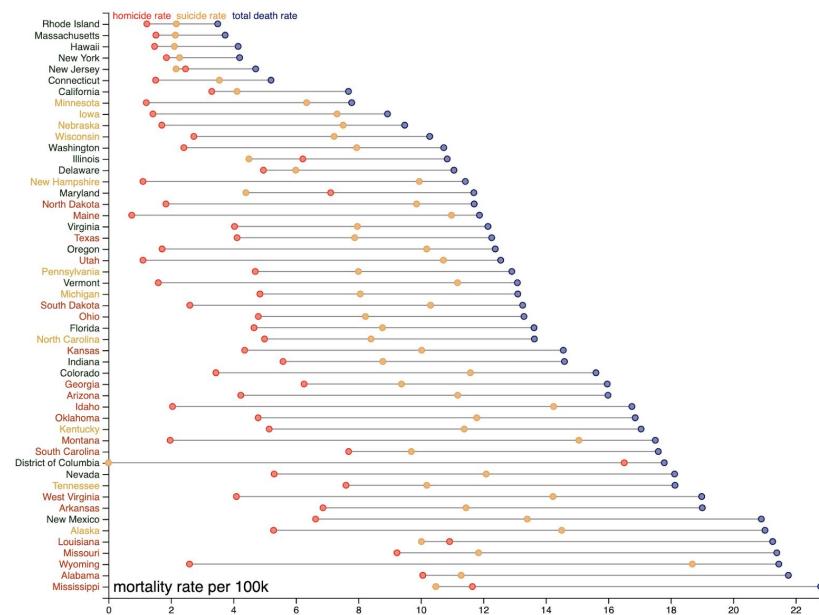


[4] Several loopholes, gaps and mistakes in the system have been exploited.

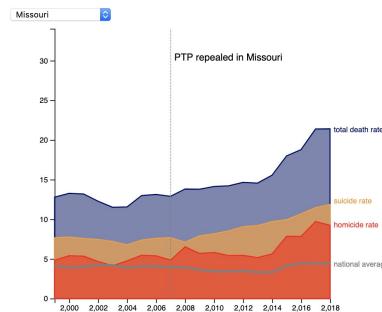
High-volume, high-frequency purchasers are not flagged. Las Vegas Strip massacre 58 killed, 546 injured	Records from terrorism and "no fly" watch lists are not included in the background check. Orlando nightclub massacre 49 killed, 53 injured	Gun owners are not prohibited from lending their weapons to others. Sandy Hook Elementary massacre 27 killed, 2 injured
Crimes prosecuted within the military and dishonorable discharges are often not entered into any database. Texas First Baptist Church massacre 26 killed, 20 injured	Schools are not required to report students who are expelled or otherwise punished for reasons related to violence. Marjory Stoneman Douglas High School shooting 17 killed, 17 injured	Background checks are not required for private sales or transfers of ownership. San Bernardino mass shooting 14 killed, 21 injured
Purchases can proceed if the background check's result isn't determined within 3 days. Charleston Church shooting 9 killed, 1 injured	Law enforcement may not always confiscate weapons that are required to be surrendered. Harry Pratt Co. warehouse shooting 5 killed, 6 injured	Past restraining orders, depending on the state, do not affect the results of a background check. Mercy Hospital shooting 3 killed, 0 injured

[5] States that passed red flag laws had the lowest firearm mortality rates in 2018; states that have no plan to implement red flag laws had the highest mortality rates.

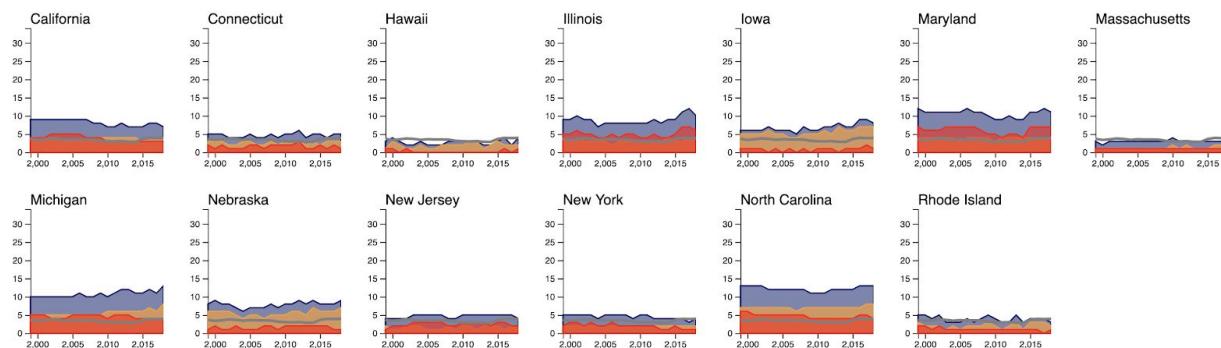
2018 firearm mortality rate by state and red flag law status (passed, proposed or no proposal)



[6] Some states require permits in order to purchase a gun, colloquially known as PTP laws. Missouri saw a definite increase in gun homicides and suicides after repealing its PTP law in 2007.



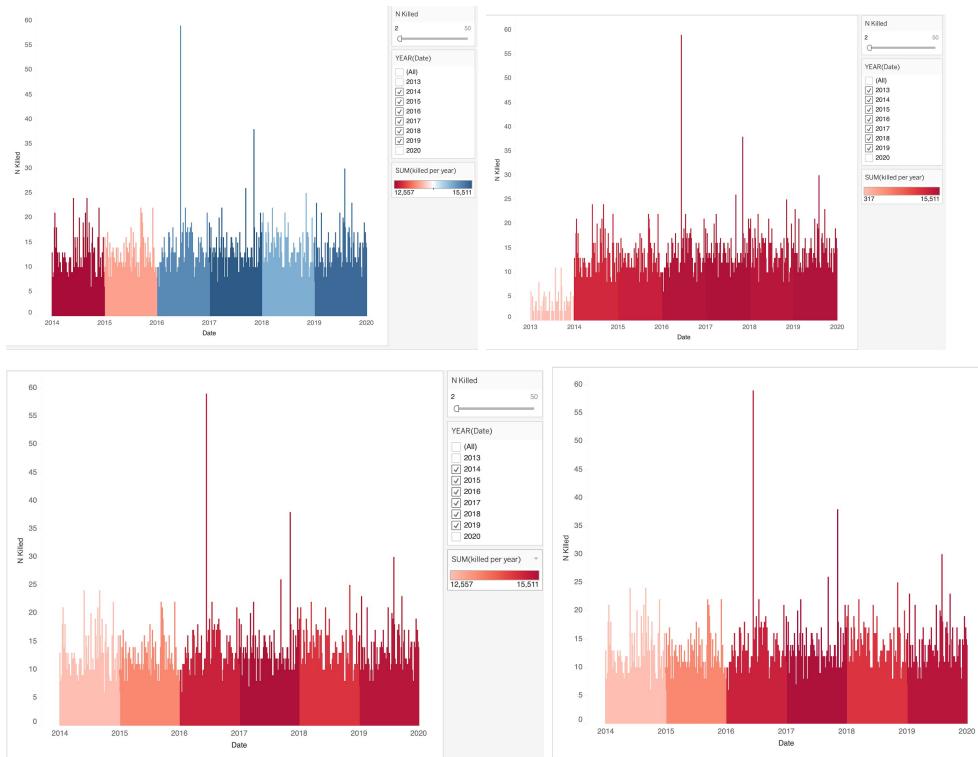
a. Meanwhile, states that have had PTP laws for several decades have consistently had homicide rates below the national average.



EDA + Viz Prototypes

Charting daily gun deaths (data=Gun Violence Archive):

Prototyping in Tableau:



Restrict to homicides in which 2 or more individuals were killed,

1/1/14-12/31/19.

(mass = dataset of shooting events in which > 2 people were killed;

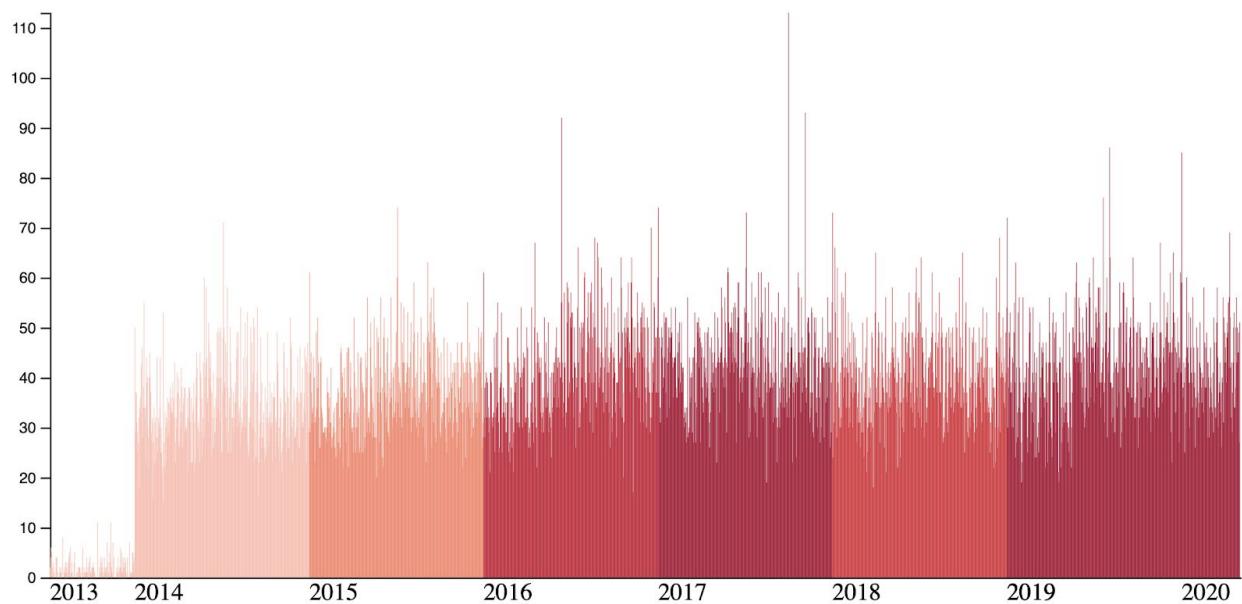
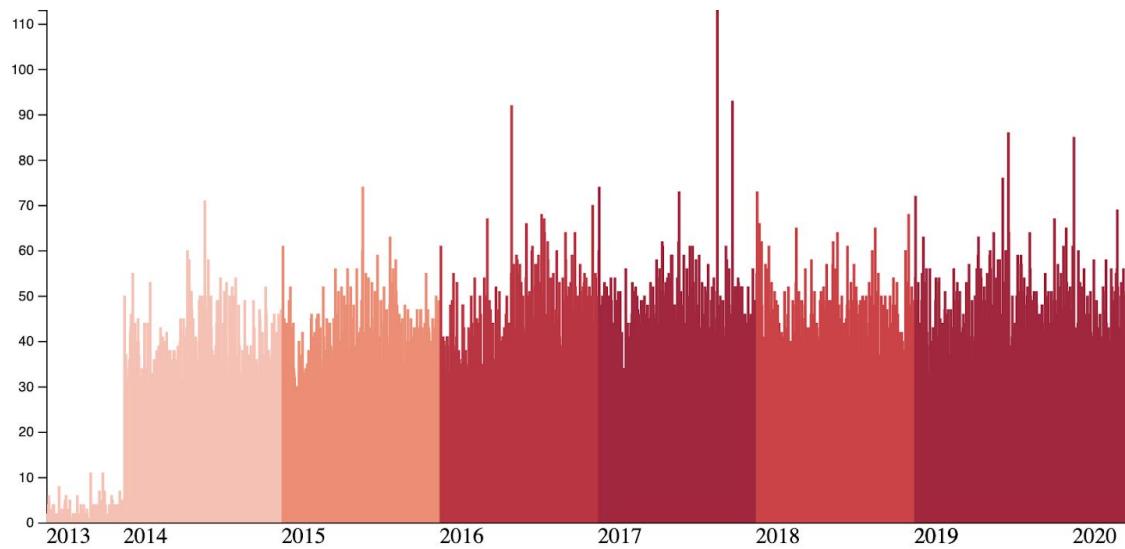
filtered = dataset of shooting events in which > 0 people were killed)

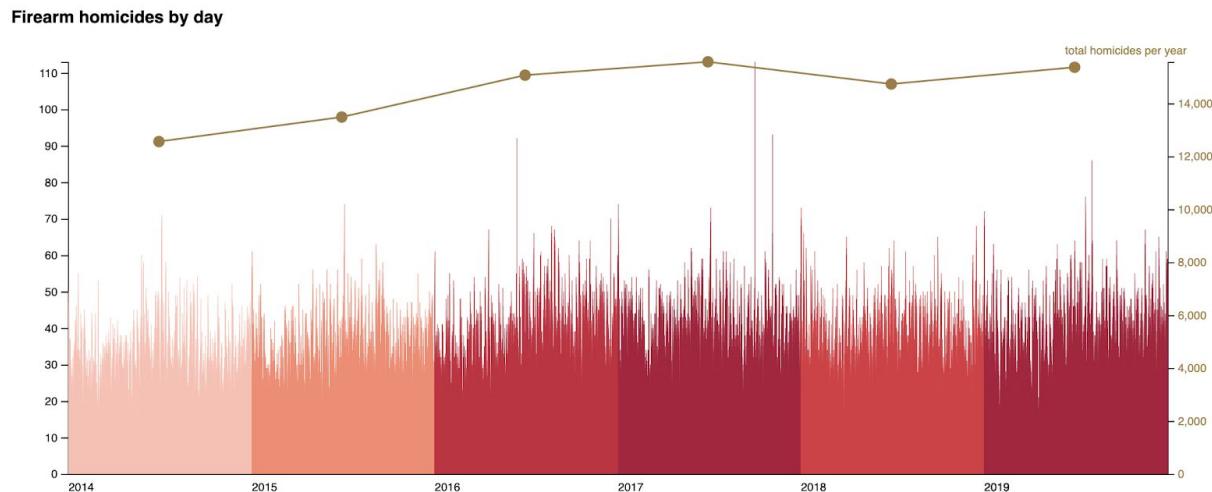
```
In [11]: mass.groupby('year').sum()
Out[11]:
   n_killed  n_injured  prev_n_killed
year
2013      172        55          25
2014      548        84        5663
2015     630       123       6495
2016     630       151       7000
2017     730       583       8157
2018     642       117       7274
2019     660       187       7714
2020     214        16       2705
```



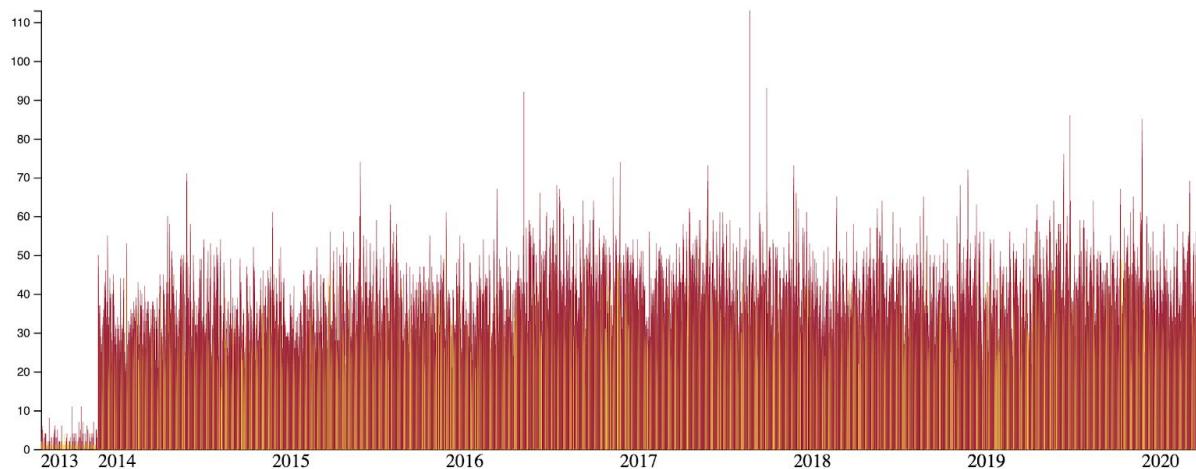
```
In [12]: filtered.groupby('year').sum()
Out[12]:
   n_killed  n_injured  prev_n_killed
year
2013      317       414          53
2014    12557      2440      178437
2015    15484      2912      204619
2016    15066      3072      257683
2017    15970      3626      271347
2018    14731      2899      242769
2019    15364      3267      268702
2020    5127      1041      89308
```

Prototyping in d3:

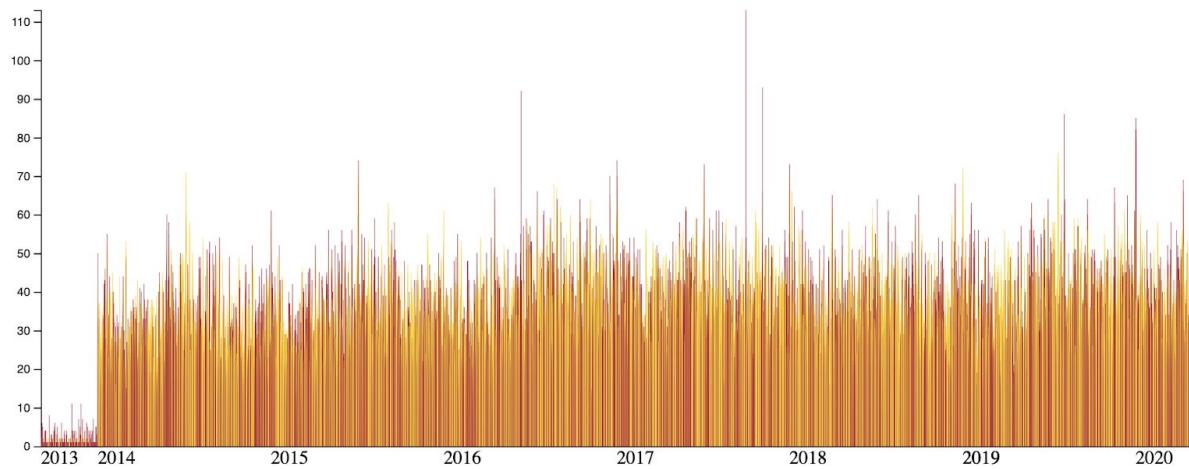




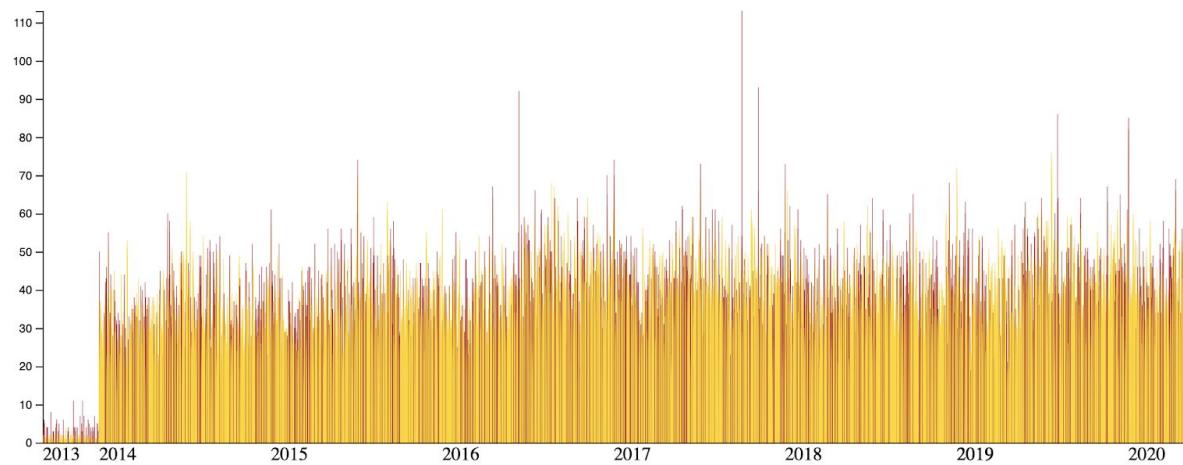
Firearm homicides have increased since 2014.



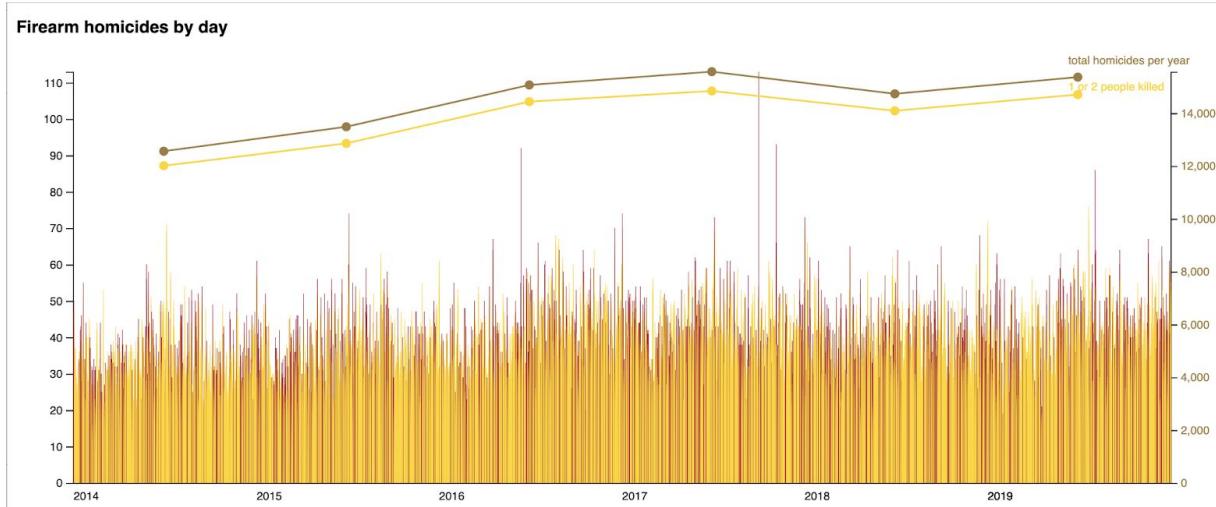
(above): gold represents shootings in which only 1 person was killed



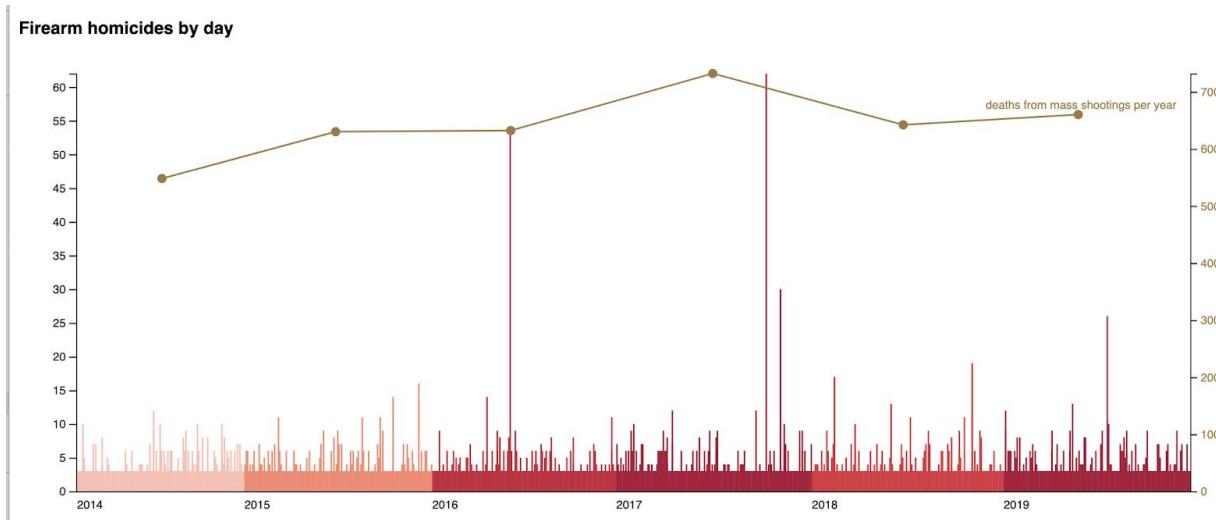
(above): gold represents shootings in which 2 people were killed



gold represents shootings in which 1 or 2 people were killed (the vast majority of daily gun homicides)



Shootings in which 1 or 2 people were killed account for the vast majority of gun homicides in the U.S.



(above): Deaths from shootings in which 3 or more people were killed

Add dashed lines btwn killed per year and dots? Or percent increase? Dual axis.

Add mass shootings

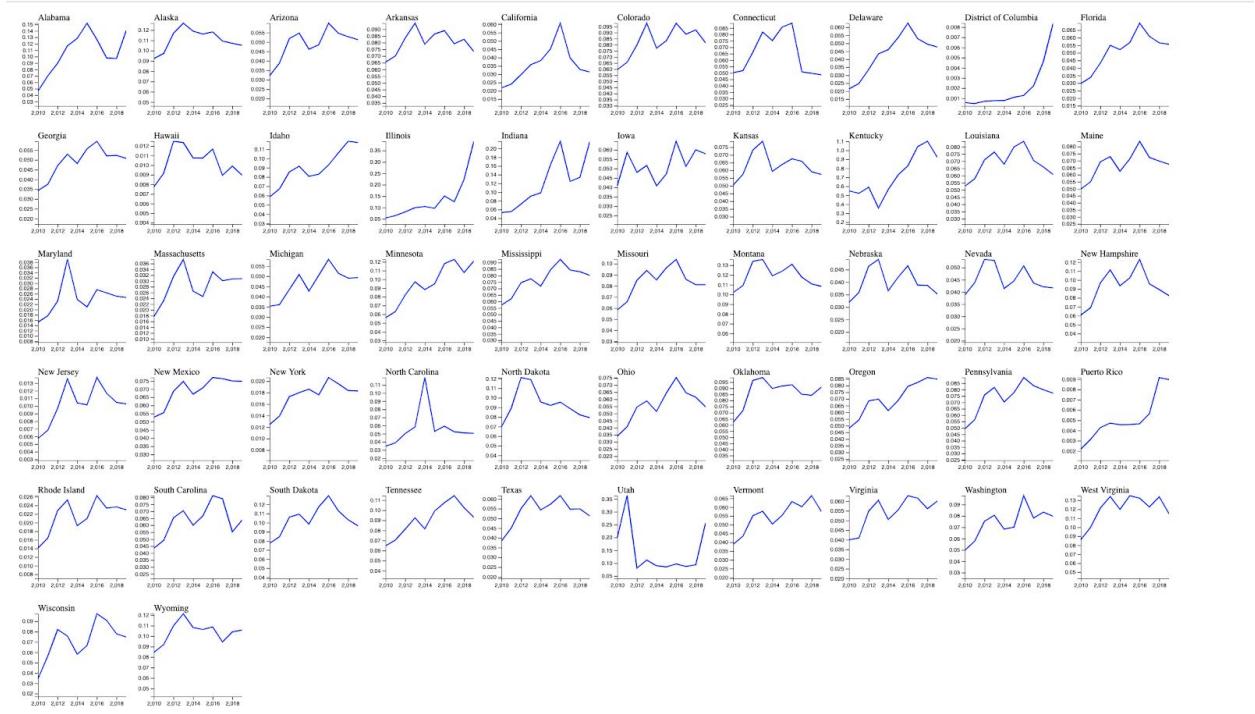
Initially used nested summed data for each day; add prev_val attribute to data so you can use individual instead of nest, and have individual tooltips.

<https://pudding.cool/2019/10/prosecutors/>

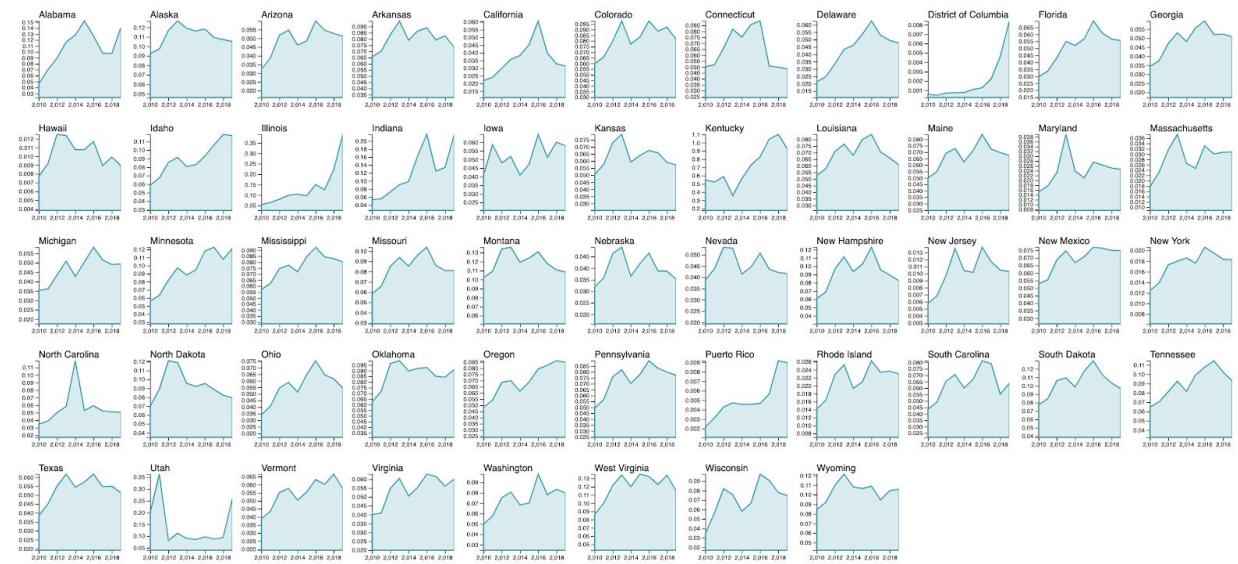
Highlight using size and color, not opacity.... (bars are too close to one another)

≥ 3

Background checks (data = NICS, census):

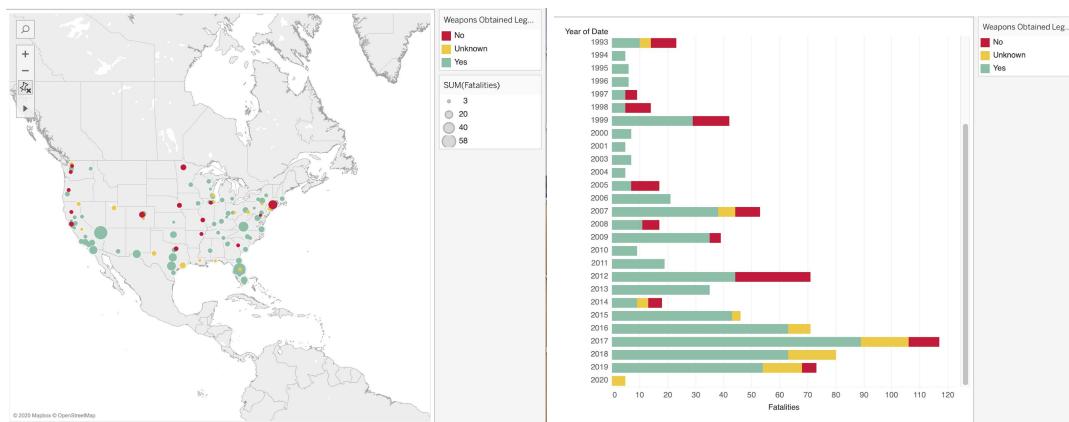


National Instant Criminal Background Check System (NICS) queries normalized by population for each state (2010-19)

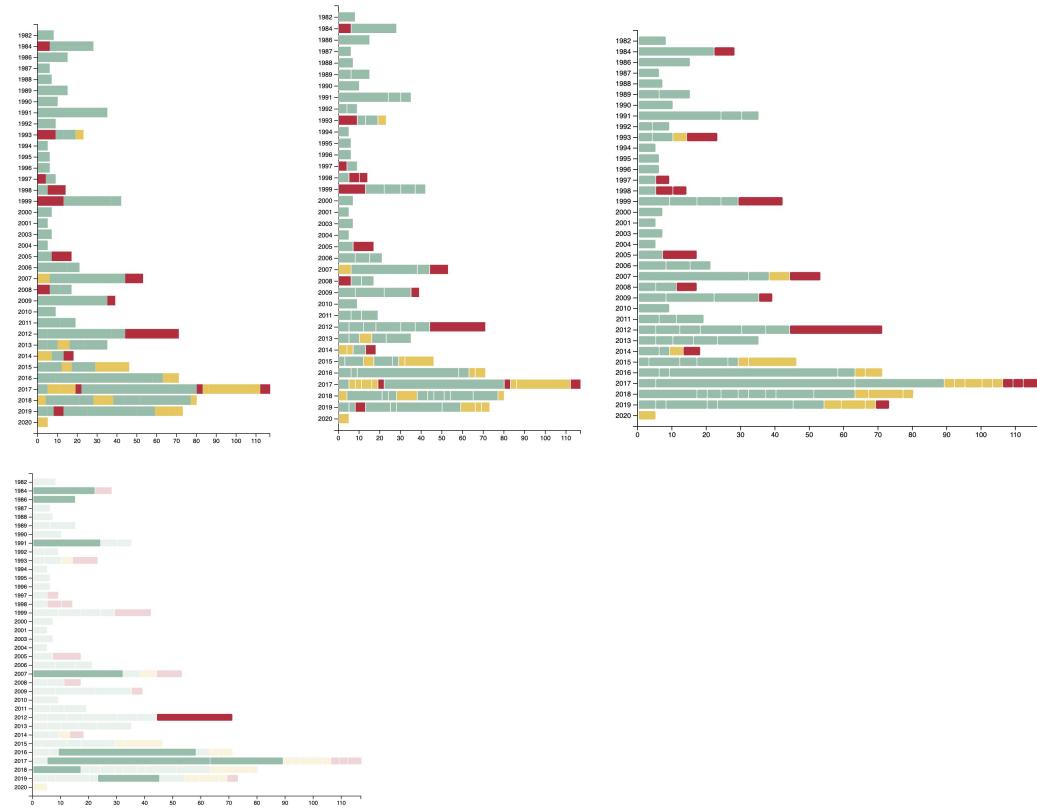


NICS queries normalized by population
Add trend lines? Percent change?

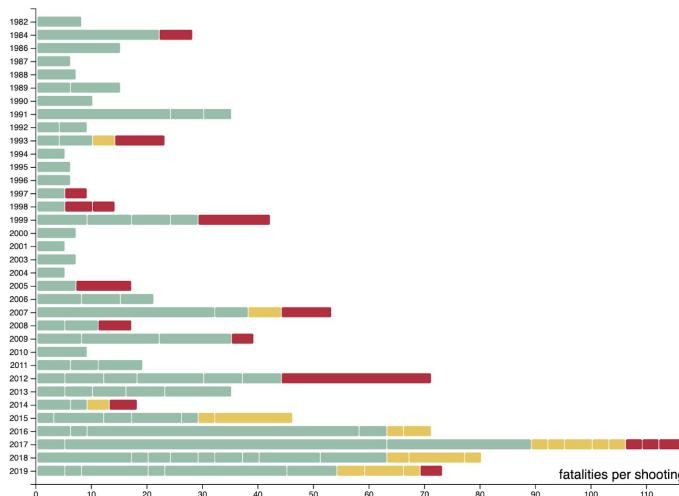
Charting the legality of firearms used in mass shootings (data = Mother Jones):



Prototyping in d3:



Legally purchased, illegally purchased, or unknown weapons used in mass shootings



Legally obtained firearms were used in 9/10 of the deadliest mass shootings since 1982

Notable loopholes, lapses and failures of the background check system:

High-volume, high-frequency purchasers are not flagged.
Las Vegas Strip massacre
58 killed, 546 injured



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Sandy Hook Elementary massacre
27 killed, 21 injured

Crimes prosecuted within the military and dishonorable discharges are often not entered into any database.

Texas First Baptist Church massacre
26 killed, 20 injured

Crimes prosecuted within the military and dishonorable discharges are often not entered into any database.

Sandy Hook Elementary massacre
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Schools are not required to report students who are expelled or otherwise punished for reasons related to violence to the authorities.

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Schools are not required to report students who are expelled or otherwise punished for reasons related to violence to the authorities.

Sandy Hook Elementary massacre
27 killed, 21 injured

Past restraining orders, depending on the state, do not affect purchases from terrorist and "no fly" watch lists are not included in the background check.

Mary's Hospital shooting
3 killed, 0 injured

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High-volume, high-frequency purchasers are not flagged.
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Records from terrorism and "no fly" watch lists are not included in the background check.

Orlando nightclub massacre
49 killed, 50 injured

Records from terrorism and "no fly" watch lists are not included in the background check.

High-volume, high-frequency purchasers are not flagged.
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Texas First Baptist Church massacre
26 killed, 20 injured

Purchases can proceed if the background check's result is not determined within 3 days.

Charleston Church shooting
9 killed, 0 injured

Purchases can proceed if the background check's result is not determined within 3 days.

Purchases can proceed if the background check's result is not determined within 3 days.

Charleston Church shooting
9 killed, 0 injured

Law enforcement may not always confiscate weapons that are required to be surrendered.

Henry Pratt Co. warehouse shooting
9 killed, 0 injured

Law enforcement may not always confiscate weapons that are required to be surrendered.

Law enforcement may not always confiscate weapons that are required to be surrendered.

Henry Pratt Co. warehouse shooting
9 killed, 0 injured

Past restraining orders, depending on the state, do not affect the results of a background check.

Merry Hospital shooting
3 killed, 0 injured

Past restraining orders, depending on the state, do not affect the results of a background check.

Past restraining orders, depending on the state, do not affect the results of a background check.

Merry Hospital shooting
3 killed, 0 injured

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Sandy Hook Elementary massacre
27 killed, 21 injured

Crimes prosecuted within the military and dishonorable discharges are often not entered into any database.

San Bernardino mass shooting
14 killed, 0 injured

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San Bernardino mass shooting
14 killed, 0 injured

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Change order. Add transparency. Change font size + coloring.

Past restraining orders, depending on the state, do not affect the results of a background check.
Chicago Mercy Hospital shooting
4 killed in 2018

<https://chicago.suntimes.com/2018/11/20/18479467/hospital-shooter-s-history-of-threats-no-legal-hurdle-to-owning-gun>

In 2014, Juan Lopez' then-wife was granted a restraining order against him for threats, but it was dismissed for want of prosecution. Only those convicted of domestic violence against a spouse, or under a permanent restraining order, are prohibited from owning guns under federal law; the law does not apply to those convicted of harming an unmarried partner.

Purchases can proceed if the background check's result isn't determined within 3 days.
Charleston church shooting
9 killed in 2015

Dylann Roof had been arrested on drug charges in March, but the background check examiner never saw the arrest report because the wrong agency was listed in the state's criminal history records. Roof was able to complete the purchase after a three-day waiting period, despite having a disqualifying history.

Sources:

<https://www.fbi.gov/services/cjis/nics/about-nics>

Schools are not required to report students who are expelled or otherwise punished for reasons related to violence to the authorities.

Marjory Stoneman Douglas High School shooting (Parkland, Florida)
17 killed in 2018

Nikolas Cruz was expelled after allegedly bringing knives to campus and reports that he made threats against other students. Before expulsion, the school banned Cruz from wearing a backpack on campus — school officials never explained why he was no longer attending.

https://safesupportivelearning.ed.gov/discipline-compendium/choose-state/results?field_sub_category_value=Grounds+for+possible+suspension+or+expulsion

https://www.washingtonpost.com/national/anti-gun-marches-planned-for-cities-throughout-the-u-s-world/2018/03/24/a7365514-2f59-11e8-b0b0-f706877db618_story.html

Records from terrorism and “no fly” watch lists are not included in the background check.

Orlando Pulse nightclub shooting

49 killed in 2016

<https://lawcenter.giffords.org/gun-laws/policy-areas/who-can-have-a-gun/terrorist-watchlist/>

High-volume and high-frequency purchasers are not flagged.

Las Vegas music festival shooting

58 killed in 2017

Stephen Paddock purchased 33 weapons between October 2016 and September 2017. His complete arsenal included 12 AR-15 rifles equipped with bump stocks and 100-round magazines, eight AR-10 rifles and a revolver, among other weapons. Federal authorities are only alerted of a multiple sale if it occurs in one purchase.

<https://apnews.com/13330a8ee80743aebbea492eddd0d9a4/Mass-shooters-use-loopholes,-lapses-in-checks-to-get-guns>

<https://abcnews.go.com/US/las-vegas-shooter-preparing-siege-authorities-sources/story?id=50416137>

Crimes prosecuted within the military and dishonorable discharges are often not entered into any database.

Sutherland Springs church shooting

26 killed in 2017

David Kelley pleaded guilty to charges of assault on his wife and stepson, and was dismissed from the Air Force on a bad conduct discharge. Kelley was able to purchase four guns because the Air Force failed to input the court-martial convictions into FBI databases, though the military requires such information be shared. In the months following his attack, the military submitted more than 4,000 names to the system.

<https://www.cnn.com/2018/02/12/us/gun-background-check-backlog-military-dishonorable-discharge-invs/index.html>

Gun owners are not prohibited from lending their weapons to others.

Newtown school shooting

26 killed in 2012

At the time of the shooting, Adam Lanza was too young to purchase ammunition or to own or carry a handgun under Connecticut law. He had access to guns and ammunition through his mother, whom he fatally shot before driving to the school.

<https://www.law.cornell.edu/uscode/text/18/922>

<https://apnews.com/13330a8ee80743aebbea492eddd0d9a4/Mass-shooters-use-loopholes,-lapses-in-checks-to-get-guns>

http://usnews.nbcnews.com/_news/2012/12/14/15913678-gunmans-mother-owned-weapons-used-in-connecticut-school-massacre

Military service member mental health issues are not reported.

Washington Navy Yard shooting

12 killed in 2013

Aaron Alexis, a former reservist turned civilian contractor, passed state and federal background checks and legally purchased the pump-action shotgun used in the Washington Navy Yard shooting despite a history of violent outbursts and recent mental health treatment. Alexis was arrested for firing a gun in anger in Texas in 2004 and in Seattle in 2010 but was not prosecuted in either case. He was honorably discharged from the Navy in 2011 on at least eight occasions of misconduct.

https://www.washingtonpost.com/blogs/liveblog-live/liveblog/shooting-at-washington-navy-yard/?Post+generic=%3Ftid%3Dsm_twitter_washingtonpost#3e136c0b-c174-4b53-9ba4-cfc9d4a14733

Mmmm no :/

There are no background check or reporting requirements around private sales and transfers of ownership.

San Bernardino party shooting

14 killed in 2015

Prohibited persons do not always turn over weapons that are required to be surrendered.

Aurora, Illinois shooting

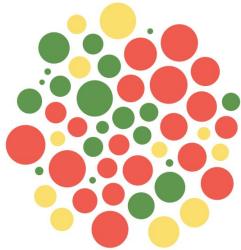
6 killed in 2019

Gary Martin initially passed the background check, though he was convicted for a felony aggravated assault and served two and a half years in prison in 1995. Upon discovering his prior conviction, Illinois State Police sent a written notice demanding that Martin surrender his weapon. He never did, and police never confiscated it.

<https://www.businessinsider.com/us-mass-shooters-exploited-gaps-errors-in-background-checks-2019-9>

<https://www.nytimes.com/interactive/2015/10/03/us/how-mass-shooters-got-their-guns.html>
<https://pudding.cool/2019/05/names-in-songs/>

Red Flag Laws (data = CDC):

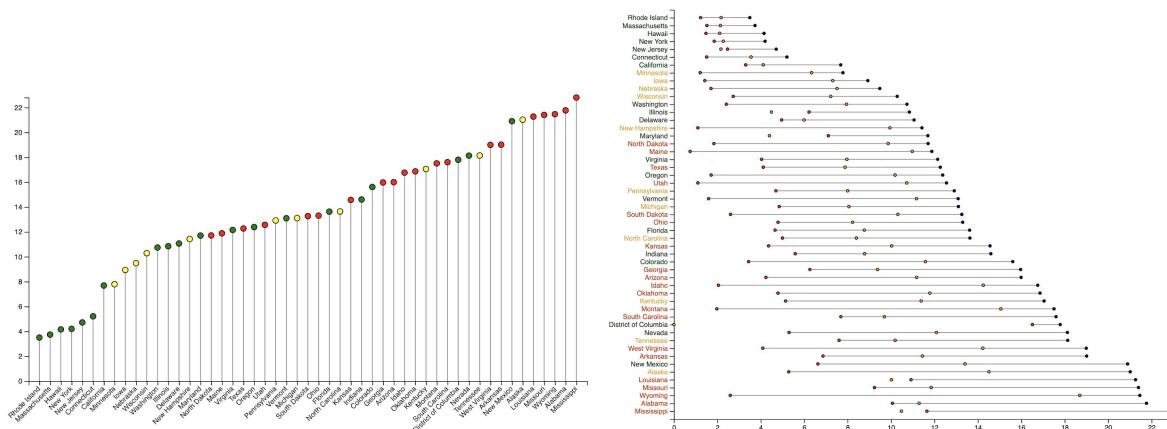


Green = passed red flag laws, yellow= proposed, red = no proposal;

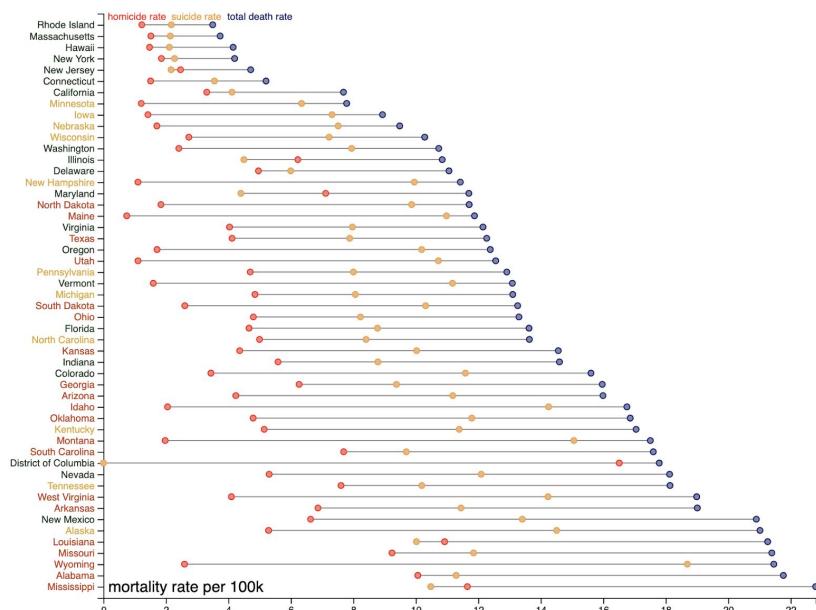
Radius = firearm homicides/100k people

I don't really like these charts, they kind of trigger trypophobia ://

Box plot? Violin plot?



2018 firearm mortality rate by state and red flag law status (passed, proposed or no proposal)

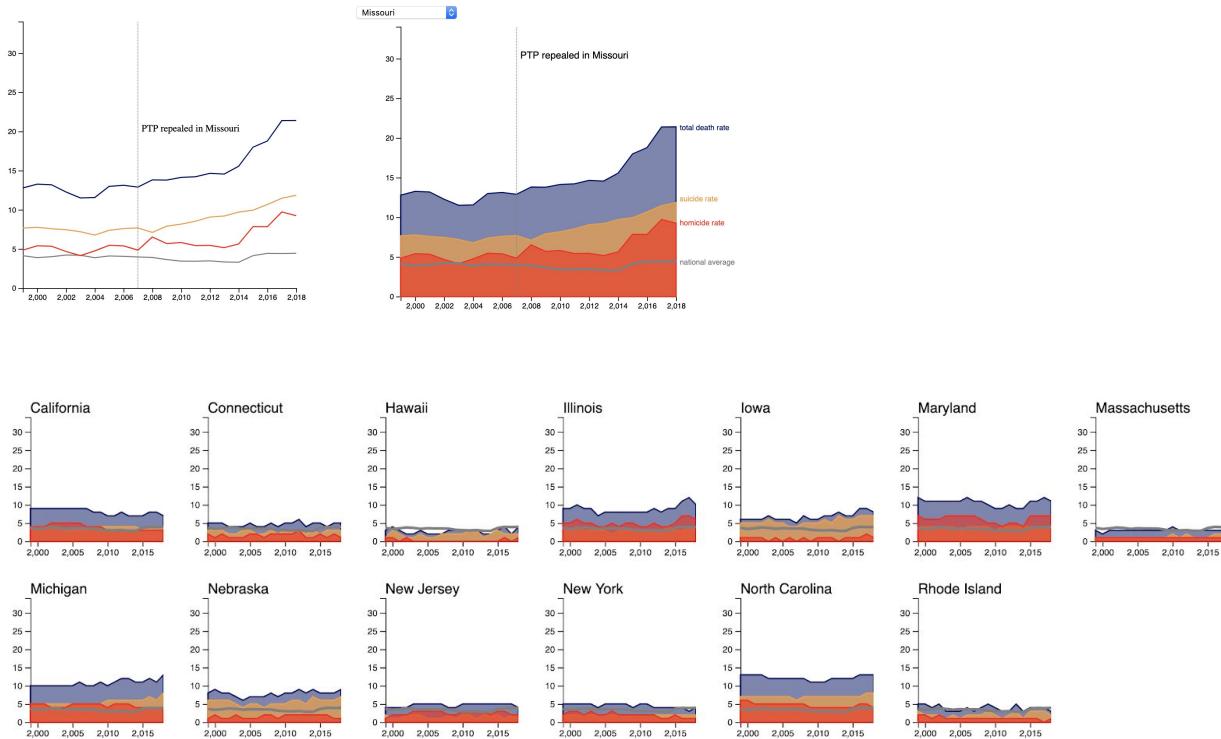


Extreme Risk Protection Orders, colloquially referred to as “Red Flag laws”

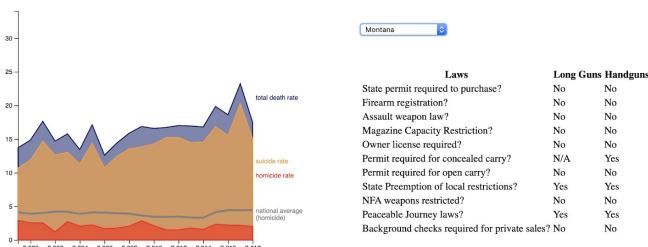
Slew of states passed red flag laws in the aftermath of the Parkland shooting, in which law enforcement failed to act after several friends and family members expressed concern about the shooter’s violent tendencies.

Long-term impact can really only be measured in Connecticut and Indiana

Permit to Purchase (data = CDC):



Most states that require a permit to purchase firearms consistently have lower homicide rates than the national average.



Indigo = total, orange = suicide, red = homicide, gray = U.S. average for homicide

To-dos:

Selection, change y axis

Create combined data of [licenses](#) and red flag laws

Scrape [this wikipedia article](#)

Small multiple of all states w/ PTP

Transition from area to line?

Other areas worth looking into:

Race and gun ownership:

- A lot of the United States' most sweeping gun control legislation was enacted in response to armed black activists during the Civil Rights Movement
 - Mulford Act
 - Gun Control Act of 1968
 - "Saturday Night Special" handgun bans
 - Poor citizens singled out in several state-level gun bans (Illinois, Virginia)
 - States begin to ban guns in capitol buildings after activists storm them in protest
 - Etc.
- Even today, black people are killed for legally possessing and open-carrying firearms (and in few, horrible cases, toys that look like guns).
- **Are gun control laws applied unevenly? Do they make it more difficult for people of color — who arguably are in most need of protection in this country — to arm themselves?**

History of legislation

- Universal background checks consistently have >90% favorability in public opinion polls
- Most proposed gun control legislation has similar majority favorability
- Yet even bipartisan efforts (see Graham-Blumenthal bill) end up stalling in Congress
- Republicans somewhat famously tried to repeal Obamacare more than 70 times during Obama's presidency — **why, even when democrats had a supermajority, are so few bills even introduced in Congress? Why does all reform happen at the state level, as opposed to the federal?**

History of firearm technology

- The AR-15 has been around since 1959, and remains the most popular firearm today, and is used in a majority of mass shootings
- Bump stocks were invented in 2002, and banned 16 years later by President Trump after the Las Vegas shooting
- In several states, handguns are more regulated than rifles
- **How does the type of gun used in mass shootings affect gun control legislation? Have advances in technology (ie. smart guns, bump stocks) curtailed or intensified gun violence?**

Comparison to global stage

- Several countries (NZ, Canada) are known for enacting strict gun control immediately following mass shootings
- Almost every country (other than Yemen and the U.S.) requires permits to purchase a gun

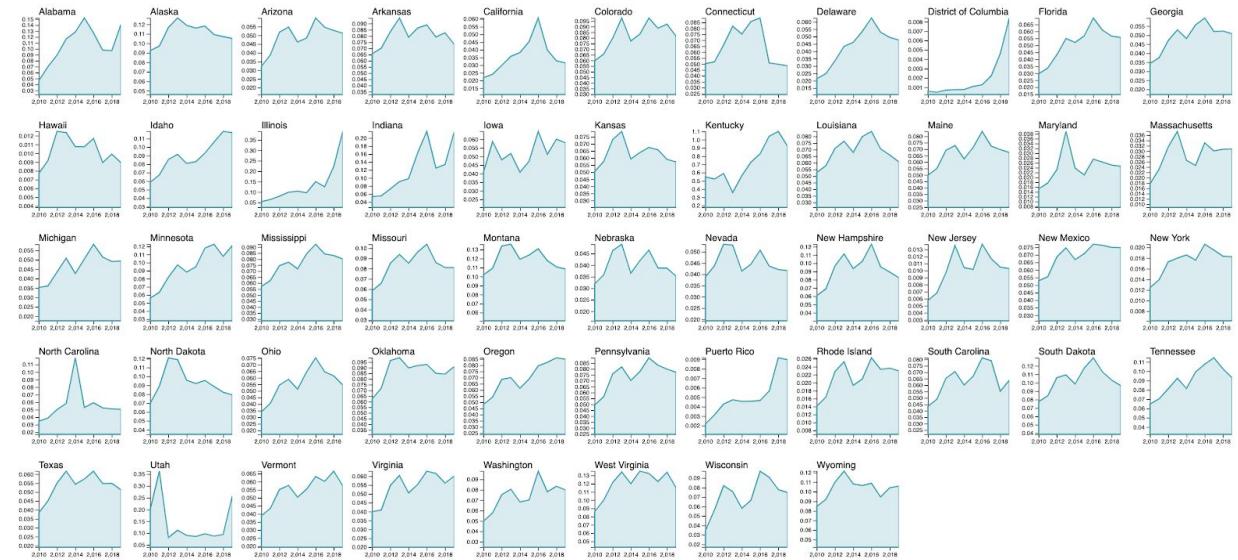
Age of buying guns

- Some states only let 21+ individuals purchase guns; in most states, the age is 18+
- Does this have a noticeable effect? What about in preventing school shootings?

Structure:

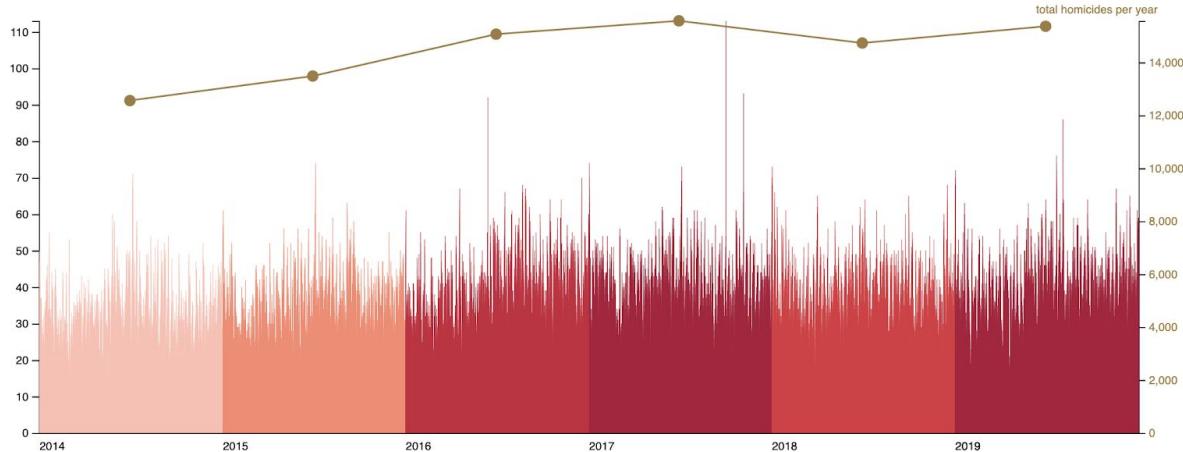
1. Federal background checks have increased in most states since 2010.

National Instant Criminal Background Check System (NICS) queries normalized by population for each state (2010-19)

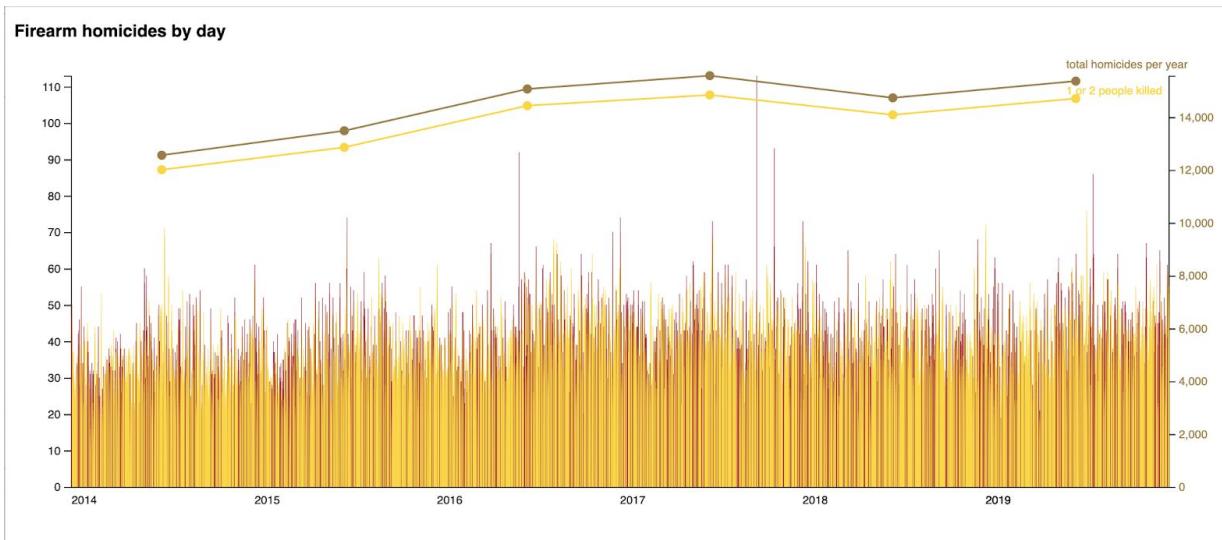


2. The number of firearm homicides per year has also increased since 2014.

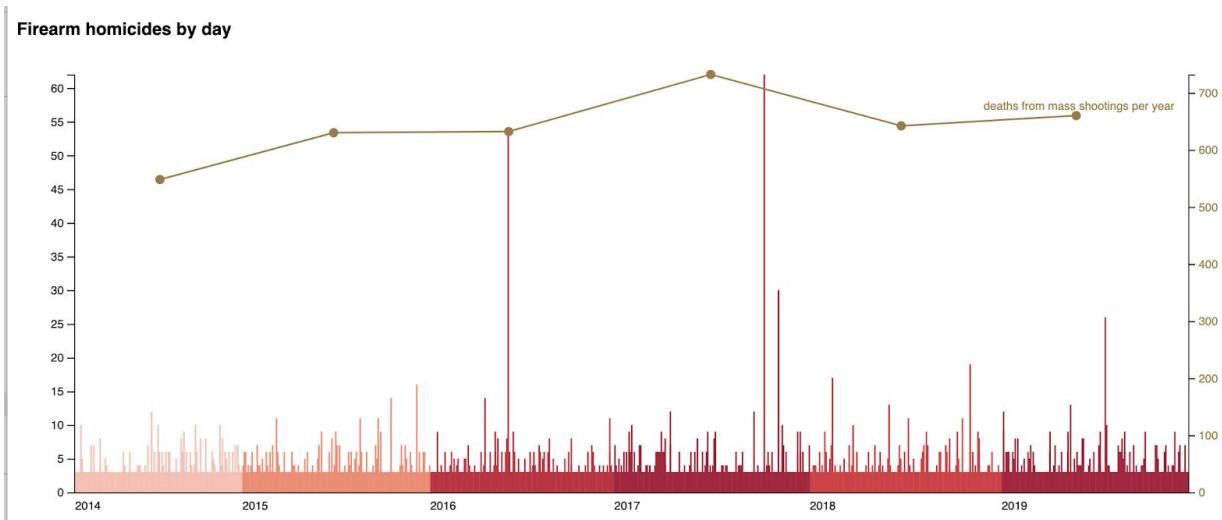
Firearm homicides by day



- a. Shootings in which 1 or 2 people were killed represent the vast majority of daily firearm homicides

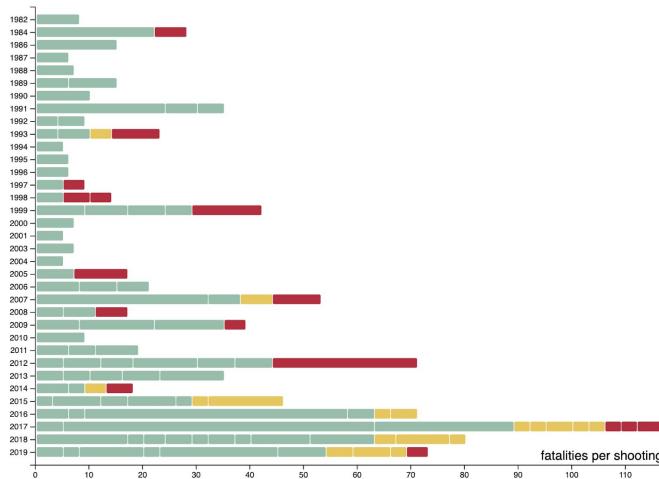


b. But the number of people killed in mass shootings per year has also increased.



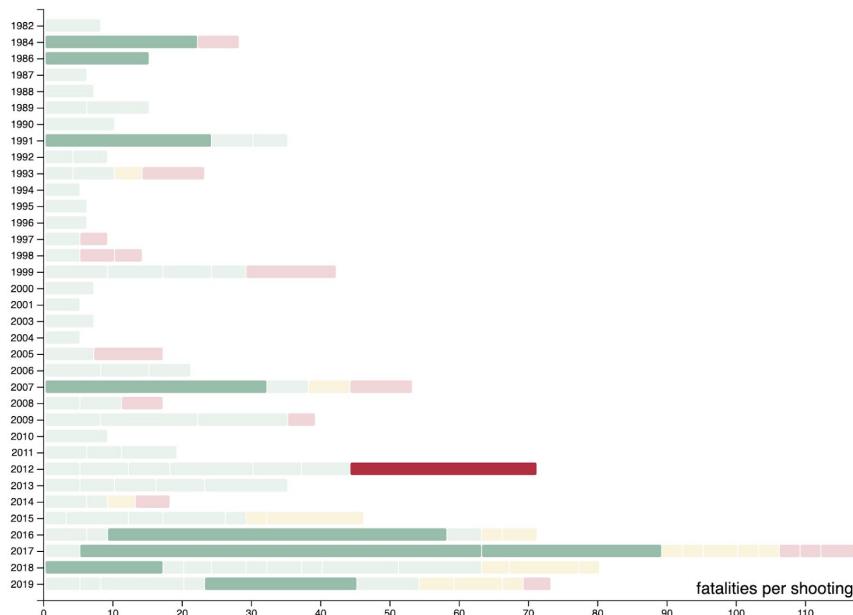
3. Most firearms used in mass shootings were legally obtained.

Legally purchased, illegally purchased, or unknown weapons used in mass shootings



- a. Legally obtained weapons were used in 9/10 of the deadliest mass shootings since 1982

Legally purchased, illegally purchased, or unknown weapons used in mass shootings

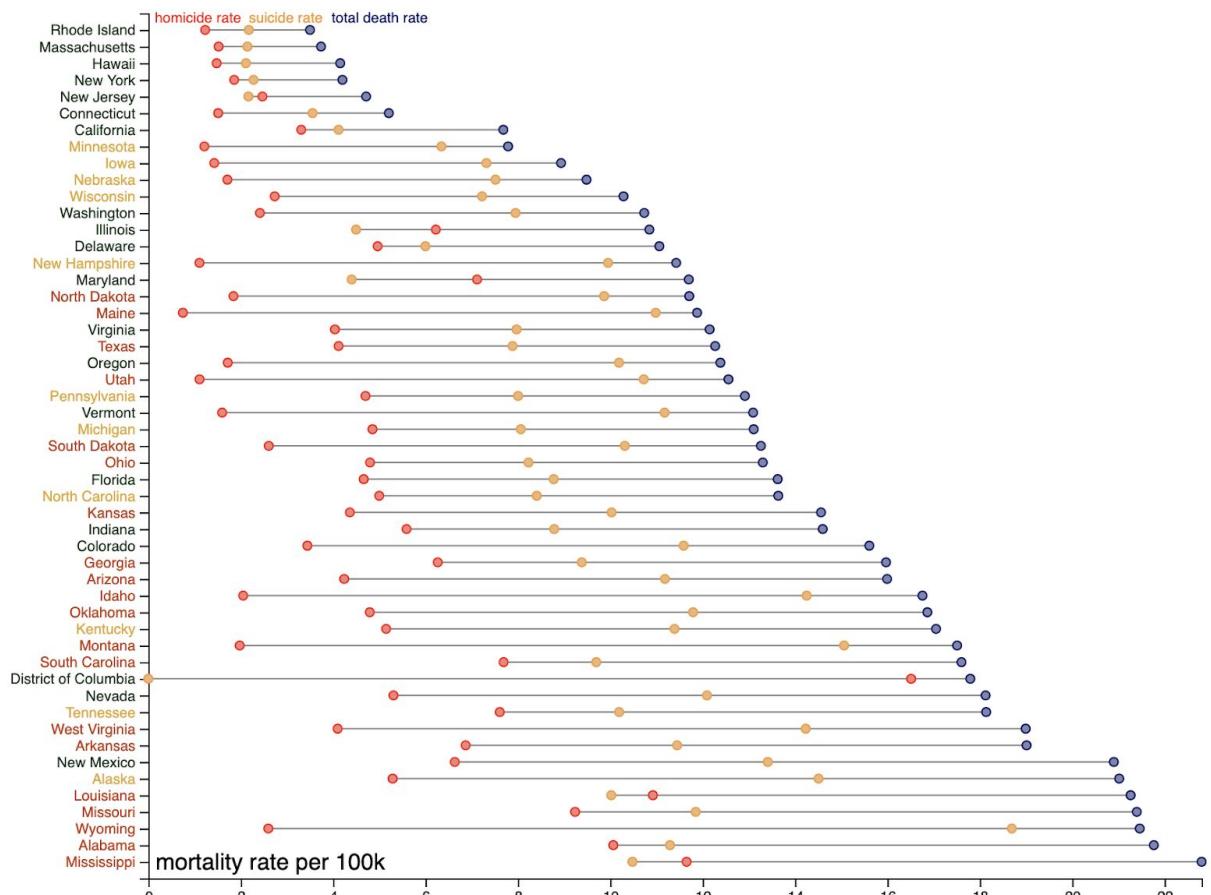


4. Mass shooters have taken advantage of notable loopholes, lapses and failures of the background check system in order to obtain weapons.

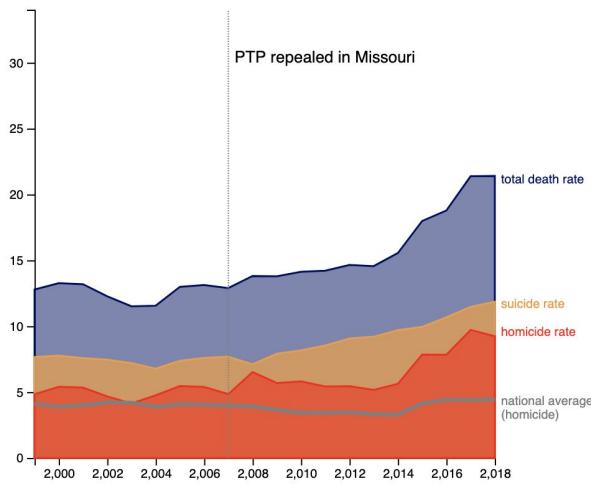
High-volume, high-frequency purchasers are not flagged. Las Vegas Strip massacre 58 killed, 546 injured	Records from terrorism and "no fly" watch lists are not included in the background check. Orlando nightclub massacre 49 killed, 53 injured	Gun owners are not prohibited from lending their weapons to others. Sandy Hook Elementary massacre 27 killed, 2 injured
Crimes prosecuted within the military and dishonorable discharges are often not entered into any database. Texas First Baptist Church massacre 26 killed, 20 injured	Schools are not required to report students who are expelled or otherwise punished for reasons related to violence. Marjory Stoneman Douglas High School shooting 17 killed, 17 injured	Background checks are not required for private sales or transfers of ownership. San Bernardino mass shooting 14 killed, 21 injured
Purchases can proceed if the background check's result isn't determined within 3 days. Charleston Church shooting 9 killed, 1 injured	Law enforcement may not always confiscate weapons that are required to be surrendered. Harry Pratt Co. warehouse shooting 5 killed, 6 injured	Past restraining orders, depending on the state, do not affect the results of a background check. Mercy Hospital shooting 3 killed, 0 injured

5. States that passed red flag laws had the lowest firearm mortality rates in 2018; the states with the highest mortality rates have no plan to implement red flag laws as of 2020.

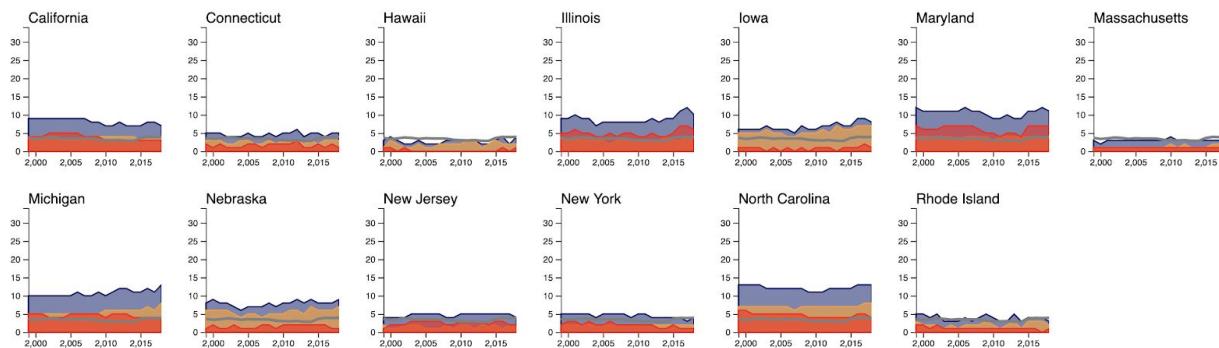
2018 firearm mortality rate by state and red flag law status (passed, proposed or no proposal)



6. Some states require permits in order to purchase a gun, colloquially known as PTP laws. Missouri saw a definite increase in gun homicides and suicides after repealing its PTP law in 2007.



- a. Meanwhile, states that have had PTP laws for several decades have consistently had homicide rates below or around the national average.



- b. The exception being DC.