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CENTER for
SUICIDE PREVENTION

Suicide Prevention: Addressing Firearm Access

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Objectives:

Review the epidemiology of firearm suicide

Illustrate the importance of lethal means access in suicide risk

Describe poloicies and practices to reduce firearm suicide

Disclosures: Funders include the AFSP, NIMH, CDC, NIDA, and James Wah Fund for Mood Disorders Research

Leading Causes of Death in US, by Age Group (averaged past several years)

Rank	10-14 years	15-19 years	20-29 years	30-39 years	40-49 years	50-59 years
1	Unintentional Injuries	Unintentional Injuries	Unintentional Injuries	Unintentional Injuries	Unintentional Injuries	Malignant Neoplasms
2	**Suicide**	**Suicide**	**Suicide**	**Suicide**	Malignant Neoplasms	Heart Disease
3	Malignant Neoplasms	Homicide	Homicide	Malignant Neoplasms	Heart Disease	Unintentional Injuries
4	Congenital Malformations	Malignant Neoplasms	Malignant Neoplasms	Heart Disease	**Suicide**	Liver Disease
5	Homicide	Heart Disease	Heart Disease	Homicide	Liver Disease	Chronic Lower Respiratory Ds
6	Heart Disease	Congenital Malformations	Diabetes Mellitus	Liver Disease	Diabetes Mellitus	Diabetes Mellitus
7	Chronic Lower Respiratory Ds	Chronic Lower Respiratory Ds	Congenital Malformations	Diabetes Mellitus	Cerebro-Vascular	**Suicide**
8	Cerebro-Vascular	Cerebro-Vascular	Complicated pregnancy	Cerebro-Vascular	Homicide	Cerebro-Vascular

2023:

- **49,300 Suicides**
- 19,252 Homicides

Suicide is the Overall **11th Leading Cause** of Death in US

9th leading cause in **Tennessee**

WISQAS (CDC)

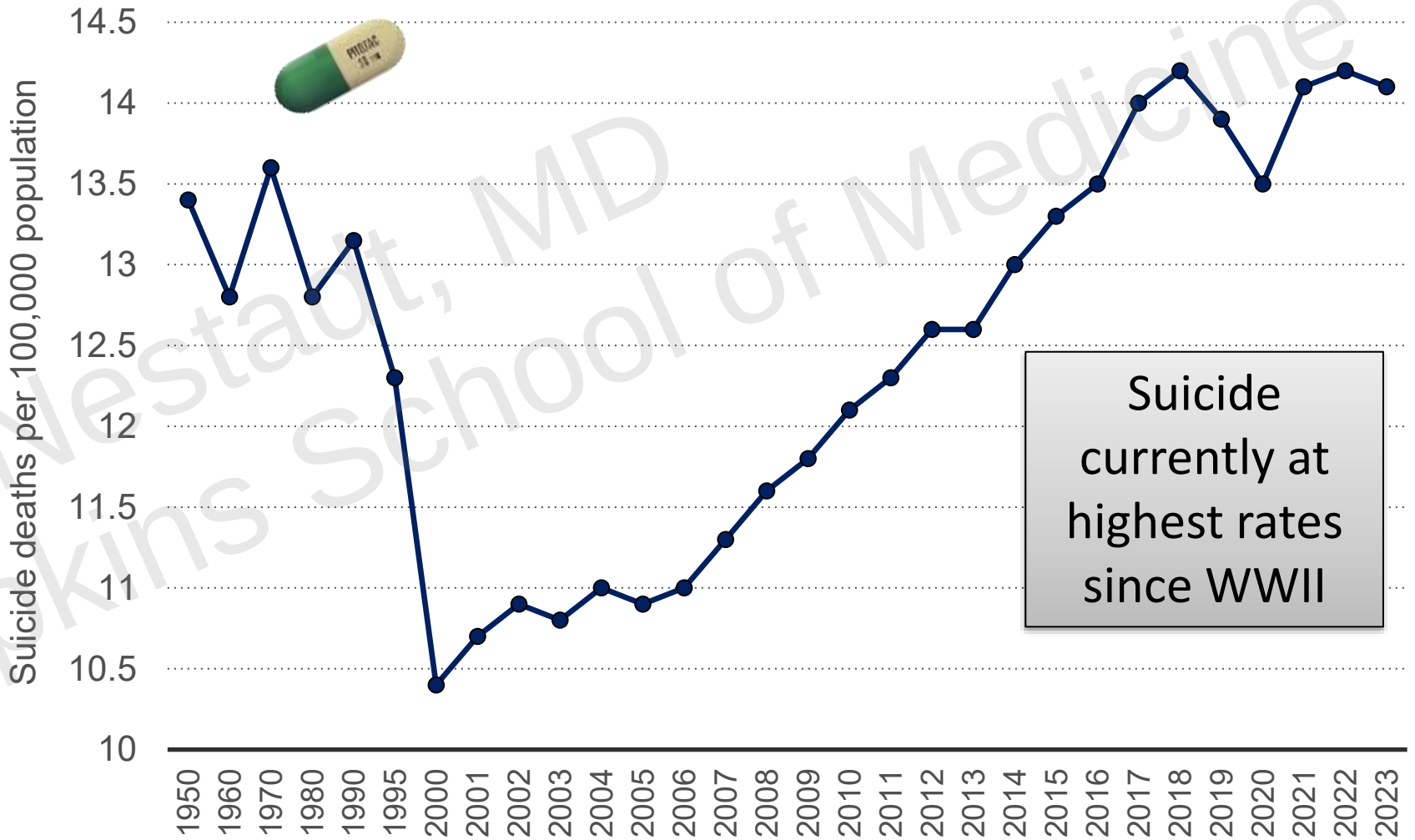
Suicide Deaths increasing for 20+ years

Annual US Suicide Rate (Age Adjusted):

14.1 per 100K (2023)

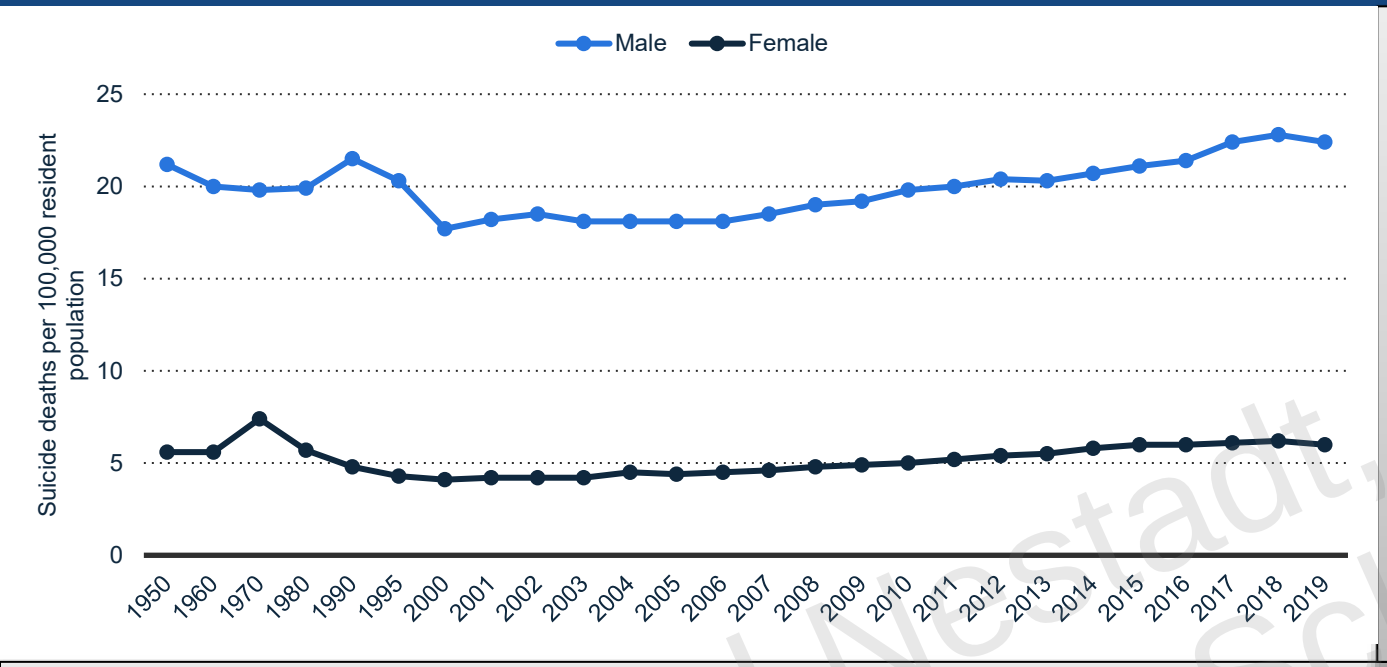
Tennessee Rate:
17.3 per 100K

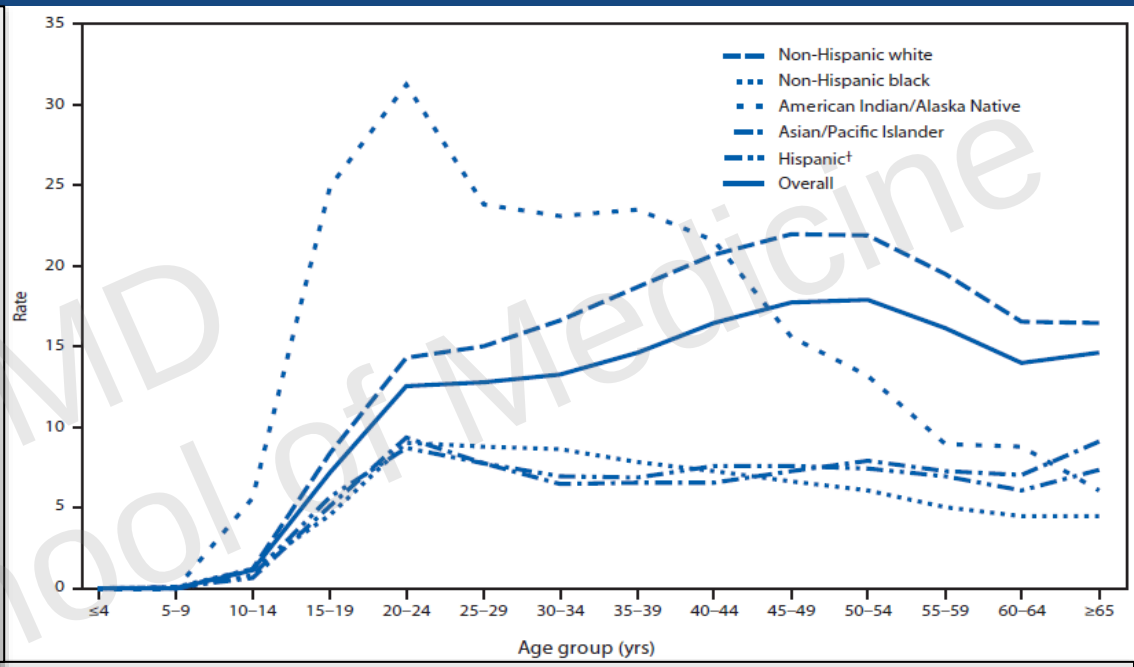
Rates have been **climbing** through most the 21st century

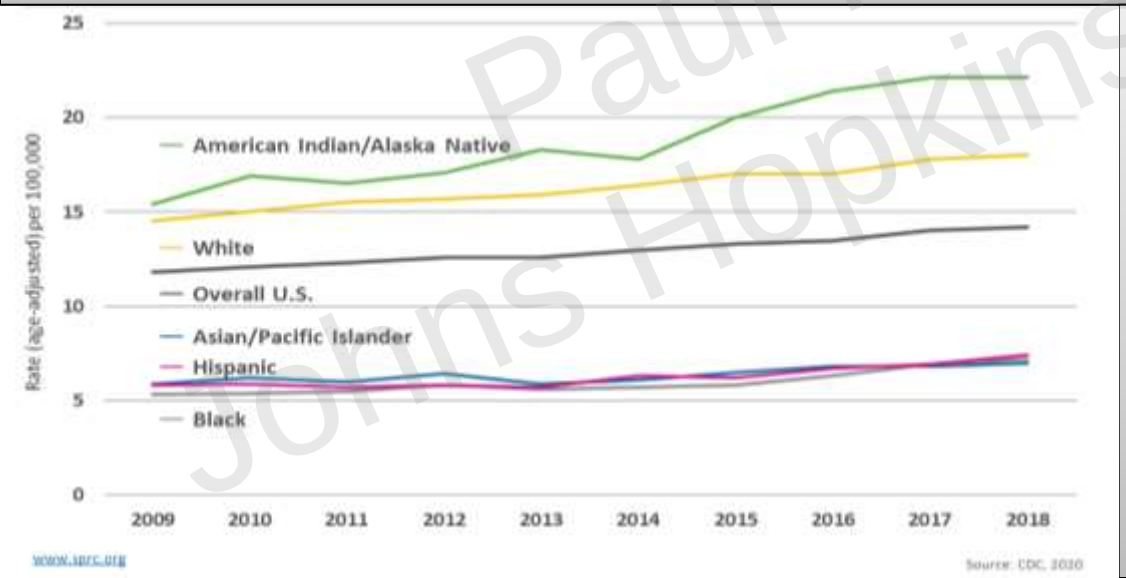


Source: US Department of Health and Human Services; CDC

Suicide in The United States

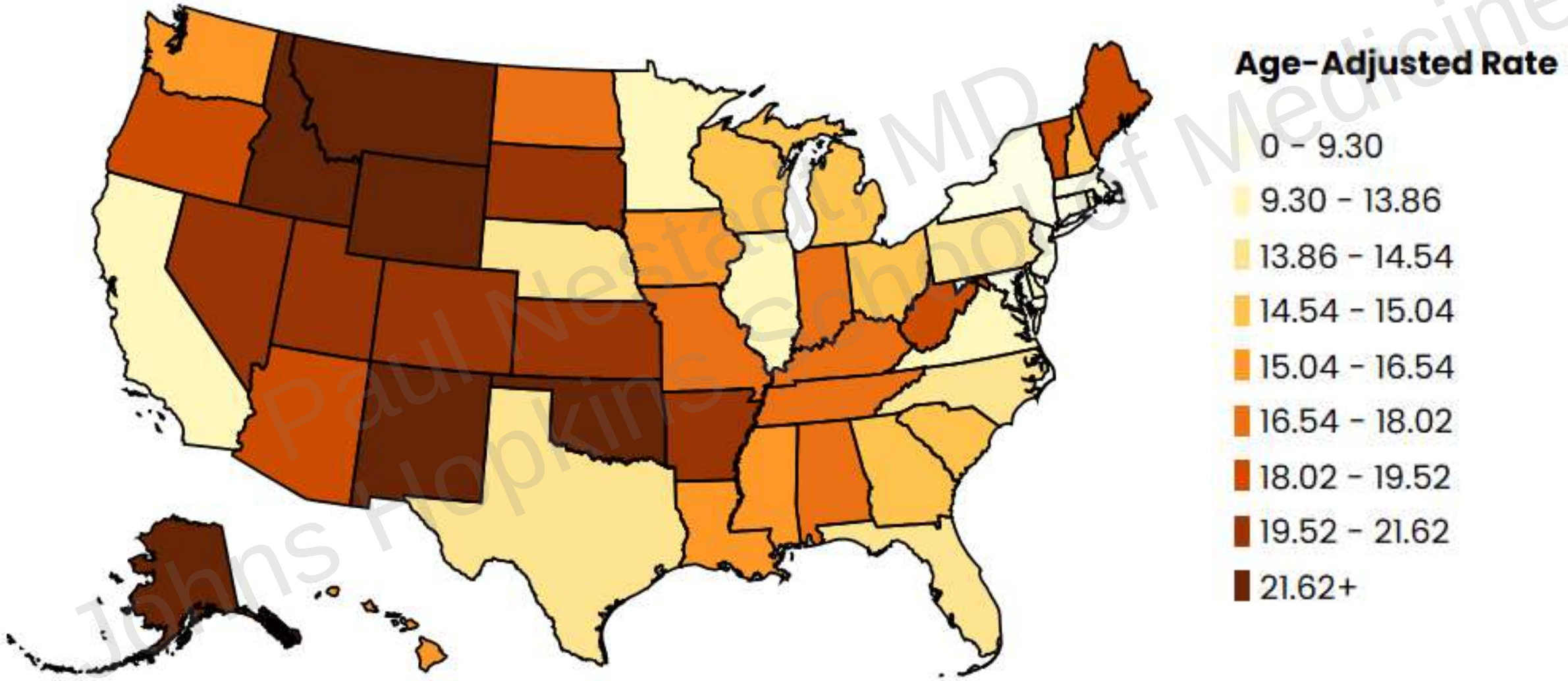




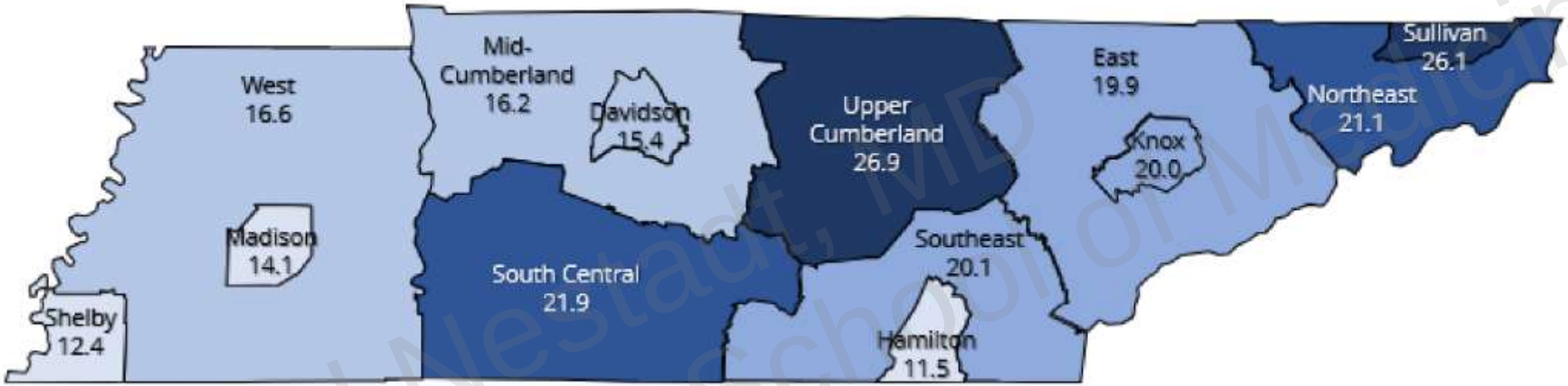


- Completed suicides are predominantly male (78%)
- Indigenous and White populations die at 2-3x rates of Black, Hispanic, or Asian populations
- Rate peaks around age 50 and ages 80+
  - African Americans & AI/AN peak suicide rate at age 20

Suicide rates by state -- 2023



Suicide rates by Tennessee Health Region



Suicide Rate
(per 100,000 Population)

- 10.0 - 14.9
- 15.0 - 16.7
- 16.8 - 20.4
- 20.6 - 22.0
- 22.1 - 27.0

Suicide Death Rates

	Number of Deaths by Suicide	Rate per 100,000 Population	State Rank
Tennessee	**1,279**	**17.31**	**21**
Nationally	49,316	14.12	

Source: AFSP and Bryan Barks- Southeast Regional Director at the Tennessee Suicide Prevention Network

Risk Factors for Self Harm & Suicide

Sociodemographic and educational factors

- Sex (female for self-harm and male for suicide)—most countries*
- Low socioeconomic status*
- Lesbian, gay, bisexual, or transgender sexual orientation
- Restricted educational achievement*

Individual negative life events and family adversity

- Parental separation or divorce*
- Parental death*
- Adverse childhood experiences*
- History of physical or sexual abuse
- Parental mental disorder*
- Family history of suicidal behaviour*
- Marital or family discord
- Bullying
- Interpersonal difficulties*

Psychiatric and psychological factors

- Mental disorder*, especially depression, anxiety, attention deficit hyperactivity disorder
- Drug and alcohol misuse*
- Impulsivity
- Low self-esteem
- Poor social problem-solving
- Perfectionism
- Hopelessness*

Hawton, 2012

All the factors in the panel have been shown to be related to self-harm. *Shown to be related to suicide.

Psychiatric Disorder as Risk Factor

- Most (**80-90%**) suicide decedents suffer mental illness as a predisposing or precipitating factor (Barraclough, 1974; Cavanaugh, 2003)
- Psychiatric illness greatly increases the likelihood of death by suicide
  - Annual US suicide rate ~14 per 100,000, or **lifetime chance of suicide = 1%**
  - Lifetime suicide risk if suffering from **mood or anxiety disorder = 5%** (2.2-15%)
  - Lifetime suicide risk if suffering from **schizophrenia= 10%** (9-13%)
  - Lifetime suicide risk if **substance dependent = 8-15%**

Predicted relative risks for suicide.

Disorder	Both	Males	Females
Major Depressive Disorder	7·64 [4·3, 13·58]	7·78 [4·34, 13·93]	7·51 [4·18, 13·51]
Dysthymia	4·11 [2·09, 8·09]	4·18 [2·12, 8·26]	4·04 [2·02, 8·06]
Anxiety Disorders	4·89 [2·76, 8·69]	4·98 [2·78, 8·91]	4·81 [2·68, 8·64]
Bipolar Disorder	6·05 [3·38, 10·83]	6·15 [3·4, 11·13]	5·94 [3·29, 10·75]
Schizophrenia	5·98 [3·33, 10·72]	6·09 [3·73, 10·98]	5·88 [3·24, 10·66]

Miller, 1991;
Meltzer, 1995;
Schneider, 2009;
Baldessarini, 2020;
Moitra, 2021

Suicide is a **Behavior**

A suicidal act emerges from a variety of environmental and personal factors

- Some chronic, some acute
- Some **fixed**, some **modifiable**

Many important factors are immutable

- Family history of suicide
- Male sex, white race
- Terminal illness, etc.

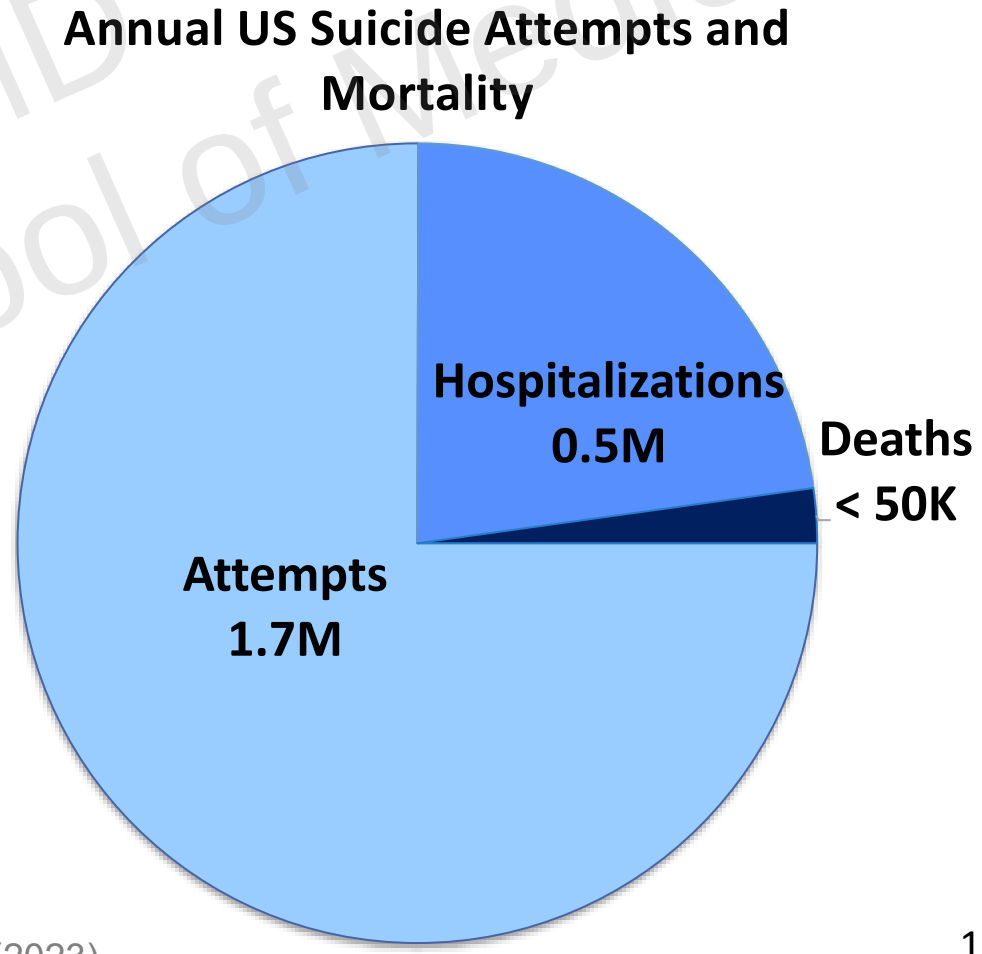
Other important factors can be addressed

- Social isolation, Poverty
- **Access to lethal means**
- **Mental Illness**
  - **Psychiatric disorders** are among the most **significant** modifiable risk factors

Suicide Attempts in the United States

Despite the suicide death rate being so high, its still **much smaller than the suicide attempt rate**

In Past Year:	High Schoolers	Adults
Seriously Considered	20%	5.0%
Made Plan	16%	1.4%
Attempted	9%	0.6%
Required Medical Attention	2%	---
Completed (2019)	0.011%	0.015%



Source: AFSP, CDC, and National Survey of Drug Use and Mental Health (2024), YRBS (2023)

With all of these attempts, how do so many survive?

- Notable sex differences:
  - **Females** have **2-3x** the suicide **attempt** rate
  - **Males** have **3-4x** the suicide **death** rate
  - **Why?**

- In general, suicide **attempts** have a relatively **low fatality rate**

- If a **firearm** is used in a suicide attempt, it will **usually be fatal**

- **Men tend to use guns**, as opposed to women who tend to overdose

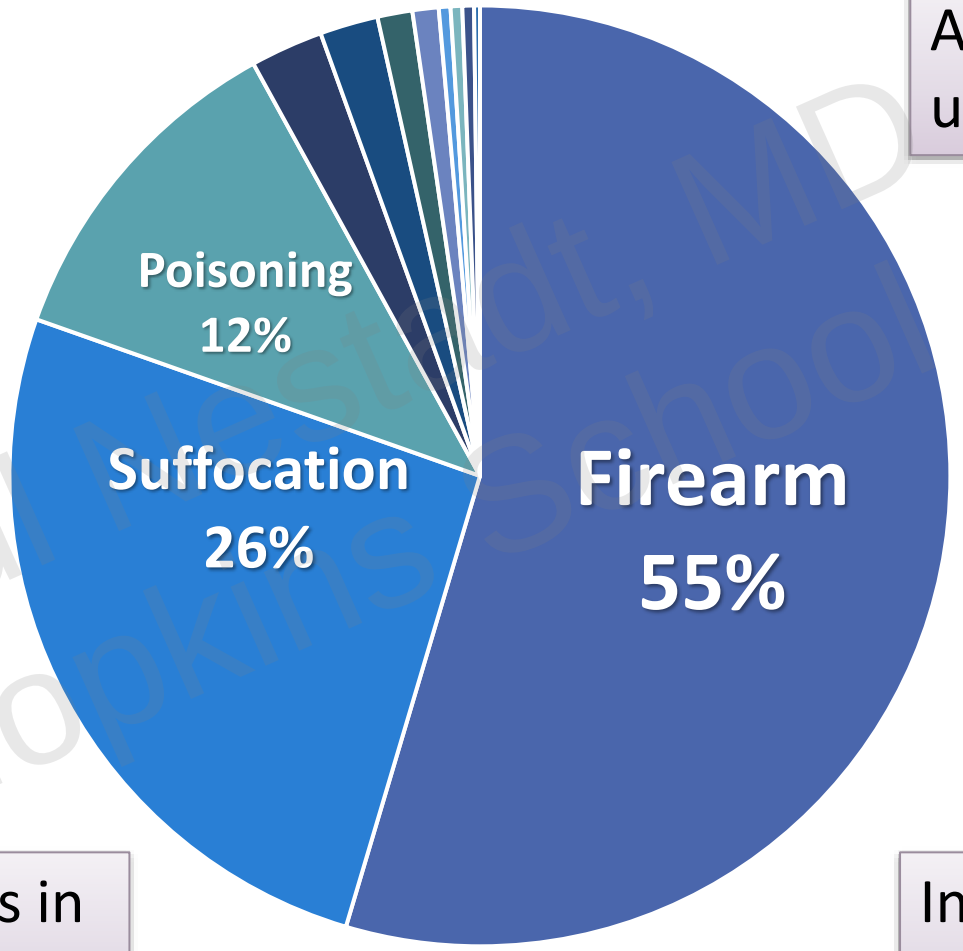
Method	Deaths	Attempts	% Fatal
Firearm	156,901	175,190	89.6%
Poisoning	43,868	2,366,014	1.9%
Gas	8,659	28,417	30.5%
Hanging	76,688	145,568	52.7%
Drowning	3,115	5,527	56.4%
Cutting	5,539	784,309	0.7%
Jump/ Crash	9,875	35,836	27.6%
Other	4,732	275,589	1.7%
Total	309,377	3,816,450	8.1%

Conner et al, 2019

Suicide Methods in The United States-- 2021

5-6% of suicide *attempts* use guns.

Those become half of all suicide *deaths*.



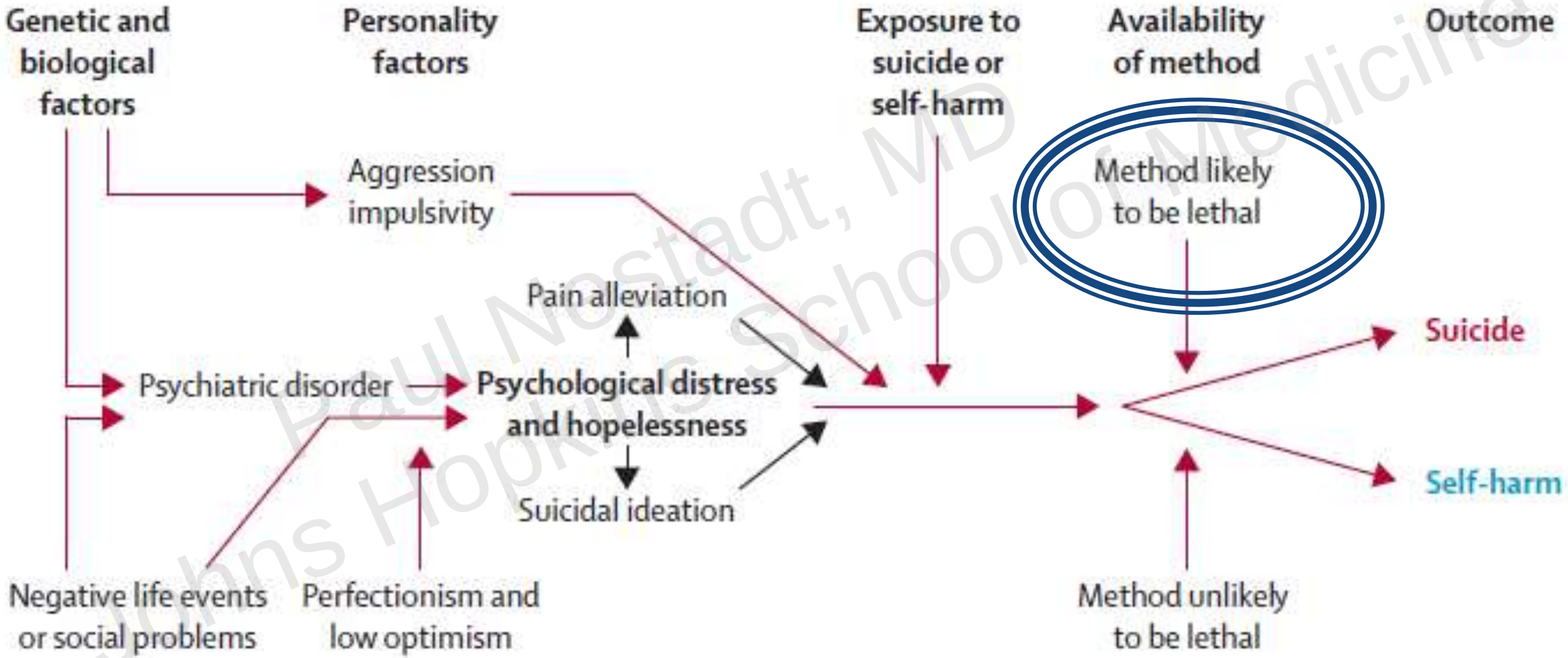
Among **Veterans**, firearms are used in 74% of suicide deaths

The **majority** of gun deaths in the US (and TN) are suicides

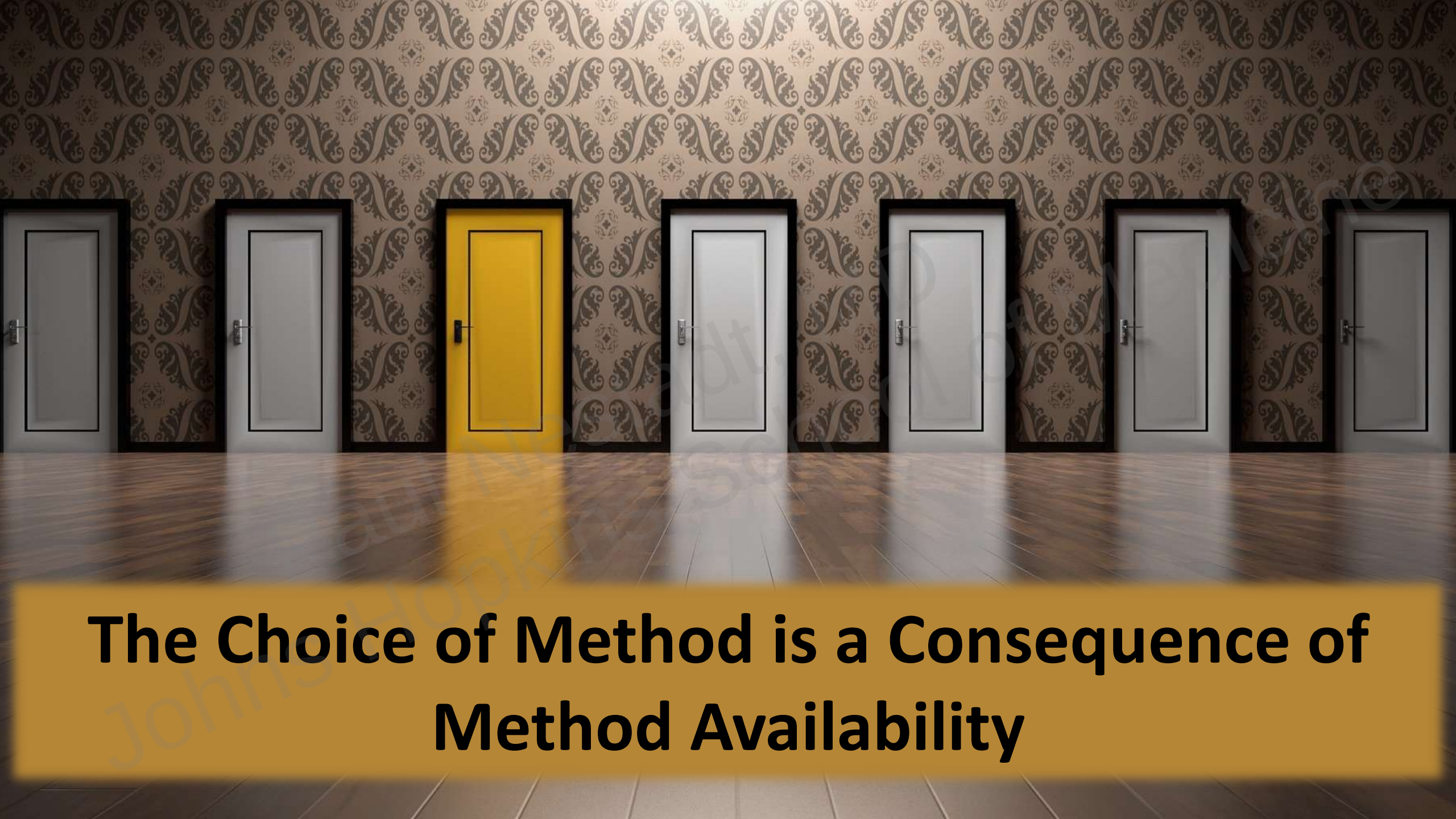
In **Tennessee**, firearms are used in 2/3rd of all suicide deaths

WISQAS (CDC)

Pathway and Key Risk Factors for Self Harm and Suicide



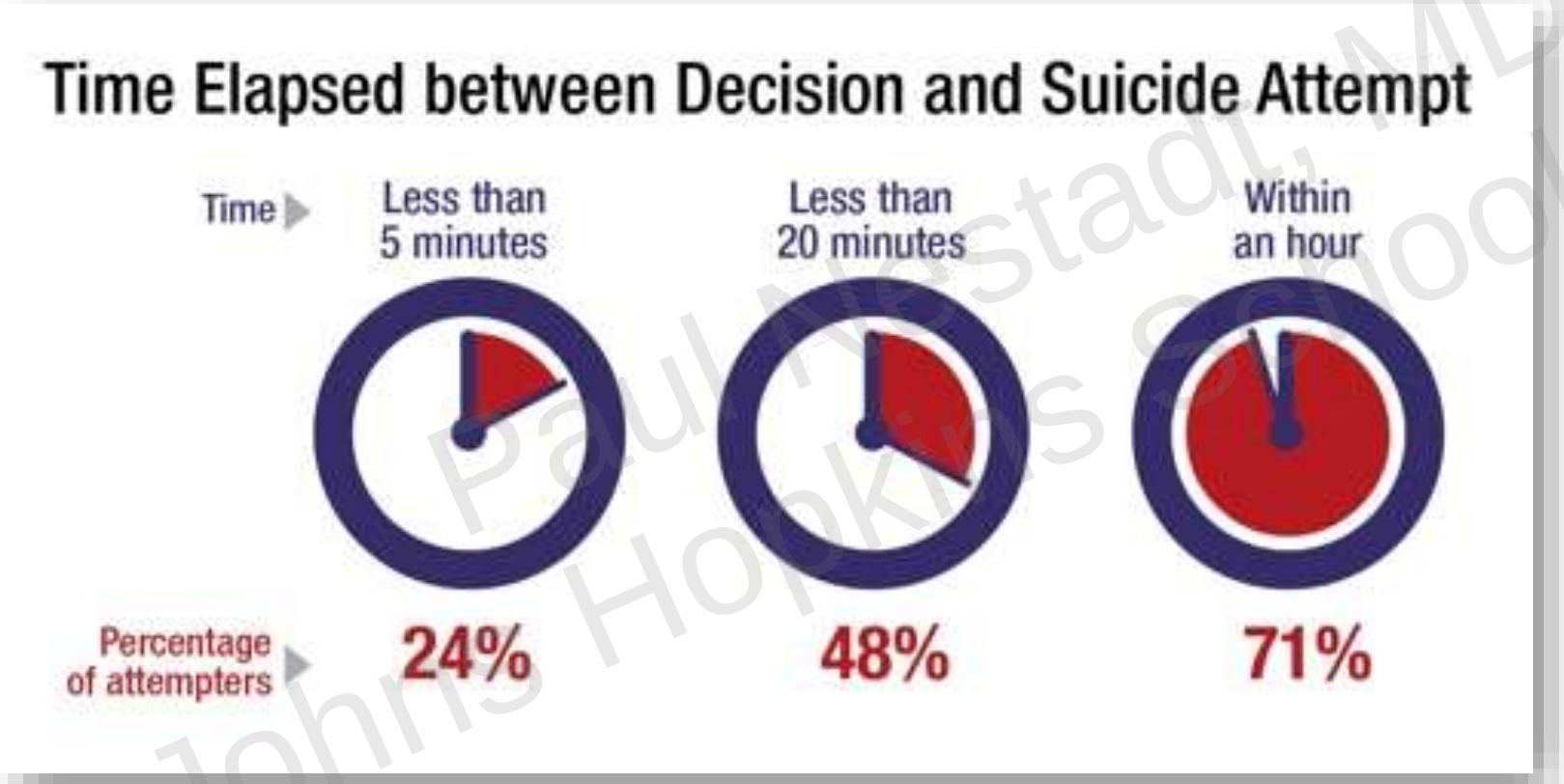
Hawton, 2012



The Choice of Method is a Consequence of Method Availability

Suicide Is A Powerful, But Brief Impulse

Simon (2001) interviewed 153 young high lethality suicide attempters and found that fully 87% of them had only decided to make the attempt within 24 hours of the attempt; and most had decided within the hour

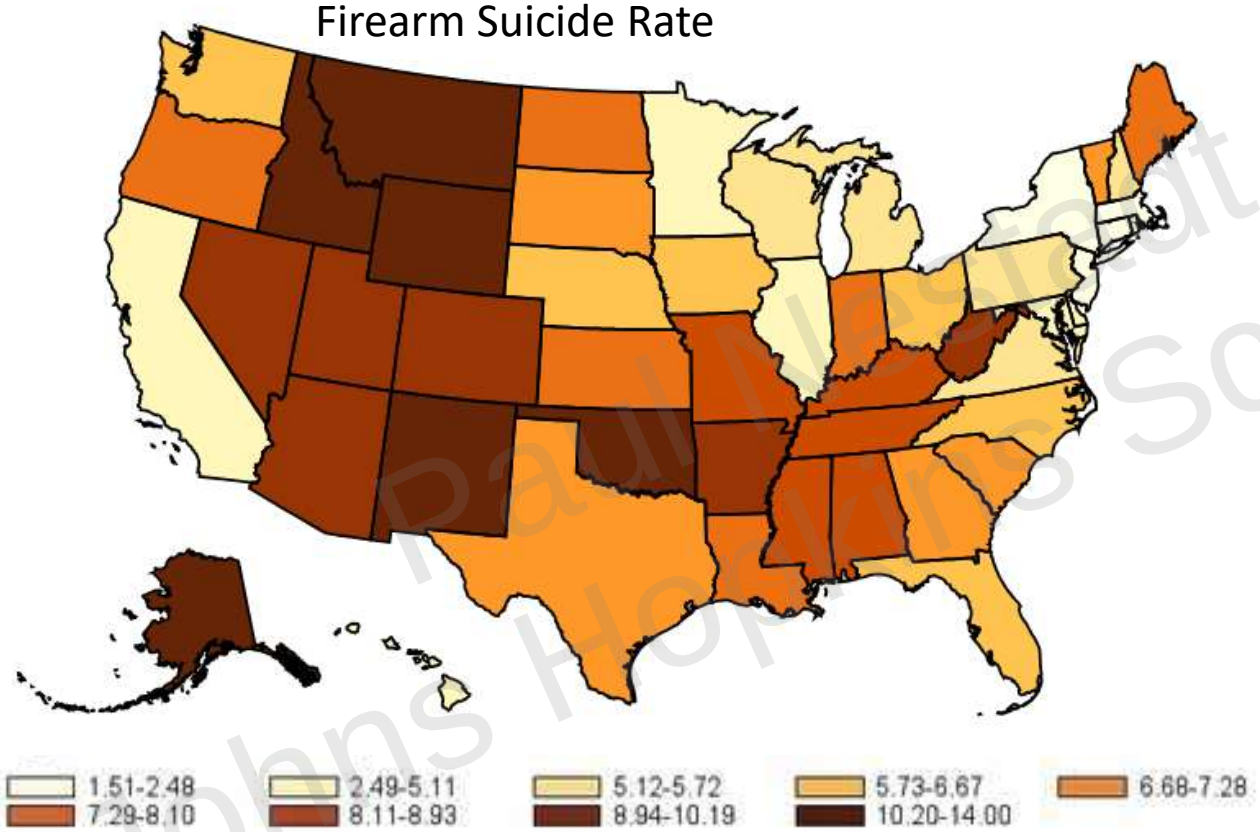


If a lethal method of suicide isn't readily available, the impulse can pass and help can be sought

Firearm Suicide Rate By State

Who uses a gun for suicide?

Firearm Suicide Rate

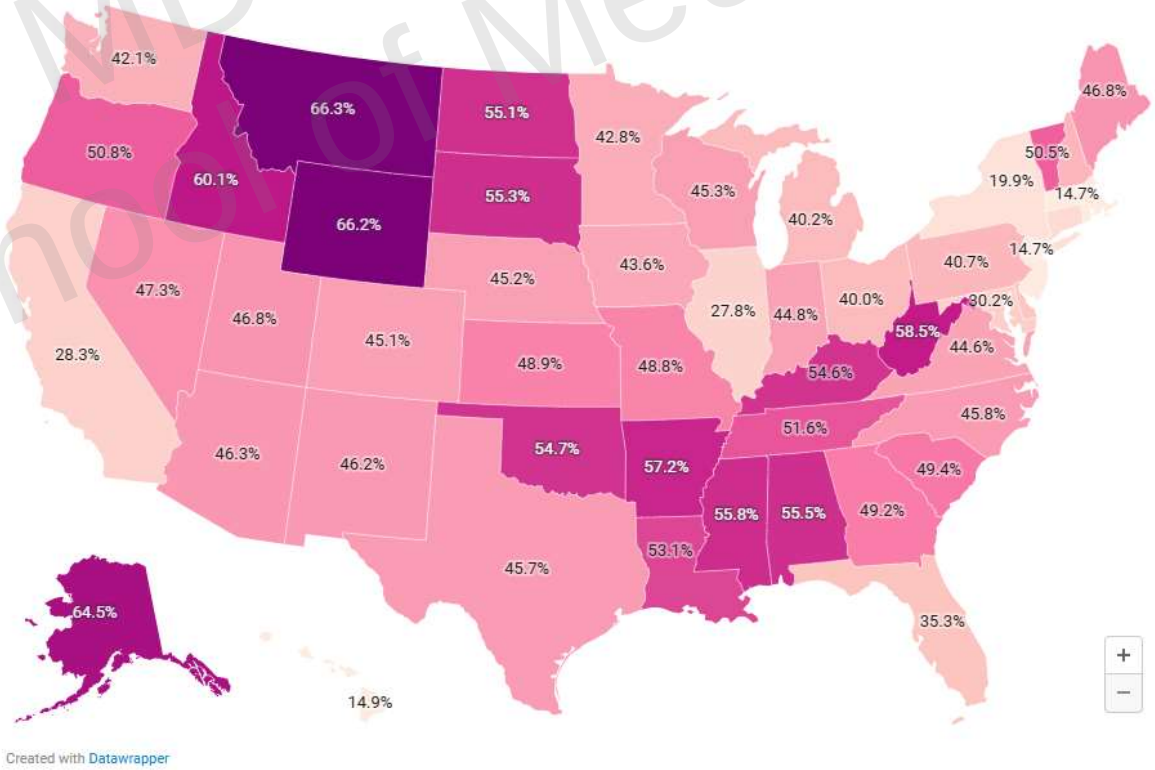


CDC - WISQARS

National Map of Firearm Suicide Rates by State - 2023

People who own guns.

% Households with Guns



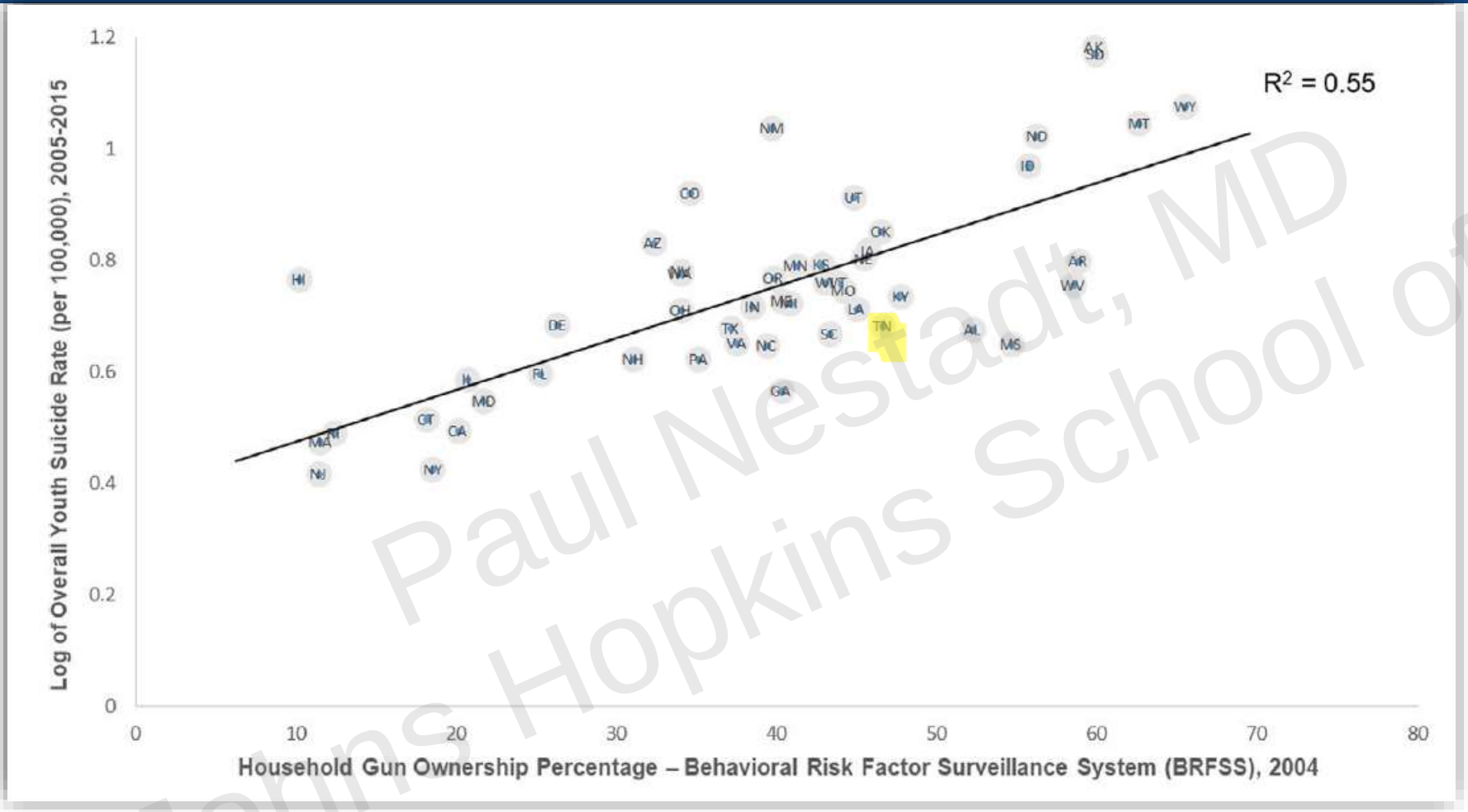
More Gun Access Has Repeatedly Been Shown To Increase Suicide

- **Individuals** with access to a firearm have **3.2x** the risk of suicide (Anglemyer, 2014)
- **Areas** with more guns have **50%** higher suicide rates (Miller, 2015)
  - **90%** higher rates in kids
  - Higher ratios in kids: fewer readily available methods, requiring transport
- In urban counties, there is a **1% increase in suicides** for **each additional** gun shop (Steelesmith, 2019)
- Soldiers who kept a loaded gun at home or carry off-duty have **4x odds of suicide** (Dempsey 2019)

Suicides in metropolitan statistical areas/divisions with the highest versus lowest gun ownership levels (BRFSS 2002–2004); mortality data WONDER 1999–2010

	High-gun MSA*	Low-gun MSA†	Ratio
Total population (person-years)	500 million	503 million	1.0
Proportion of households with firearms	34%	11%	3.2
Proportion of population living in city >1 million	12%	35%	0.3
Proportion of population living in city 500 000–1 million	14%	3%	4.1
Proportion of population living in city 200 000–500 000	8%	4%	2.4
Whole population			
Firearm suicide	32 081	13 545	2.4
Non-firearm suicide	25 623	25 485	1.0
Total suicide	57 704	39 030	1.5
Subpopulations			
Men			
Firearm suicide	27 546	12 060	2.3
Non-firearm suicide	17 722	18 149	1.0
Total suicide	45 268	30 209	1.5
Women			
Firearm suicide	4535	1485	3.1
Non-firearm suicide	7901	7336	1.1
Total suicide	12 436	8821	1.4
Children ages 0–17			
Firearm suicide	819	261	3.1
Non-firearm suicide	1008	705	1.4
Total suicide	1827	966	1.9

Household Gun Ownership and Youth Suicide Rates, By State



Knopov et al (2019) compared each state's household gun ownership proportion to its youth suicide rate (age 10-19), controlling for other risk factors and youth suicide attempts

In the multivariate model, they found for each **10% increase in household gun ownership**, the youth suicide rate **increased by 27%**

The Inevitability of Suicide (Substitution of Means?)

If we remove a lethal method, will attempters just find another way?

- Miller (2006) found that **74% of Americans** surveyed believed that all or most GG Bridge jumpers would have **found another way to complete suicide**, if thwarted
  - Gun ownership and smoking were greatest predictors of this belief

- Betz (2010) found that among **ED physicians and nurses, 54%** believed similarly that if a firearm suicide decedent hadn't had a gun, most or all of them would have just **completed another way**

Is this true?

- Seiden (1978) checked on 515 GG Bridge jumpers who were restrained/ saved during an attempt and found that over a median f/u period of 26 years, only **4.9% of them ended up completing** suicide (usually very soon after the failed attempt)

- Similarly, O'Donnell (1994) found that only **9.6%** of the 94 attempters who miraculously survived jumping in front of a London Tube train **reattempted and died** over a 10 year f/u period

What happens when a popular, lethal, convenient method of suicide is removed?

- In the UK, coal gas in ovens were high in Carbon Monoxide (CO) and was a top method of suicide
- Throughout the 60's and 70's, CO content in ovens were reduced
- Both CO suicides AND total suicides decreased concurrently (no replacement methods)

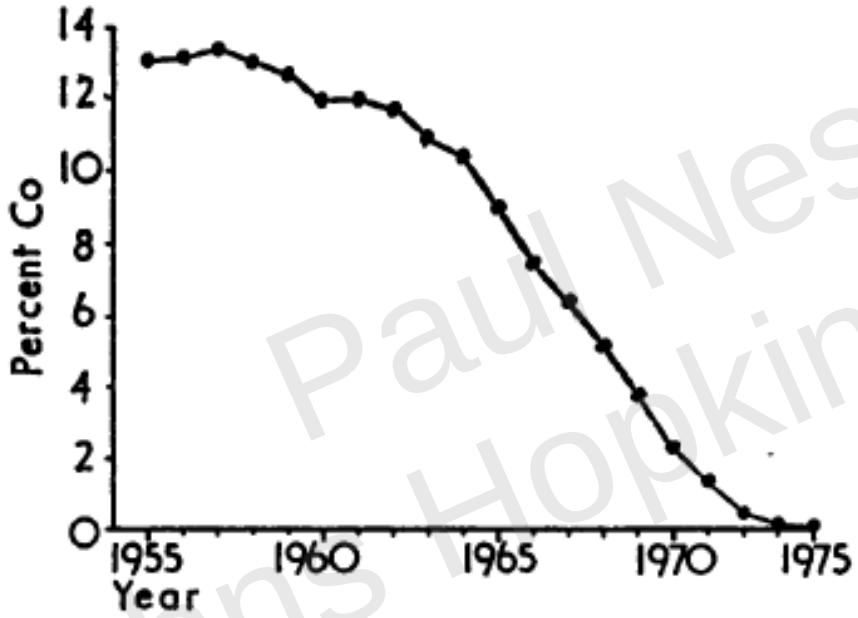


FIG. 3. Percentage of CO in domestic gas, United Kingdom 1955-74.

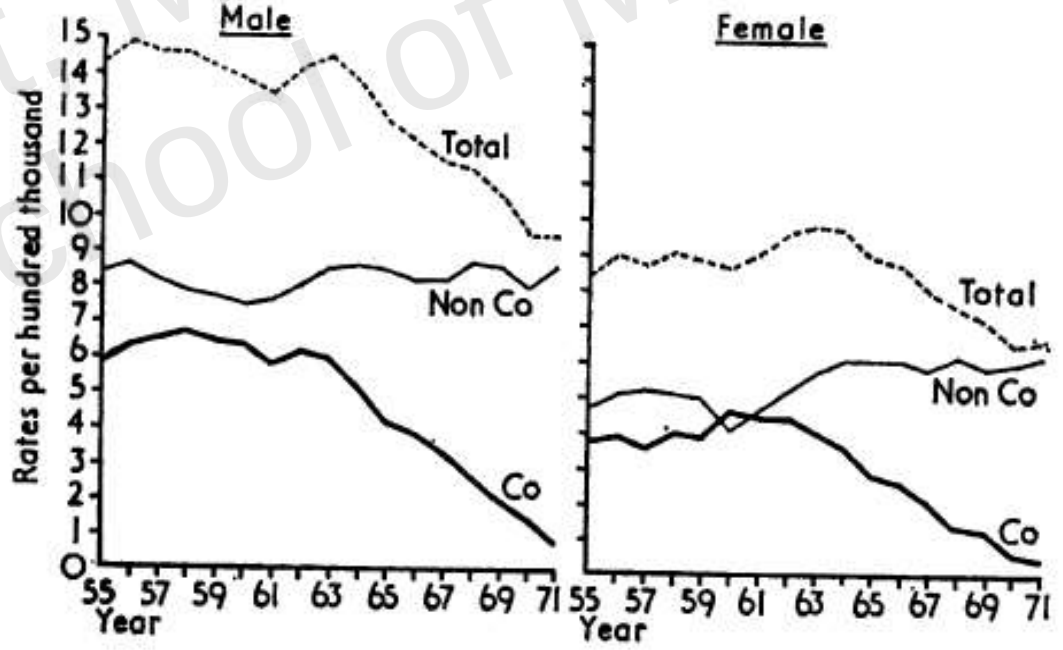
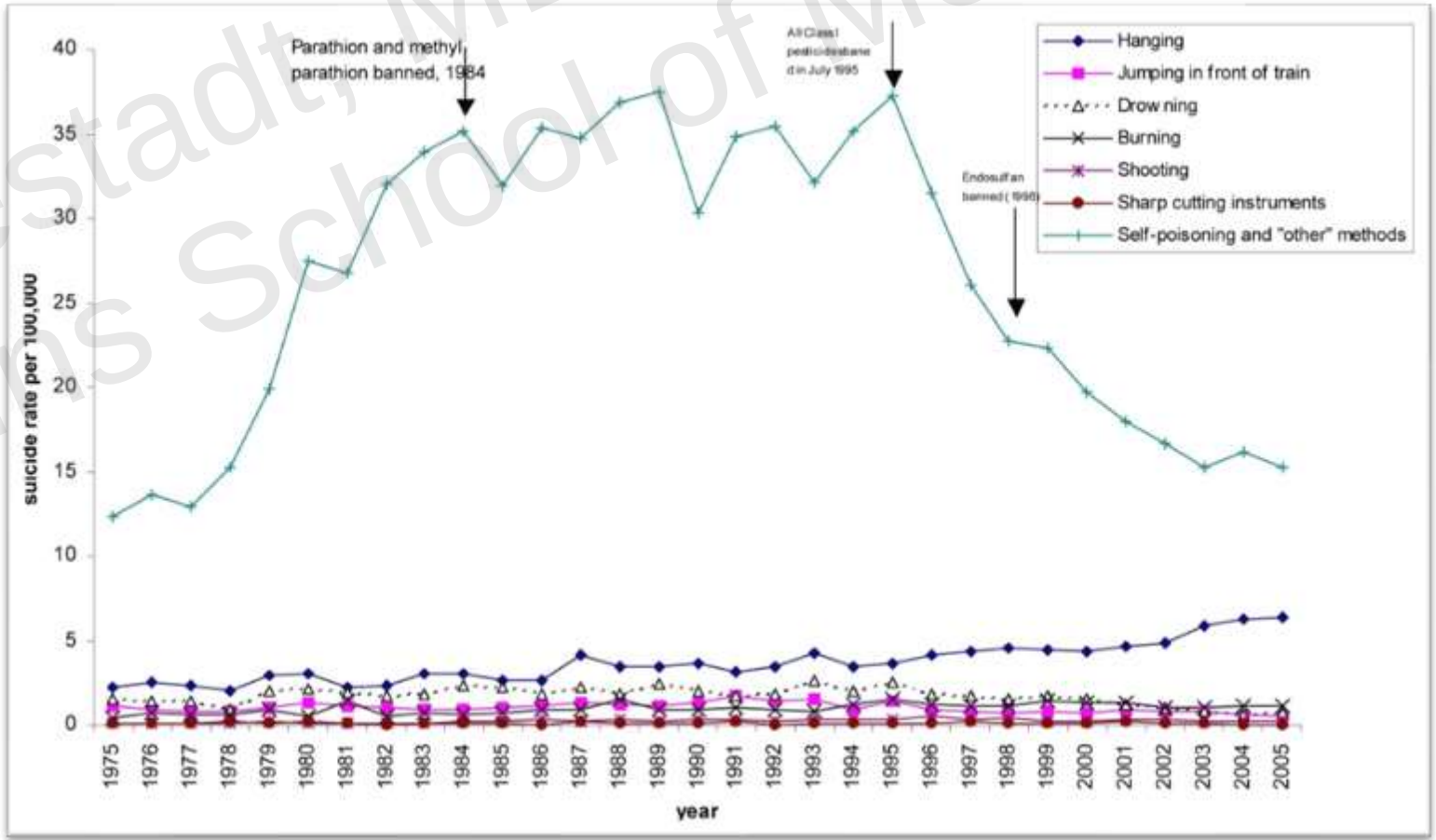


FIG. 4. England and Wales: sex-specific suicide rates by mode of death.

Kreitman, 1976

Other Examples of Restricting Access to Lethal Means

- The most common suicide method in **Sri Lanka** was ingesting **pesticides**, because they were always available and some of them were terribly lethal
- When the most lethal class of **pesticides were banned in 1995**, the suicide rate was cut **almost in half**



- Similarly, when regulations forced pharmacies to pack **paracetamol in blister packages**, reducing access, UK poisoning suicides **dropped by 22%**

- When **Israeli soldiers** were forbidden from **storing their guns at home on weekends**, their suicide rates **fell 40%**
  - 70% drop in weekend rates, no change in weekday rates

Bridge Barriers

- In areas where **bridges** attract suicidal jumpers, **fences and barriers** save lives
- Of DC's 10 high bridges, the **Duke Ellington Bridge** accounted for half of the city's bridge suicides, with the Taft bridge a distant second
- In 1986, **anti-suicide fences** were erected on both sides of the Ellington
- Ellington deaths quickly decreased by **90%**
- Despite the Taft being located only a **5 minute walk** away, there were **no significant increases in Taft jumps** or jumps from other DC bridges

Berman, Athey & Nestadt (2021)

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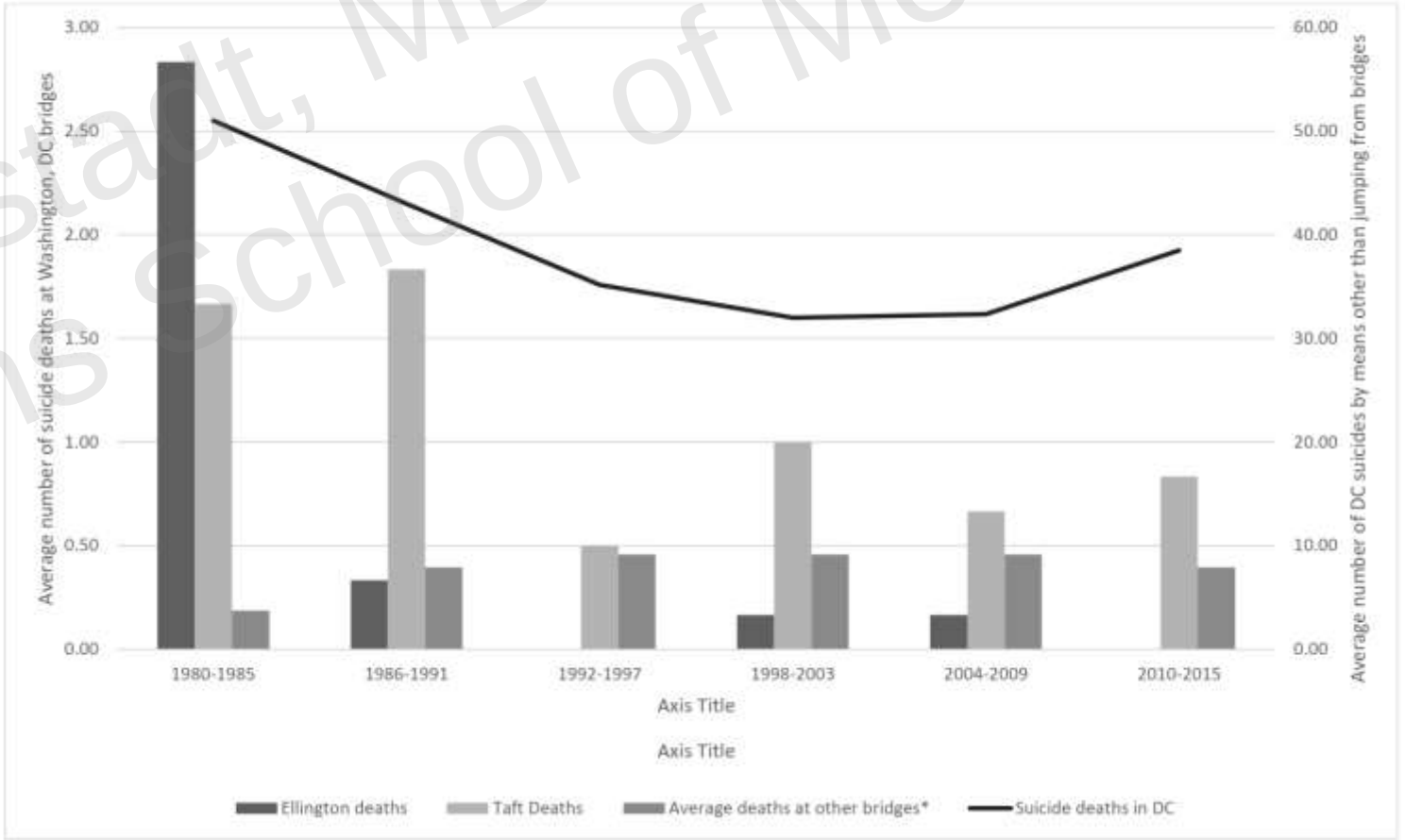
Figure 1. Six-year moving averages of suicide deaths at sites around Washington DC



Berman, Athey, Nestadt (2021)

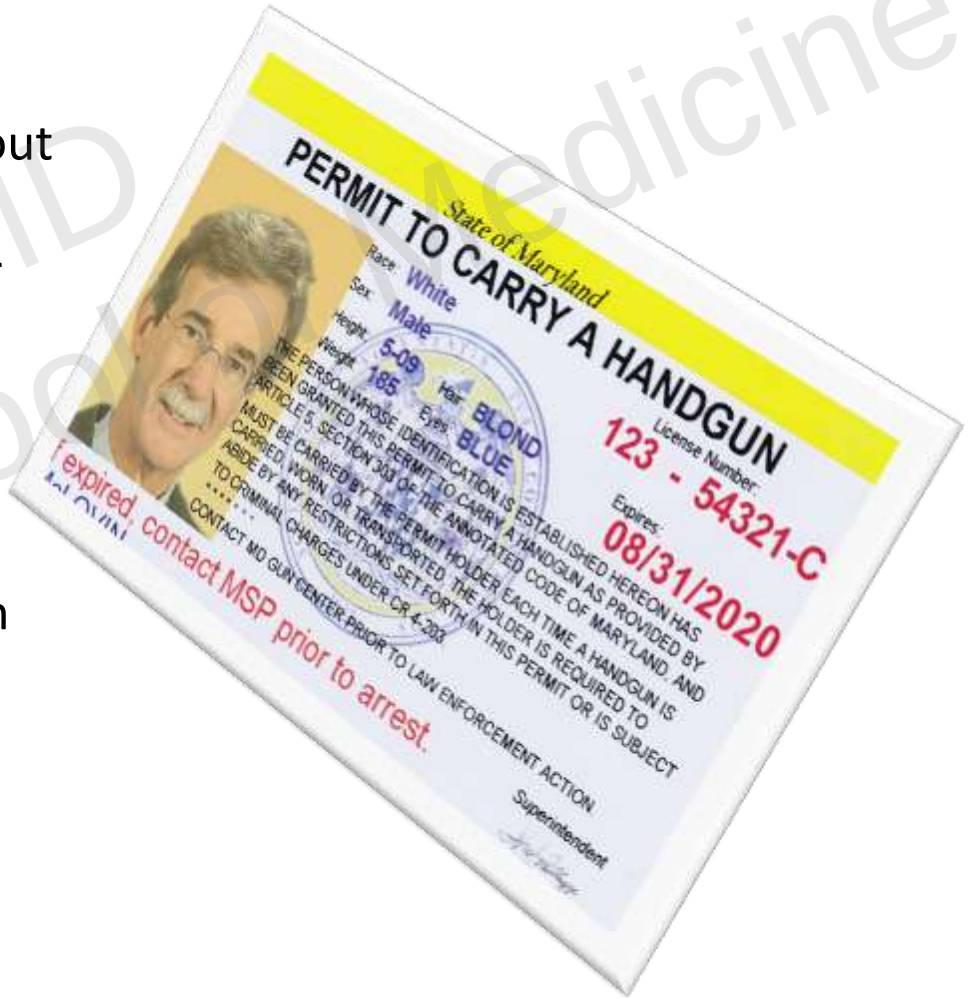
Regulations Which Reduce Gun Access Are Effective

- When DC began requiring **gun licensing in 1976**, firearm suicides **dropped 23%,** with no replacement (Loftin et al. 1991)
- Athey et al. (2024) found that **child access prevention laws**, requiring safe storage of firearms, **decreased youth firearm suicide** rates **by 14%**
- Anestis & Anestis (2015) found that state **laws that required guns to be stored locked**, **background checks**, and **restrictions to open carry** all individually decreased suicide rates.
- Kaufman et al. (2018) used a composite score to rate the stringency of firearm regulations for each state. They found that the **total suicide rate was decreased by 20% in states with more gun laws**, such as dealer regulation, background checks for private sales, permit to purchase, junk gun regs, reporting requirements, and restrictions in number of firearms sold at a time.

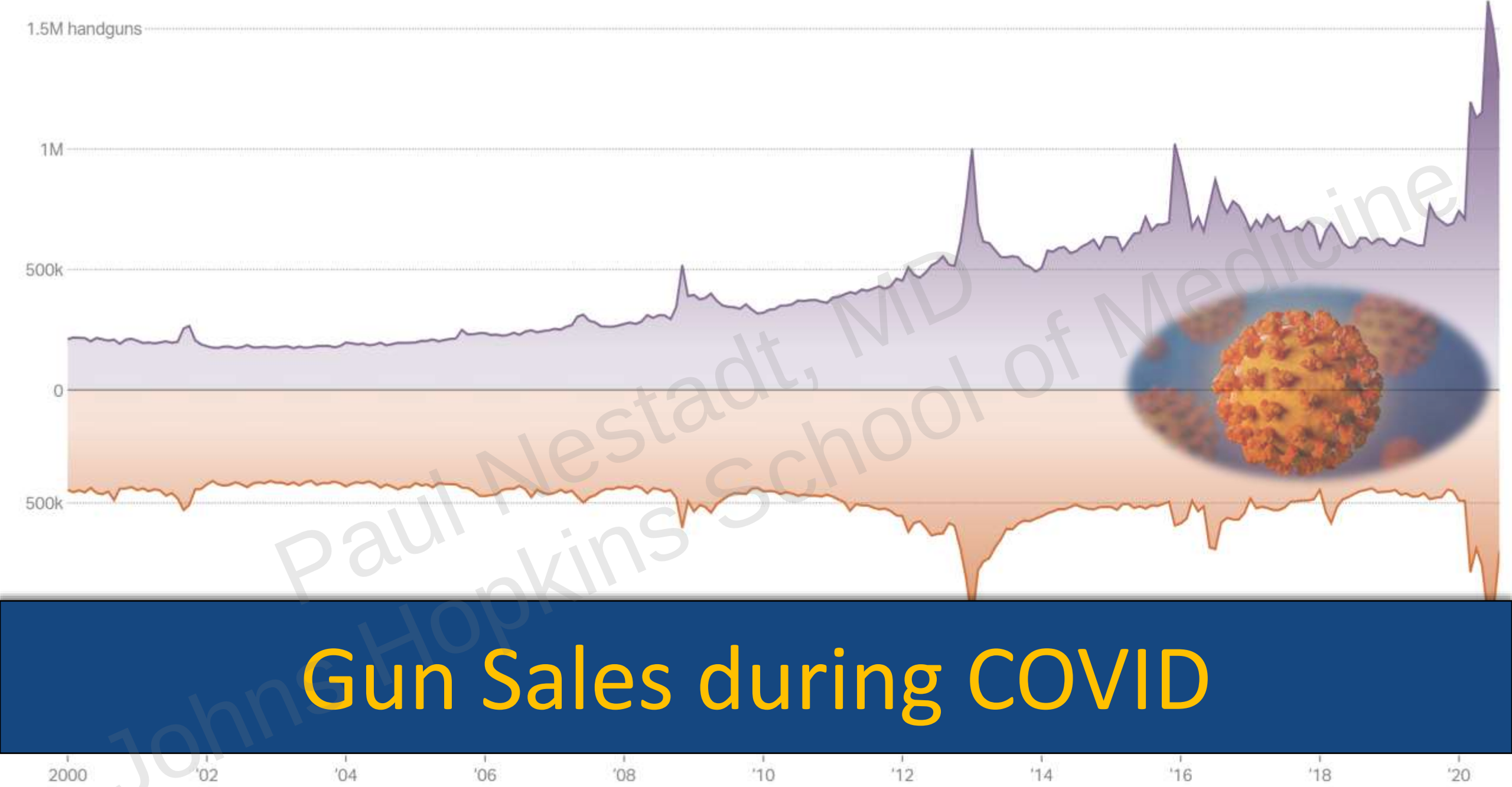
Regulations are Effective

- In **1995**, Connecticut enacted "**Permit-to-Purchase**" gun laws, increasing the wait time needed for a purchase and screening out certain ineligible individuals.
  - **CT firearm suicide rates dropped by 15%,** relative to similar states without the law, with no increase in suicide by other means (total decrease)
  - Gun homicides also decreased by 40%

- In **2007**, Missouri repealed their own "**Permit-to-Purchase**" gun laws.
  - **MS firearm suicide rates increased by 16%,** with only a 4% increase in non-firearm suicides
  - Gun homicides increased by 23%

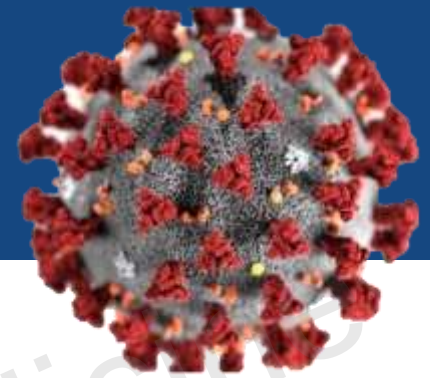


Crifasi et al, 2015



Gun Sales during COVID

COVID-19: Firearm Sales Rocket in 2020



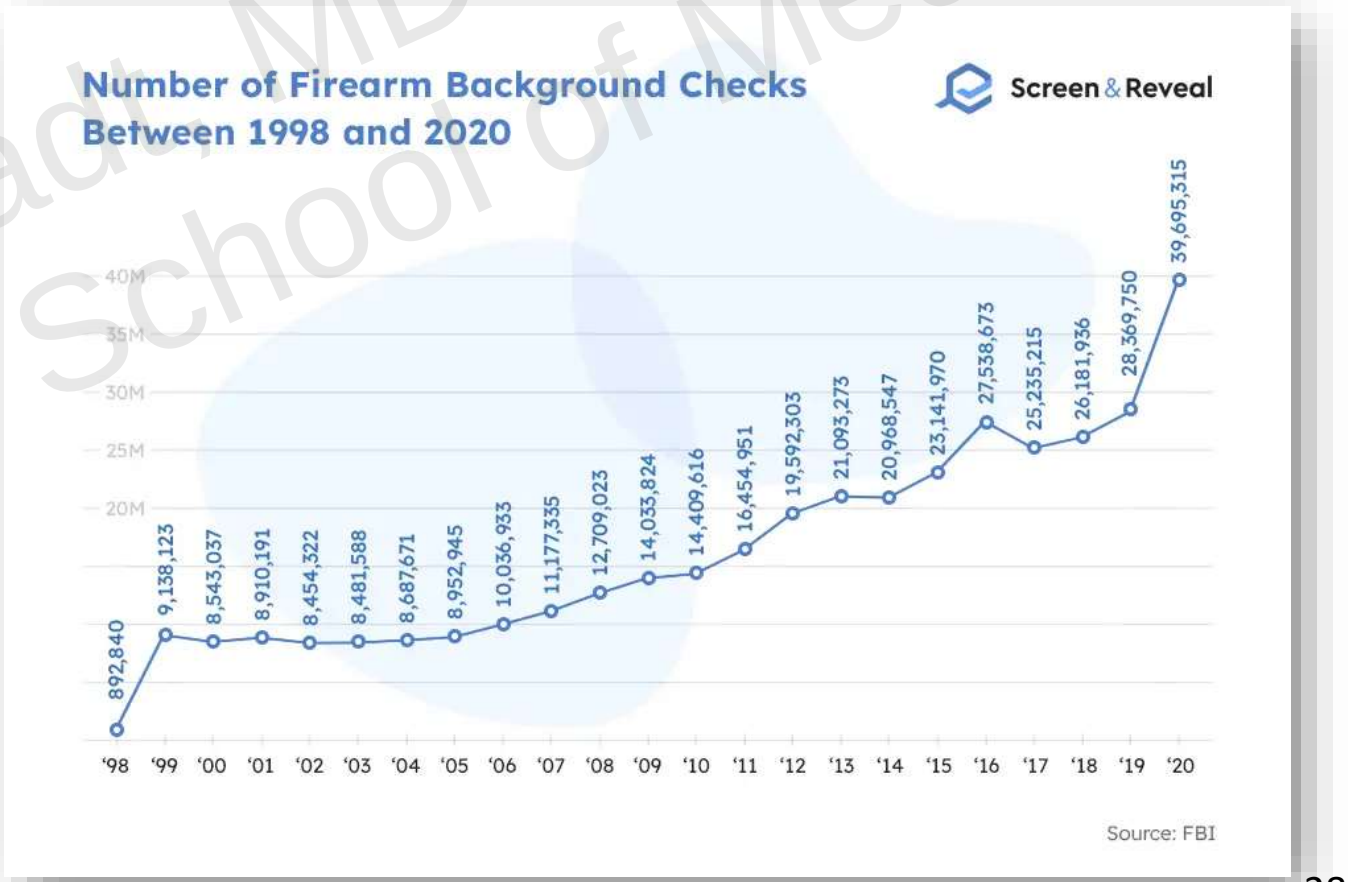
- **Firearm access** remains one of the largest and most well defined risks for suicide
  - There has been a **large spike in firearm purchases** in the context of COVID-19 and general, partisan fear

- March 2020 saw the 2nd highest number of new firearm purchases since data recorded (**41% increase** compared to ’19)

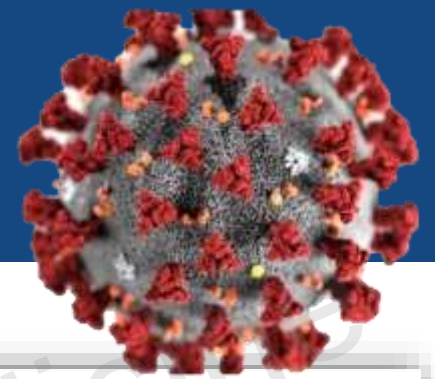
- **June broke that record** and Jul, Aug, Oct, Nov & Dec had **~50%** increases over 2019

- **Jan 2021** finally crossed **4 Million sales, and March 2021 reached 4.7M**

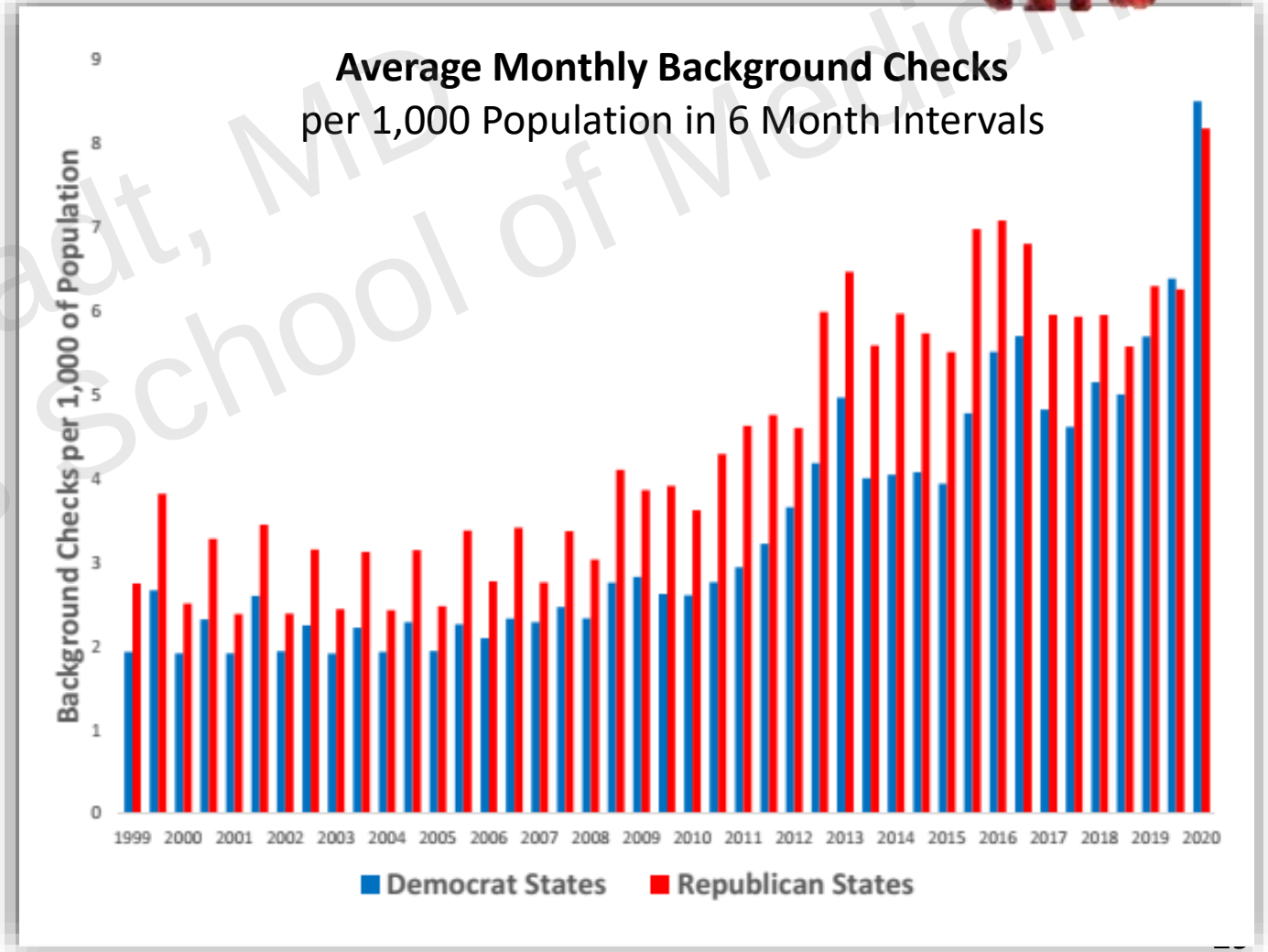
- 40-67% of these are to **new gun owners**



2020 Spike: New Gun Owners



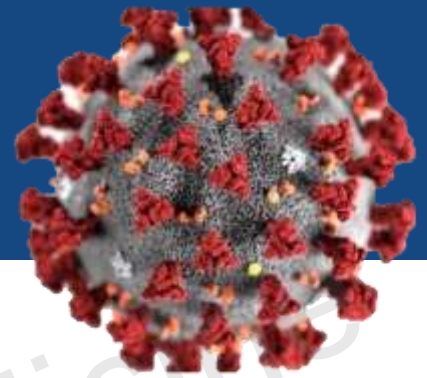
- Historically, sales spikes have been from **policy changes**
  - Those tend to be gun owners increasing their collection
- 2020 spike is largely **new gun owners**, across the political spectrum
  - Bought for protection, not policy
  - 7.5M new gun owners (Jan'19- Apr'21)
- Increase is most dramatic in **blue states**
- **Black American** gun ownership increased from **14% to 24%** (2015-21)



Miller et al. (2021)

Lang & Lang (2020)

COVID Era Gun Owners



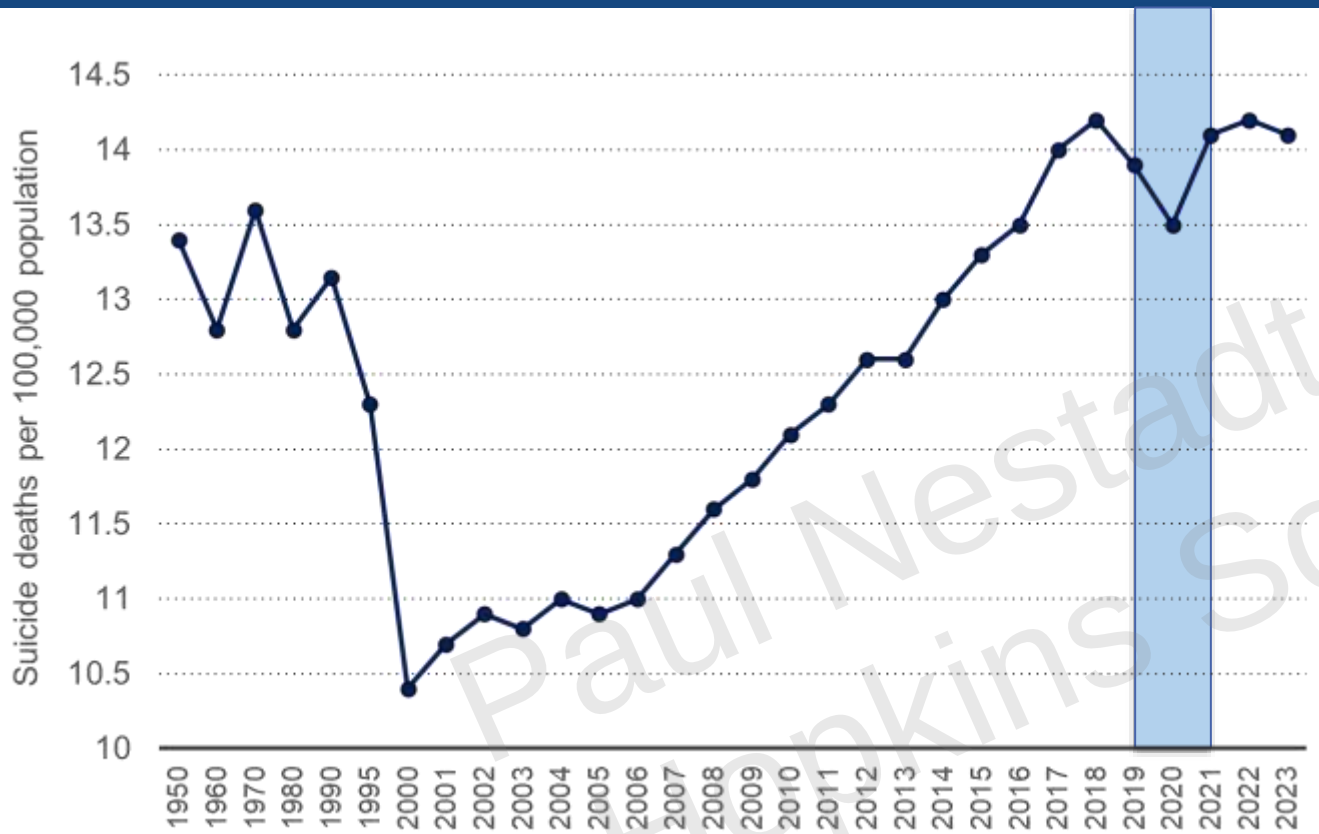
- Lyons et al. surveyed pandemic purchasers who were new gun owners
  - Half had never had any firearm safety training of any kind

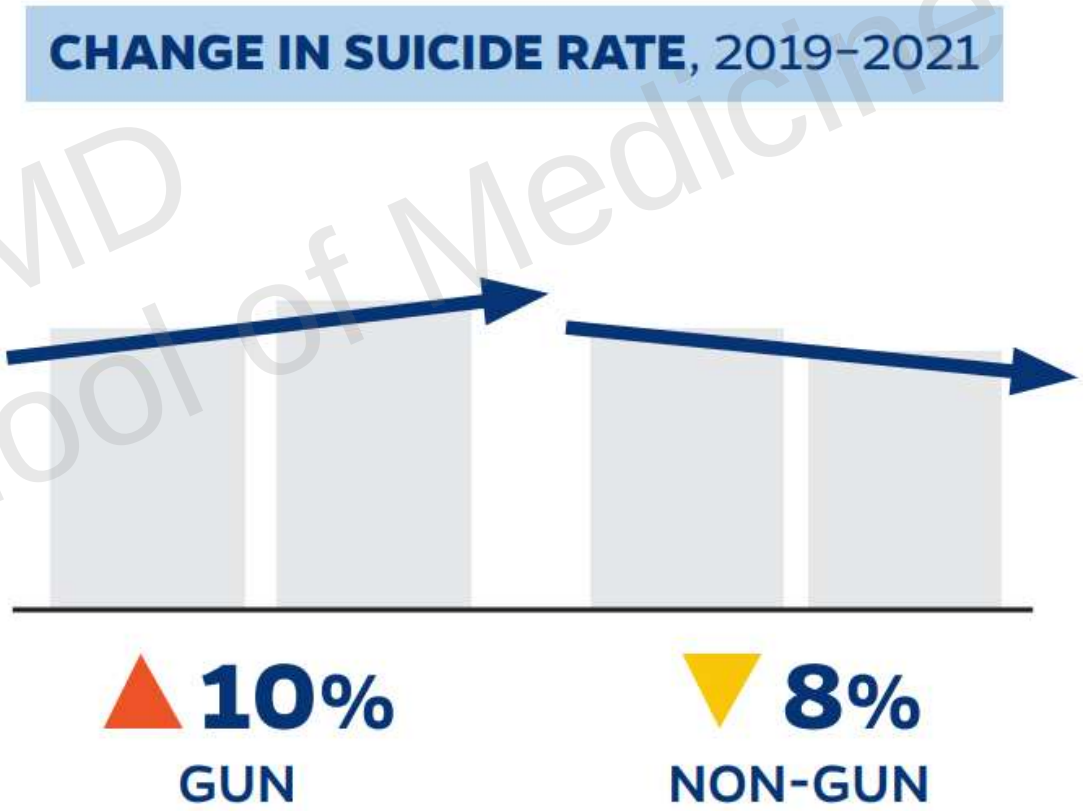
- 42% reported at least one gun stored unlocked
- **53% reported kids in the house**
- 33% had a household member with mood d/o
- 11% had a household member with dementia

- 15% had been laid off due to the pandemic
- **38% reported their mental health had gotten a little or a lot worse in the past month**

Lyons et al (2020)

Impact on Suicide

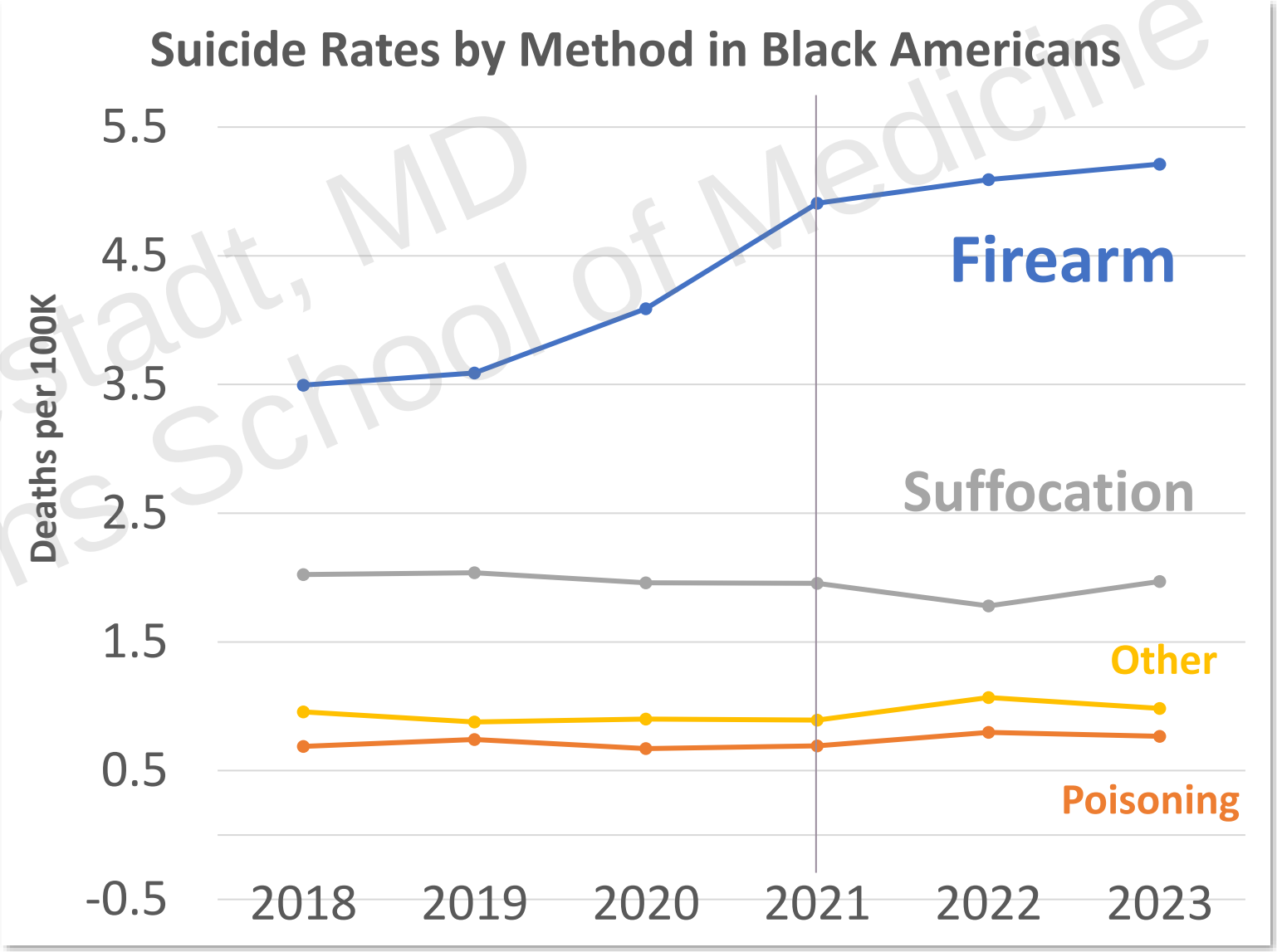




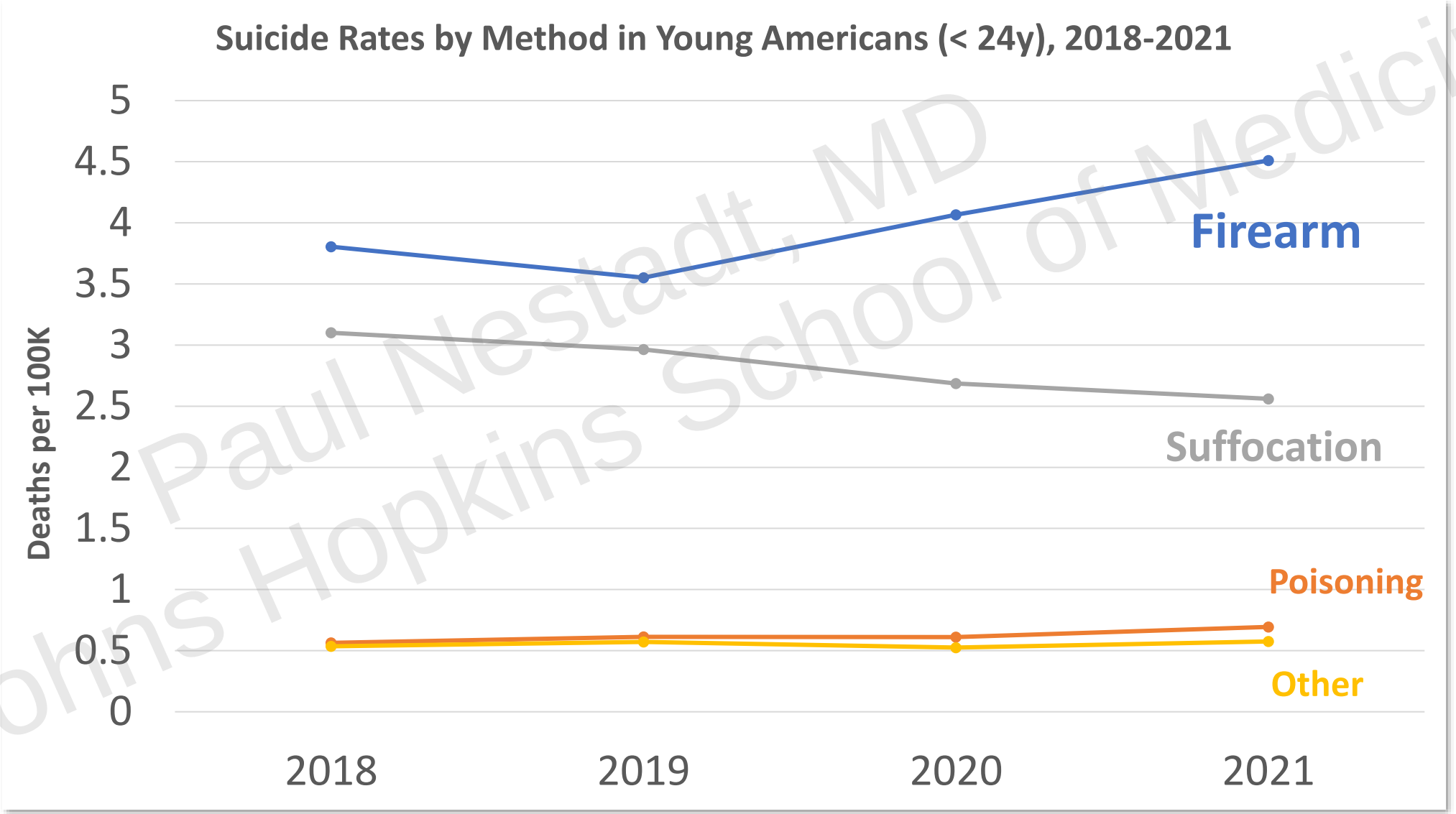
- The recent **increases in suicide rates** were **not homogenous**
- Suicide rates rose directly in tandem with **firearm access rates**
  - demographic by demographic, state by state
- **Firearms** were the **only suicide method to increase**

Special Populations

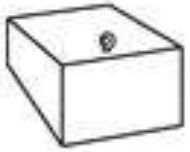
Suicide Rate Changes Over the Pandemic (Deaths per 100K)			
Race/ Ethcy	2019	2021	% change
Asian	6.7	6.7	0.0%
Black	7.2	8.4	16.7%
Hispanic	7.3	7.9	8.2%
White	15.8	15.7	-0.6%
Multi/ Other	9.9	11.1	12.1%



Special Populations



Self Regulation:
Safe Storage Options

	Option	Description	Notes
Retain Possession	**Cable lock** 	Key or combination; usable on most firearms. Cost: $10-$50	Can be cut; Must install according to directions (not through trigger) and keep key or combination away from at-risk persons
	Trigger lock 	Key or combination; blocks trigger but doesn't prevent loading. Cost: $10-$50	Must not use on loaded gun (could still fire), must keep key or combination away from at-risk persons; not usable on lever-action guns
	Lock box 	Key, combination, keypad or biometrics; smaller than safe. Cost: $25-$350	Firearm can be stored loaded or unloaded, must keep key or combination away from at-risk persons; may require batteries
	Safe 	Key, combination, or biometric identification. Cost: $200-$2,500	Most secure option if multiple guns (especially long guns)
	Disassembled gun 	Ensures gun cannot be fired but requires gun knowledge	Not always practical; may lose parts
	"Smart" gun 	Biometric identification ensures only owner can fire	Does not protect against owner suicide; cannot be retrofitted

Providers should discuss safe storage of firearms in a non-judgmental way, similar to the discussions around other safety issues such as bicycle helmets, child safety locks, and impaired driving.

Transfer Possession	**With a family member or friend** 	State laws vary widely concerning allowable storage and transfer regulations	May be most feasible option for out-of-home storage (especially with family), depending on state laws
	With law enforcement 	In most states, allowed but not required	May not be appealing to some patients
	At a gun store or range 	In most states, allowed but not required	Not all stores or ranges store firearms

MARYLAND'S SAFE STORAGE MAP:

https://mdpgv.org/safestoragemap

Ranney 2016

Voluntary Self Prohibition Laws

Allows individuals to **voluntarily sign up for a no-buy list** for firearms, preventing themselves from buying guns from a licensed dealer

- The law allows these individuals **to pre-empt crises when they are well** by reducing their own access to firearms
- **Voluntary self-prohibition** of firearms acts as a type of **advance directive**, giving people **agency**
- Recognizes that at times, **individuals may lack the judgment to make decisions** that optimize their health and well-being
- Does **not include removal of current guns** (petitioner must do this separately)
- Currently law in **Washington** (2019), **Utah** (2021), **Virginia** (2021), and **Delaware** (2024)

Content adapted from Bryan Barks

Virginia (Voluntary Do Not Sell Firearms List)

Enrollment:

- Apply through State Police Department (found on their website)
- Must submit a completed *Virginia Voluntary Do Not Sell List* form and proof of I.D. in-person or by mail
- Applicants are required to 18 years old or above

Removal:

- Submit completed removal form to the State Police Department
- 21 day waiting period after the request is received
- National Instant Criminal Background System updated

- All records are destroyed once the individual is officially taken off the list

Content adapted from Bryan Barks

Red Flag Laws

Newest Clinical Tool: Red Flag Laws

- "**Red Flag**" Laws allow police or family members to petition a court to remove temporarily firearms from individuals deemed a risk to themselves or others
- **CT Passed the first "risk warrant"** in 1999 and other states followed, with the largest increase after the 2018 **Parkland massacre**
- Maryland's **Extreme Risk Protective Order** (ERPO) law went into effect in 2018
  - **First to include physicians as petitioners**

Overview of Extreme Risk Protection Orders

- ERPOs are civil orders modeled off domestic violence protection orders (DVPOs)
- ERPO petitioners always include law enforcement, and often include others such as family/household members and healthcare providers
- ERPOs solely address access to firearms
- There are usually two types of ERPOs:
  - Ex parte, or temporary orders, that usually last up to two weeks
  - Final orders that usually last up to a year

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The National ERPO Resource Center
a project of the
Center for Gun Violence Solutions

ERPOs can be used in a variety of circumstances

Look at behavior not diagnosis

Extreme Risk Protection Order (ERPO) is Effective

- Swanson et al (2017) found that the CT's version of the law **saved one life for every 10.6 guns seized**
  - Re-evaluation by Miller et al (2024) re-estimated that for **every 22 seizures, one life is saved**

- Kivisto & Phalen (2018) used a synthetic control model to estimate that Indiana's law **reduced firearm suicides by 7.5% over 10 years, without an increase in suicides by other means**

- States who include **clinicians as petitioners** saw a **15% decrease in firearm suicides**
  - Largest decrease (**24%**) specific to **Black populations** (Gu et al. 2025)

- Still, **most clinicians** are **not** utilizing ERPO

Table 2. Estimated Suicide Prevention Effect of Connecticut's Gun Removal Policy

	Suicide outcomes for actual gun removal cases		Counterfactual (hypothetical) data assuming no gun removal		Estimated policy effect	
	Attempts	Fatalities	Attempts	Fatalities	Number of averted suicides	Number needed to remove
Firearm	7	6	101	88		
Other means	135	15	41	5		
Total	142	21	142	93	72	10.6

Why are physicians underutilizing this tool?

- Survey of Hopkins doctors: 92 responded of 353 invited (26% response rate)
- **Only 1** respondent reported filing an ERPO
- Low knowledge of ERPO
- Frequent encounters with **potentially eligible patients**
- More than half expressed a **willingness to use ERPO**

Table 1. Respondents' Familiarity With Maryland's ERPO Law and Their Opportunity and Likelihood of Use, by Specialty

Question	Respondents, No. (%)			
	Emergency Medicine (n = 26)	Pediatrics (n = 16)	Psychiatry (n = 50)	Total (N = 92)
How familiar are you with ERPOs?				
Very familiar	2 (7.7)	0	2 (4.0)	4 (4.3)
Somewhat familiar	1 (3.8)	0	5 (10.0)	6 (6.5)
A little familiar	3 (11.5)	3 (18.8)	10 (20.0)	16 (17.4)
Not at all familiar	20 (76.9)	13 (81.3)	33 (66.0)	66 (71.7)
How often do you estimate you encounter a patient at extreme risk of violence or suicide who you would consider for an ERPO?				
Daily	3 (11.5)	0	0	3 (3.3)
Weekly	9 (34.6)	0	2 (4.0)	11 (12.0)
Monthly	6 (23.1)	2 (12.5)	10 (20.0)	18 (19.6)
A few times per year	8 (30.8)	11 (68.8)	34 (68.0)	53 (57.6)
Never	0	3 (18.8)	4 (8.0)	7 (7.6)
How likely would you be to file a petition against a patient at extreme risk of violence or suicide?				
Very likely	4 (15.4)	1 (6.3)	10 (20.0)	15 (16.3)
Somewhat likely	13 (50.0)	6 (37.5)	21 (42.0)	40 (43.5)
Somewhat unlikely	5 (19.2)	6 (37.5)	14 (28.0)	25 (27.2)
Very unlikely	4 (15.4)	3 (18.8)	5 (10.0)	12 (13.0)

Frattaroli S, Hoops K, Irvin NA, McCourt AD, Nestadt PS, Omaki EP, Shields WC, Wilcox HC. Maryland's extreme risk protective order law: A survey of physician knowledge, use, and needs. JAMA Network Open, 2019;2(12). E1918037.

Survey Findings

Table 2. Barriers and Facilitators to Physicians' ERPO Use

Question	Respondents, No. (%)			
	Emergency Medicine (n = 26)	Pediatrics (n = 16)	Psychiatry (n = 50)	Total (N = 92)
What barrier(s) prevent you from being able to file an ERPO petition? Check all that apply.[a]				
Not enough time to complete paperwork	20 (76.9)	11 (68.8)	26 (53.1)	57 (62.6)
Not enough time to attend hearing at courthouse	23 (88.5)	11 (68.8)	30 (61.2)	64 (70.3)
Not a billable service	3 (11.5)	1 (6.3)	6 (12.2)	9 (9.9)
It may negatively affect my relationship with the patient	3 (11.5)	7 (43.8)	26 (53.1)	36 (39.6)
I don't think clinical providers should file ERPO petitions	1 (3.8)	3 (18.8)	2 (4.1)	6 (6.6)
Other	9 (34.6)	6 (37.5)	17 (34.7)	32 (35.2)
What tool(s) would help you file an ERPO petition? Check all that apply.				
Training on ERPO	22 (84.6)	16 (100.0)	41 (82.0)	79 (85.9)
Consultation with legal expert	19 (73.1)	10 (62.5)	30 (60.0)	59 (64.1)
A trained coordinator to complete and follow through the petition	25 (96.2)	15 (93.8)	40 (80.0)	80 (87.0)
Remote court hearings (ie, can join by phone)	21 (80.8)	8 (50.0)	39 (78.0)	68 (73.9)
Other	3 (11.5)	1 (6.3)	2 (4.0)	6 (6.5)

- **Time cited as the major barrier** to ERPO use; some concerns about impact on relationship with patients
- **87%** reported that a **coordinator** to complete and follow through with the petition would be helpful
- Such a model currently **exists for child abuse consults**

Frattaroli S, Hoops K, Irvin NA, McCourt AD, Nestadt PS, Omaki EP, Shields WC, Wilcox HC. Maryland's extreme risk protective order law: A survey of physician knowledge, use, and needs. JAMA Network Open, 2019;2(12). E1918037.

Piloting “Safe Storage Navigators” in Baltimore

- Two full time **social workers** are made available to the Johns Hopkins and University of Maryland **clinicians** and within a **local mobile crisis response organization** (BCRI)
- They are **available to be consulted** by ED clinicians, as well clinicians on the **inpatient** units and by **outpatient** providers and crisis responders
- They can be curbsided or perform **direct patient risk evaluations**
- Based on **risk assessment** and **individual patient/ family situations** they can enact a **range of interventions**
  - Counsel safe **in-home storage-** providing cable locks or sending a handyman to install a gun lock box
  - Counsel and assist with **out of home storage-** private or public
  - File **Extreme Risk Protection Orders**
    - In this case they would personally **attend court** for the orders and **follow up** with each case

Screening for Firearm Access

- Introducing any of these interventions requires **Lethal Means Counseling**, an evidence-based **gold-standard intervention**
  - Cost-effective means of **reducing access to firearms** and other potentially lethal suicide methods for at-risk individuals

- Lethal means counseling is dependent upon **lethal means assessment**: the identification of patients' access to **highly lethal means of suicide**

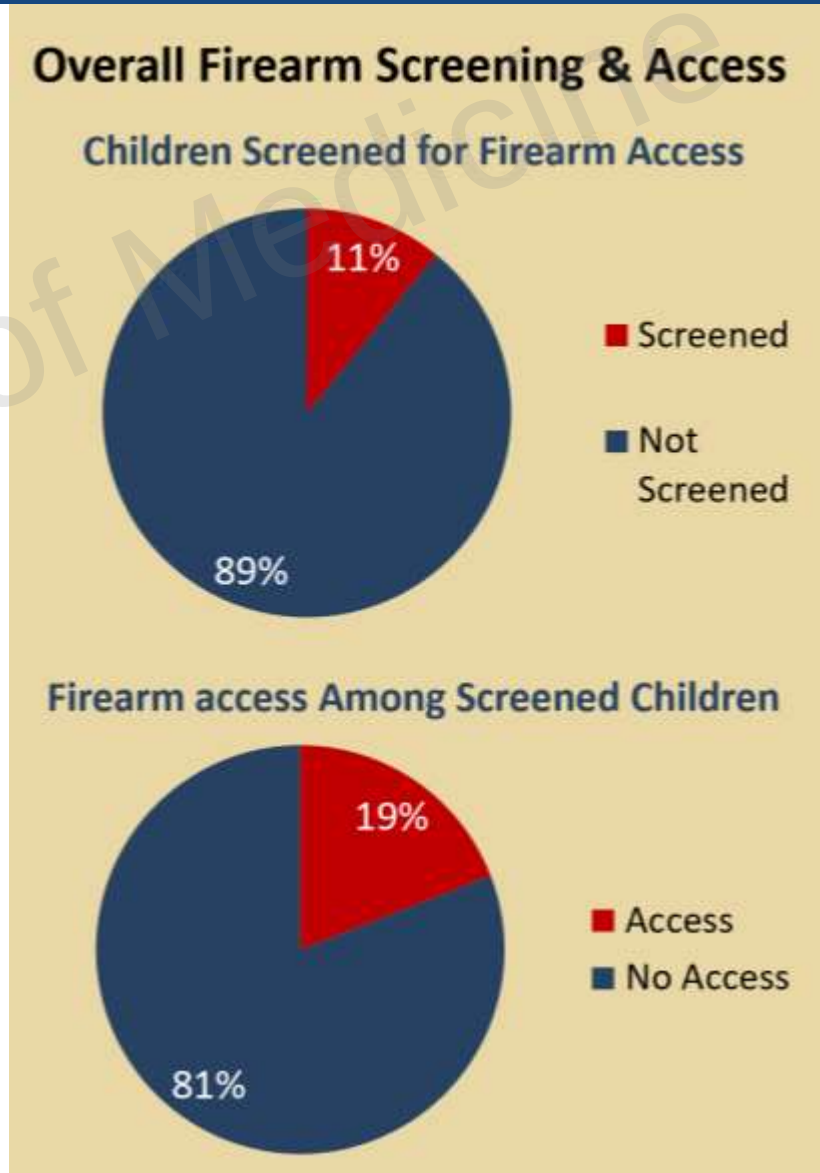
- Unfortunately, **lethal means assessment** does not always occur

Johns Hopkins Pediatric Emergency Department Studies

- Survey of patients, clinicians, and medical records in our urban pediatric emergency department found:
  - Only **53%** of clinicians report being **trained in lethal means assessment**
  - **32%** in **lethal means counseling**
  - In cases where a patient may have access to a gun, **only 42% of PES clinicians will *"often"* or *"almost always"* counsel families to lock up guns**
    - 84% see it as a social worker's job

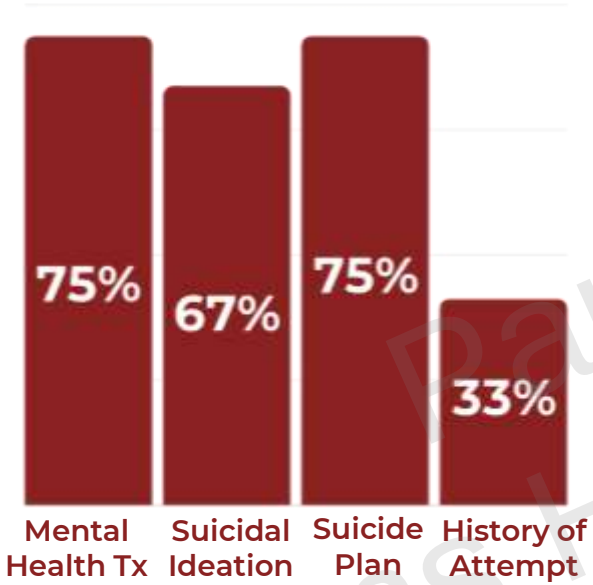
- From a **record review** of one calendar year of pediatric psych ED visits (n= 625), only **11% of patients were screened** for gun access
  - Of those screened, **19% endorsed gun access**
  - **No relationship** between **suicide risk strata** and likelihood of **firearm discussions**

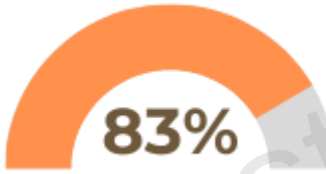
DeVinney et al. IN PREP Luscher et al. IN PREP



Families often want to be counseled

Interviews with families of youth ages 15-21 who died by firearm suicide (n=12)

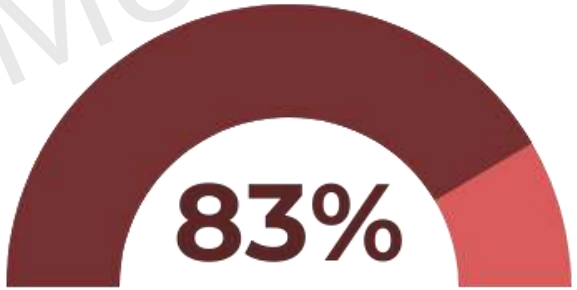




Prior Engagement with Firearms or Firearm Culture

Family-Owned Firearm Used in Suicide

Would an ERPO have been filed if you were aware of the law?



"If someone would just have suggested 'you might want to take the guns out of the house,' that's what I would have done… But we didn't think, you know…"

Kelly et al. IN PREP

Zinko et al. IN PREP

Action Items

- Clinicians must **screen for access to lethal means** (guns, medications, etc)
  - It is **never** illegal to ask- see **TN's HB0387**
- **Gun owning patients** should be aware of the **risk to themselves** and family members
  - They are far **more likely** to turn the **gun on themselves** than to use it for protection

TABLE 2. Frequency of lethal means assessment in suicide ideation and behavior groups determined by NLP query.

Positive hit on NLP query	Raw estimate (%)	Adjusted for query accuracy (%)	Adjustment for E-Code accuracy of 76%	Simulated 95% confidence interval
Firearm: Suicide behavior (E-Code) group	35.32	30.34	35.8%	33.4–38.2%
Firearm: PHQ-9 – suicide item endorsed	36.42	31.2	N/A*	30.6 – 31.9%
Medication: Suicide behavior (E-Code) group	30.66	26.73	35.1%	29.72–40.56%
Medication: PHQ-9 – suicide item endorsed	23.82	22.6	N/A*	21.9–23.5%

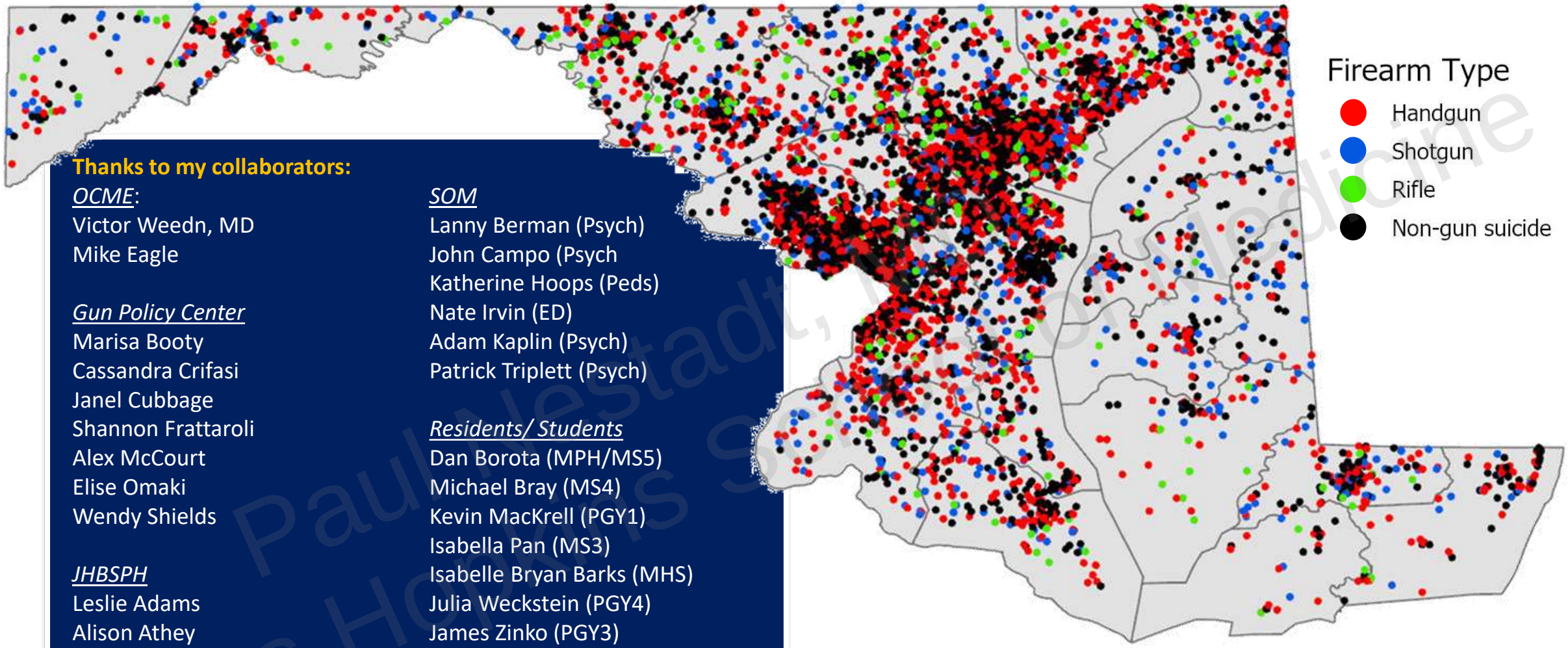
Boggs 2020

- Firearms should always be **stored locked** away, **separately** from locked **ammunition**
- Guns can **temporarily be stored** at police stations, shooting ranges, gun stores, or in **some states**, with a friend or relative
  - In extreme situations in some states, **Extreme Risk Protection Orders** can be filed

Summary

- Suicide is a **leading cause of death**, rates are **rising**, and it is **preventable**
- Suicide can be **an impulsive act**, and people use what they have
  - If attempters live, they have a **chance to get help**
  - If what they have is **very lethal and accessible**, they are likely to **die in the attempt**
- In some places those lethal means have been **coal ovens, pesticides, or paracetamol**. In the **US**, the most available and lethal means are **guns**
- **Patients and families** are not being made aware of the **suicide risks** posed by firearms– **or the tools available to them**
- **Screening** for firearm access, **regulating** access to firearms, **advising safe storage**, and generally **decreasing firearm prevalence** will likely save lives
  - In extreme situations, **Extreme Risk Protection Orders** can be filed

Maryland Suicide Completion by Firearm Type, 2003 - 2018



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Bibliography, 1

Anestis, M. D., & Anestis, J. C. (2015). Suicide rates and state laws regulating access and exposure to handguns. *AJPH*, *105*(10), 2049-2058.

Anglemyer, A., Horvath, T., & Rutherford, G. (2014). The Accessibility of Firearms and Risk for Suicide and Homicide Victimization Among Household Members A Systematic Review and Meta-analysis. *Annals of internal medicine*, *160*(2), 101-110.

Betz, M. E., Barber, C. W., & Miller, M. (2010). Firearm restriction as suicide prevention: variation in belief and practice among providers in an urban emergency department. *Injury prevention*, ip-2009.

Betz, M. E., Sullivan, A. F., Manton, A. P., Espinola, J. A., Miller, I., Camargo, C. A., & Boudreaux, E. D. (2013). Knowledge, attitudes, and practices of emergency department providers in the care of suicidal patients. *Depression and anxiety*, *30*(10), 1005-1012.

Berman AL, Athey A, Nestadt P. Effectiveness of restricting access to a suicide jump site: test of method substitution hypothesis. Inj Prev. 2021 Aug19.

Crifasi, C. K., Meyers, J. S., Vernick, J. S., & Webster, D. W. (2015). Effects of changes in permit-to-purchase handgun laws in Connecticut and Missouri on suicide rates. *Preventive medicine*, *79*, 43-49.

Dempsey, C. L., Benedek, D. M., Zuromski, K. L., Riggs-Donovan, C., Ng, T. H. H., Nock, M. K., ... & Ursano, R. J. (2019). Association of firearm ownership, use, accessibility, and storage practices with suicide risk among US Army soldiers. *JAMA network open*, *2*(6), e195383-e195383.

Frattaroli S, Hoops K, Irvin NA, McCourt A, Nestadt PS, Omaki E, Shields WC, Wilcox HC. Assessment of Physician Self-reported Knowledge and Use of Maryland's Extreme Risk Protection Order Law. JAMA network open. 2019 Dec 2;2(12):e1918037-e1918037.

Gunnell, D., Fernando, R., Hewagama, M., Priyangika, W. D. D., Konradsen, F., & Eddleston, M. (2007). The impact of pesticide regulations on suicide in Sri Lanka. International journal of epidemiology, *36*(6), 1235-1242.

Hawton, K., Simkin, S., Deeks, J., Cooper, J., Johnston, A., Waters, K., ... & Suri, D. (2004). UK legislation on analgesic packs: before and after study of long term effect on poisonings. Bmj, *329*(7474), 1076.

Hawton, K., Saunders, K. E., & O'Connor, R. C. (2012). Self-harm and suicide in adolescents. *The Lancet*, *379*(9834), 2373-2382.

Kann L, Kinchen S, Shanklin SL, et al. Youth risk behavior surveillance--United States, 2013. MMWR Surveill Summ. 2014;63 Suppl 4:1-168.

Kaufman, E. J., Morrison, C. N., Branas, C. C., & Wiebe, D. J. (2018). State firearm laws and interstate firearm deaths from homicide and suicide in the United States: a cross-sectional analysis of data by county. *JAMA internal medicine*.

Kivisto, AJ, & Phalen, PL(2018). Effects of Risk-Based Firearm Seizure Laws in CT and IN on Suicide Rates, 1981–2015. Psych services, appi-ps

Knopov, A., Sherman, R. J., Raifman, J. R., Larson, E., & Siegel, M. B. (2019). Household Gun Ownership and Youth Suicide Rates at the State Level, 2005–2015. American journal of preventive medicine, *56*(3), 335-342.

Kreitman, N. (1976). The coal gas story. United Kingdom suicide rates, 1960-71. *British journal of preventive & social medicine*, *30*(2), 86-93.

Loftin, C., McDowall, D., Wiersema, B., & Cottey, T. J. (1991). Effects of restrictive licensing of handguns on homicide and suicide in the District of Columbia. *New England Journal of Medicine*, *325*(23), 1615-1620.

Lang, Bree J. and Lang, Matthew, Pandemics, Protests and Firearms (July 12, 2020). SSRN (Preprint) http://dx.doi.org/10.2139/ssrn.3593956

Lyons, V. H., Haviland, M. J., Azrael, D., Adhia, A., Bellenger, M. A., Ellyson, A., ... & Rivara, F. P. (2020). Firearm purchasing and storage during the COVID-19 pandemic. Injury prevention. doi:10.1136/injuryprev-2020-043872

Lubin, G., Werbeloff, N., Halperin, D., Shmushkevitch, M., Weiser, M., & Knobler, H. Y. (2010). Decrease in suicide rates after a change of policy reducing access to firearms in adolescents: a naturalistic epidemiological study. *Suicide and Life-Threatening Behavior*, *40*(5), 421-424.

Bibliography, 2

Miller M, Warren M, Hemenway D, Azrael D. Firearms and suicide in US cities. Inj Prev. 2015;21(e1):e116-9.

Miller, M., Azrael, D., & Hemenway, D. (2006). Belief in the inevitability of suicide: results from a national survey. *Suicide & LTB*,*36*(1), 1-11.

Nestadt, P. S., Triplett, P., Fowler, D. R., & Mojtabai, R. (2017). Urban–Rural Differences in Suicide in the State of Maryland: The Role of Firearms. *American journal of public health*, *107*(10), 1548-1553.

Nestadt PS, MacKrell K, McCourt AD, Fowler DR, Crifasi CK. Prevalence of long gun use in Maryland firearm suicides. Injury Epidem. 2020 Dec 1;7(1):4.

O'Donnell I, Arthur AJ, & Farmer RDJ. (1994). A follow-up study of attempted railway suicides. *Social science & medicine*, *38*(3), 437-442.

Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm. *The British Journal of Psychiatry*, *181*(3), 193-199.:

Parker, K., Horowitz, J., Igielnik, R., Oliphant, B., & Brown, A. (2017). America's complex relationship with guns: An in-depth look at the attitudes and experiences of US adults. Pew Research Center.

Ranney, M. L., Betz, M.E. (2016). Discussing Firearms with ED Patients: Why, Who, Where, When, and What. *Emergency Medicine Reports*, *37*(13).

Rudolph KE, Stuart EA, Vernick JS, Webster DW. Association Between Connecticut's Permit-to-Purchase Handgun Law and Homicides. Am J Public Health. 2015;105(8):e49-54.

Seiden, R. H. (1978). Where Are They Now? A Follow-up Study of Suicide Attempters from the Golden Gate Bridge. *Suicide and Life-Threatening Behavior*, *8*(4), 203-216.

Simon OR, Swann AC, Powell KE, Potter LB, Kresnow MJ, O'carroll PW. Characteristics of impulsive suicide attempts and attempters. Suicide Life Threat Behav. 2001;32(1 Suppl):49-59.

Steelesmith, D. L., Fontanella, C. A., Campo, J. V., Bridge, J. A., Warren, K. L., & Root, E. D. (2019). Contextual Factors Associated With County-Level Suicide Rates in the United States, 1999 to 2016. JAMA Network Open, 2(9), e1910936-e1910936.

Swanson, J. W., Norko, M., Lin, H-J., et al. Implementation and Effectiveness of Connecticut's Risk-Based Gun Removal Law: Does It Prevent Suicides?, 80 Law and Contemporary Problems, pp. 179-208 (August 2016)

SAMHSA, 2013 NSDUH: Mental Health Findings, NSDUH Series H-49, HHS Publication No. (SMA) 14-4887. Rockville, MD

Vars, F. (2020). Voluntary do-no-sell lists - An innovative approach to reducing gun suicides. The New England Journal of Medicine, 383,1299-1301.

Virginia Legislative Information System. (2020). 52-51. Voluntary enrollment and removal. Virginia law. https://law.lis.virginia.gov/vacode/title52/chapter12/section52-51/

Vyrostek SB, Annest JL, Ryan GW. Surveillance for fatal and nonfatal injuries–United States, 2001. MMWR. 2004:53(SS07);1-57.

Webster, D. W., Vernick, J. S., Zeoli, A. M., & Manganello, J. A. (2004). Association between youth-focused firearm laws and youth suicides. *Jama*, *292*(5), 594-601.

Webster, D., Crifasi, C. K., & Vernick, J. S. (2014). Effects of the repeal of Missouri's handgun purchaser licensing law on homicides. *Journal of Urban Health*, *91*(2), 293-302.

Wintemute, G. J., Pear, V. A., Schleimer, J. P., Pallin, R., Sohl, S., Kravitz-Wirtz, N., & Tomsich, E. A. (2019). Extreme risk protection orders intended to prevent mass shootings: a case series. Annals of internal medicine.