



JOHNS HOPKINS
M E D I C I N E

Suicide and Lethal Means

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Objectives:

Review the epidemiology of suicide

Illustrate the importance of lethal means access in suicide risk

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Leading Causes of Death in US, by Age Group

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

2019:

- **47,511 Suicides**
- 16,425 Homicides

Suicide is the Overall
10th Leading Cause of
Death in US

2nd most common cause
of death for **Young
Americans**



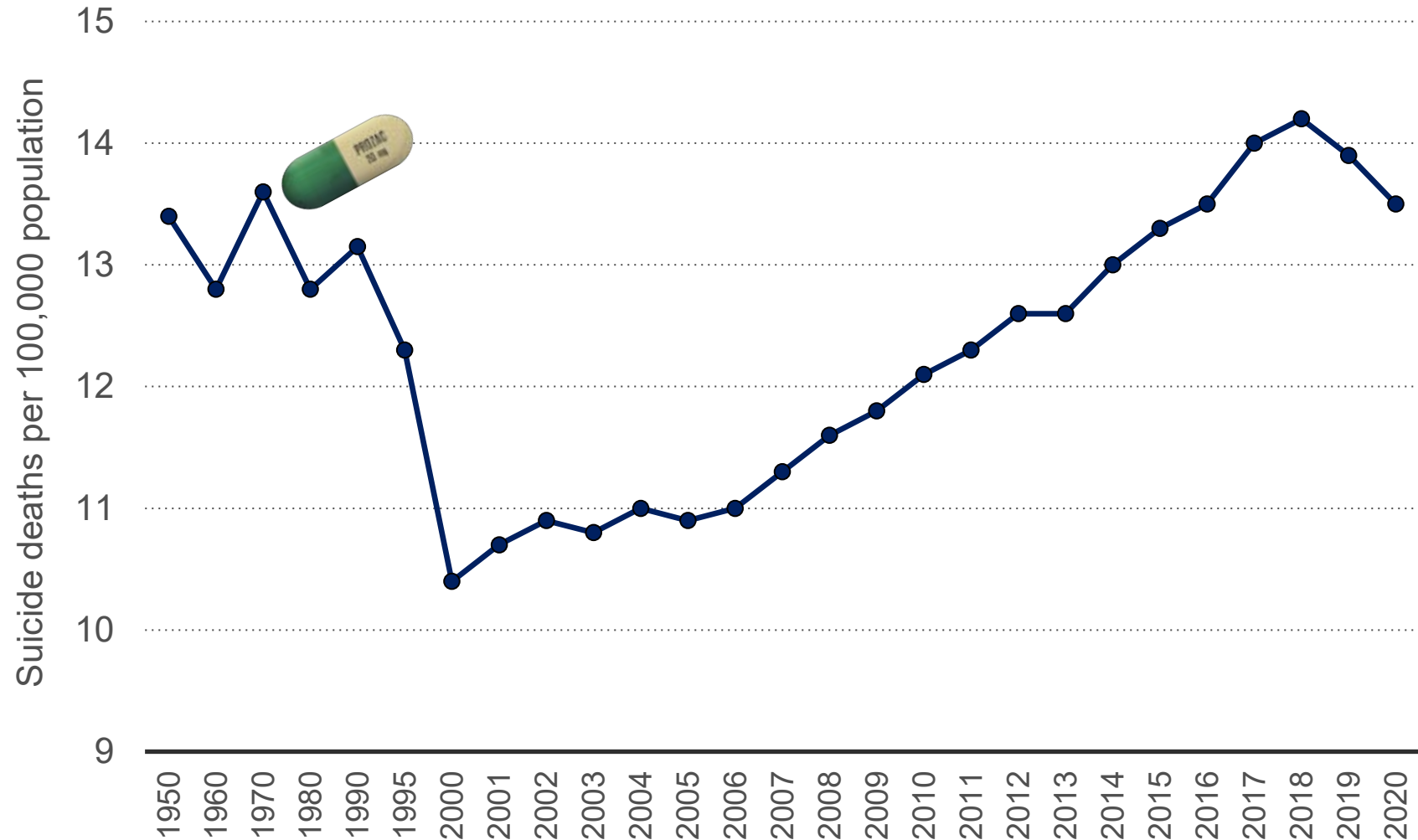
Suicide Deaths increased for 20 years-- now maybe decreasing

Annual US Suicide Rate
(Age Adjusted):

13.48 per 100K (2020)

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

Slight decreases in 2019-2020



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

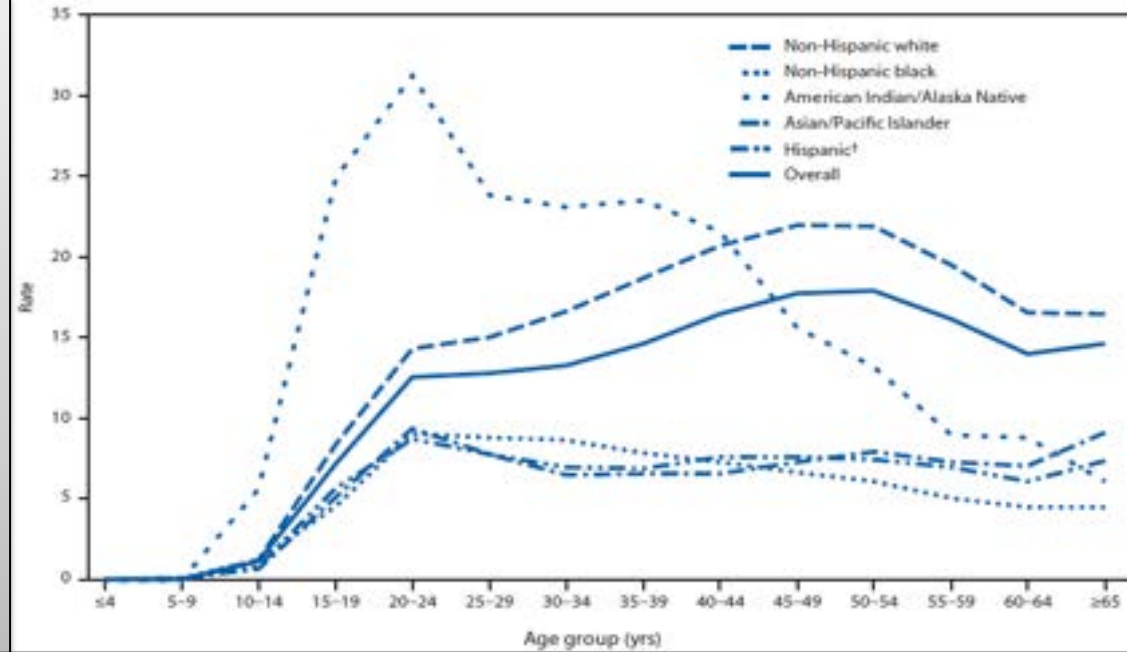
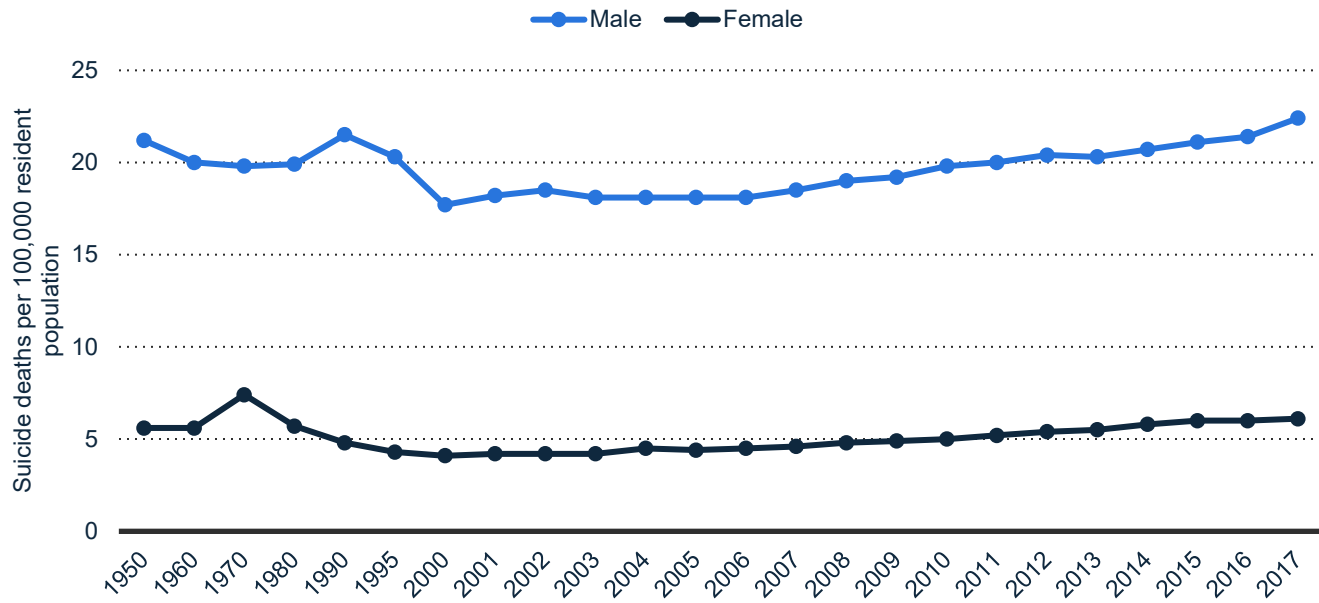
- ▶ Family history of suicide
- ▶ Male sex, white race
- ▶ Terminal illness, etc.

Other important factors can be addressed

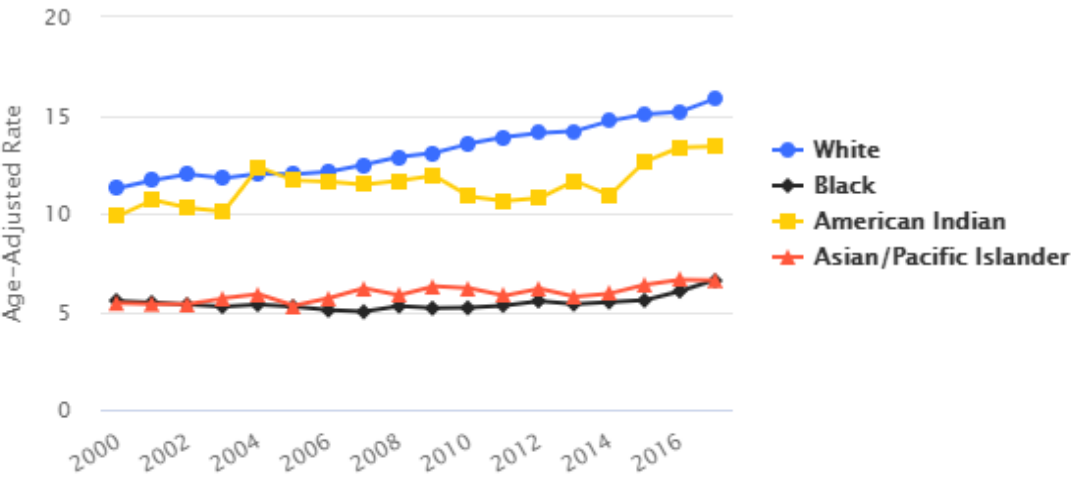
- ▶ Social isolation, Poverty
- ▶ **Access to lethal means**
- ▶ **Mental Illness**
 - **Psychiatric disorders** are among the most **significant** modifiable risk factors



Suicide in The United States

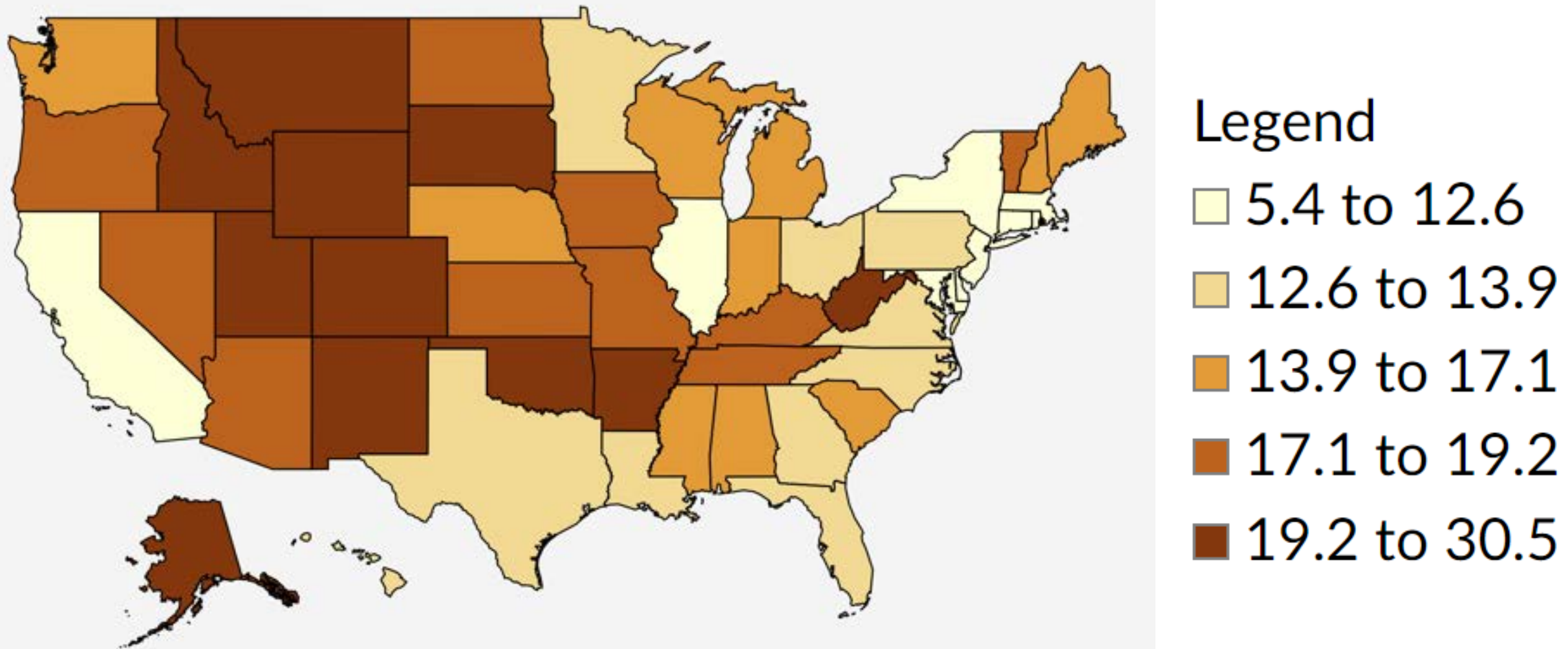


Suicide Rates by Ethnicity from 2000 to 2017



- Completed suicides are predominantly male (78%)
- Caucasians complete suicide at more than double the rate of African Americans
- Rate peaks around age 50 and ages 80+
 - African Americans & AI/AN peak suicide rate at age 20

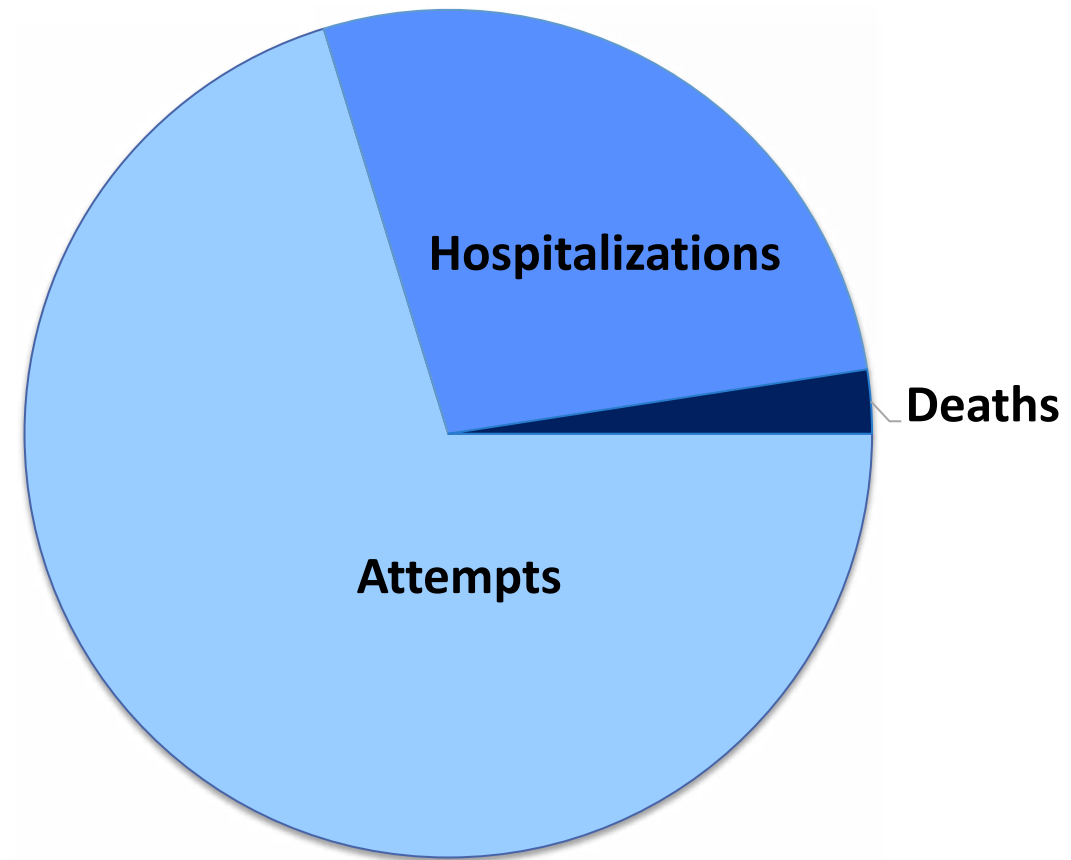
Suicide rates by state -- United States, 2020



Suicide Attempts in the United States

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

- Estimated **1.4M adults attempt suicide annually**
- About **0.4M adults** are **admitted to the hospital** for suicide attempts each year
- About **47,000 die** by suicide each year



Suicide Attempts and Mortality

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

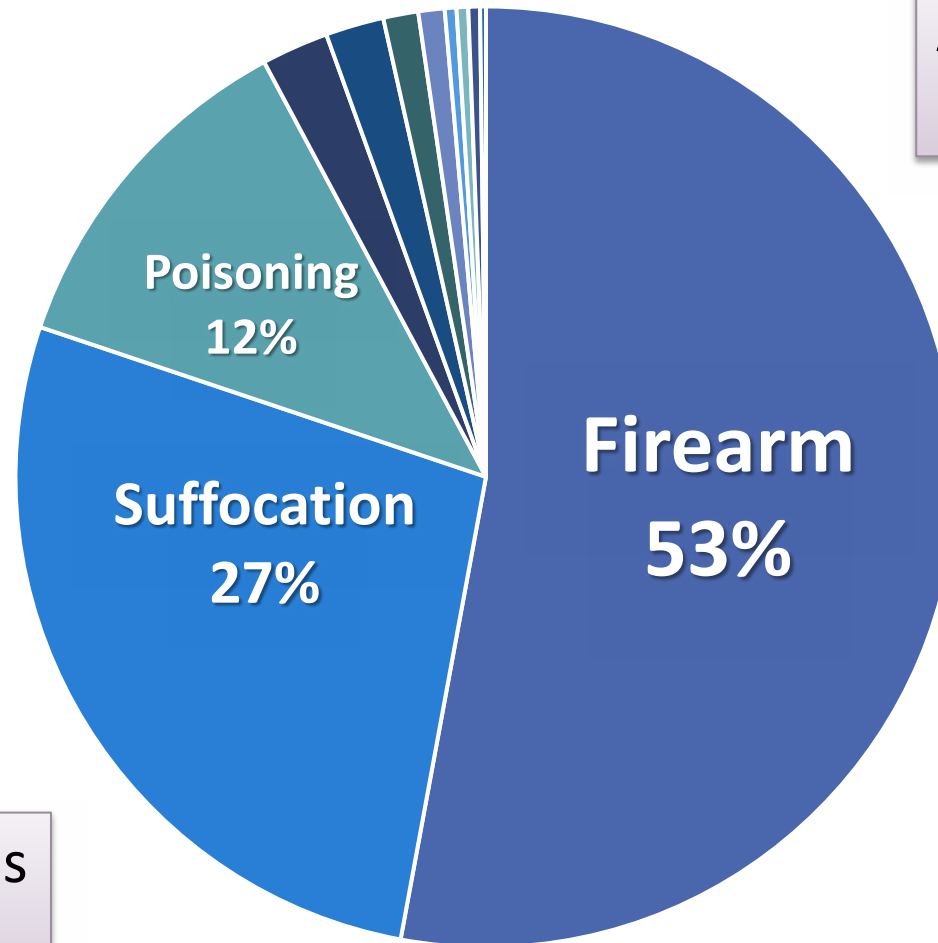
Method	Deaths	Attempts	% Fatal
Firearm	156,901	175,190	89.6%
Poisoning	43,868	2,366,014	1.9%
Gas	8,659	28,417	30.5%
Hanging	76,688	145,568	52.7%
Drowning	3,115	5,527	56.4%
Cutting	5,539	784,309	0.7%
Jump/ Crash	9,875	35,836	27.6%
Other	4,732	275,589	1.7%
Total	309,377	3,816,450	8.1%

Suicide Methods in The United States

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

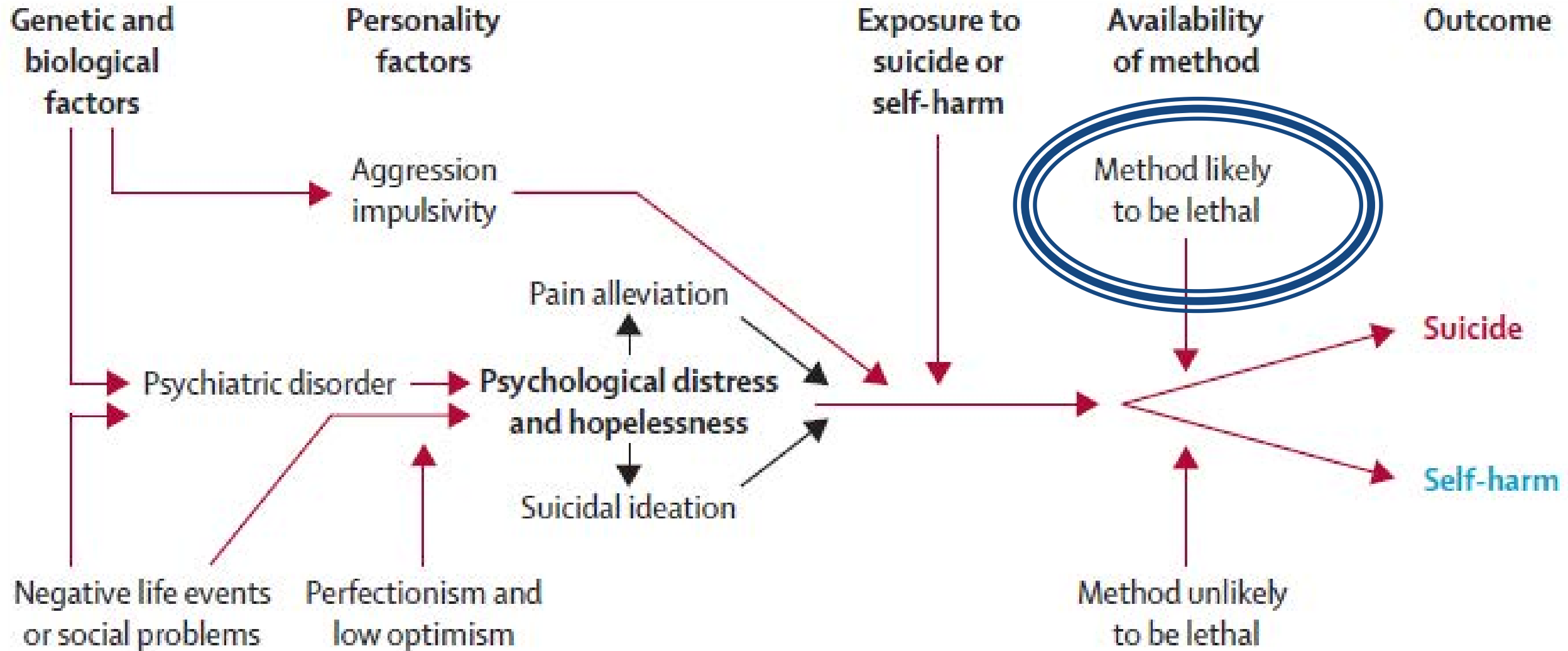
Those become half of all suicide *deaths*.

Among **Veterans**, firearms are used in 67% of suicide deaths



The **majority** of gun deaths in the US are suicides

Pathway and Key Risk Factors for Self Harm and Suicide



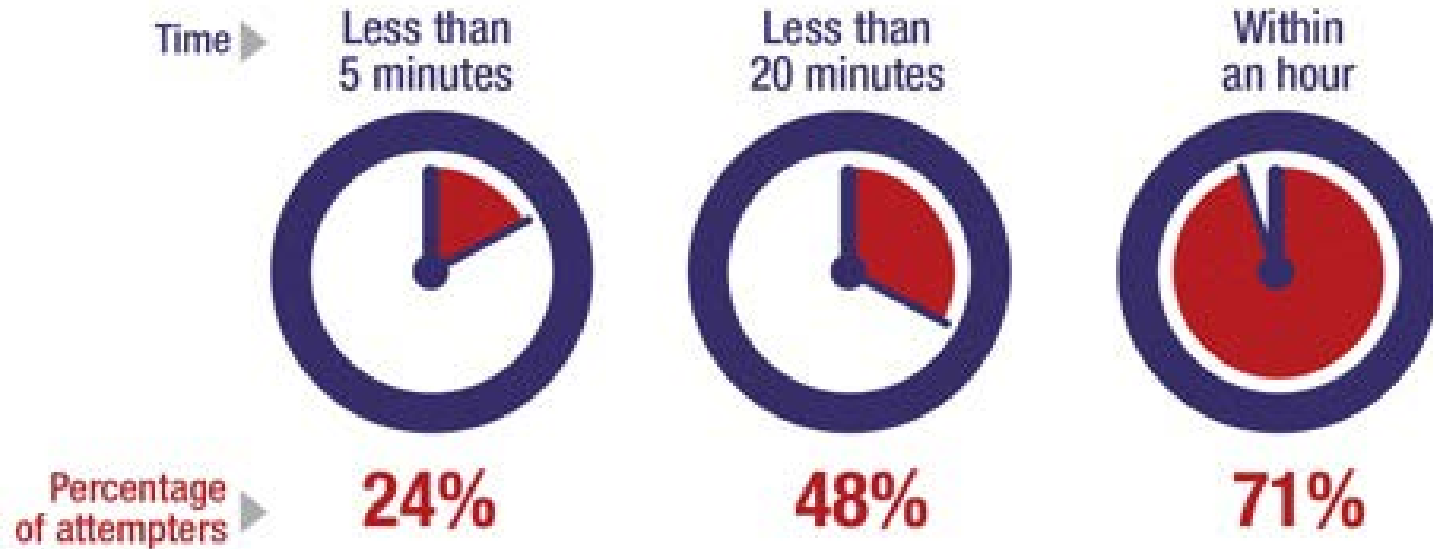


**The Choice of Method is a Consequence of
Method Availability**

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

Time Elapsed between Decision and Suicide Attempt



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

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

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)

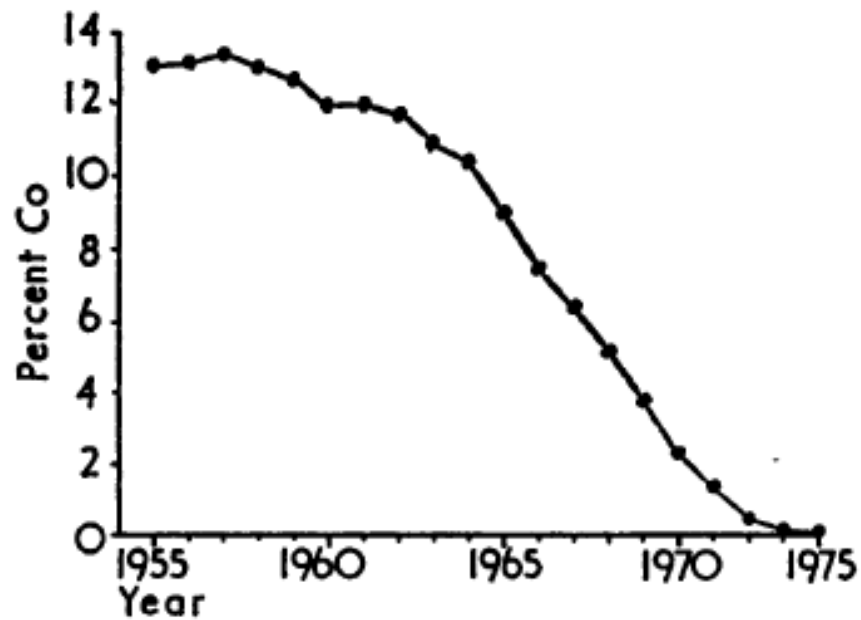


FIG. 3. Percentage of CO in domestic gas, United Kingdom 1955-74.

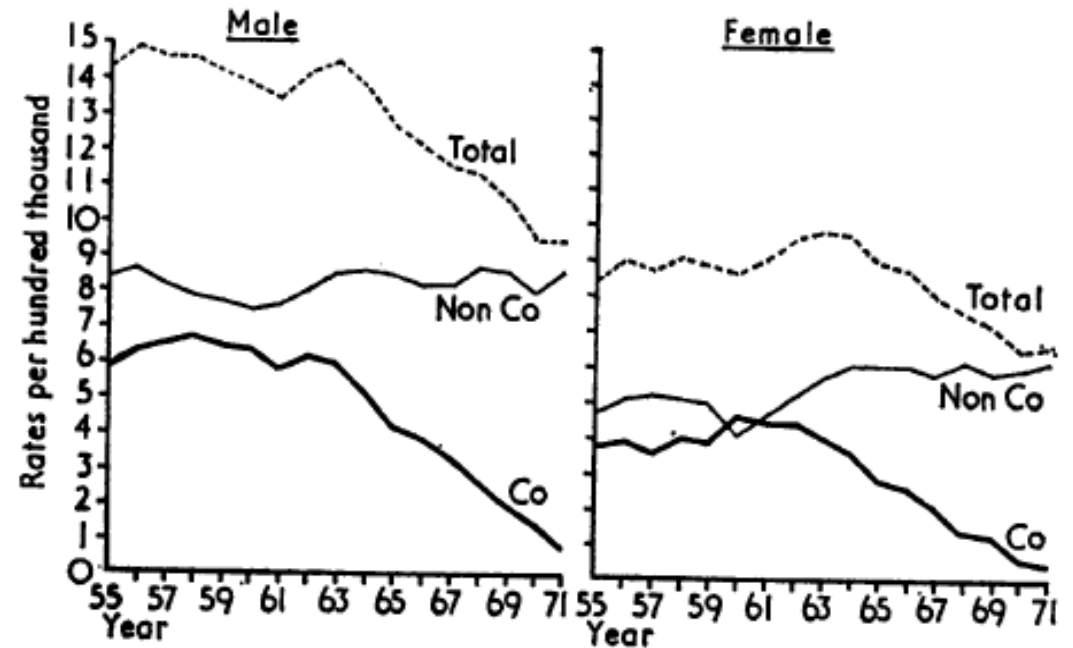
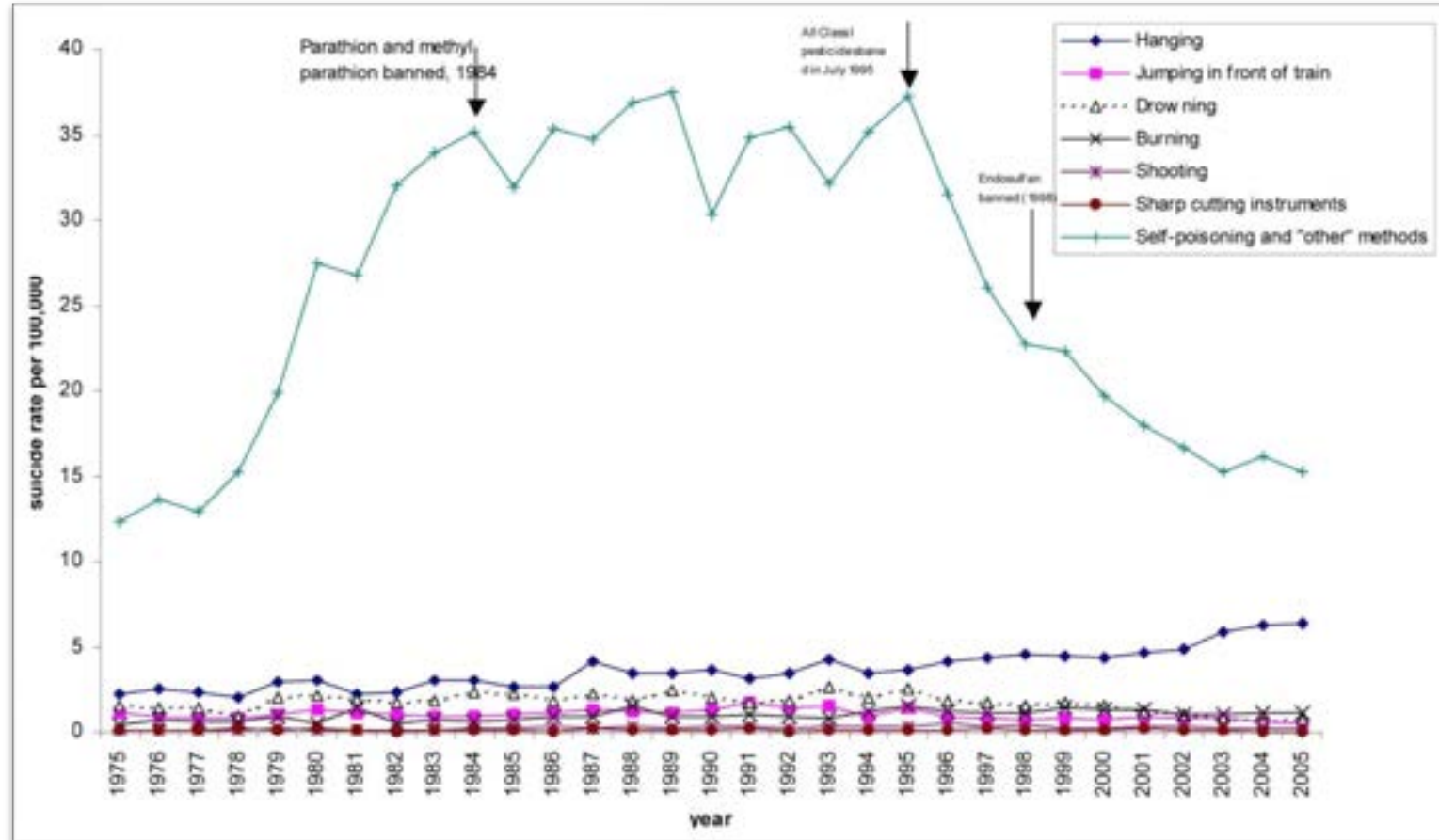


FIG. 4. England and Wales: sex-specific suicide rates by mode of death.

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


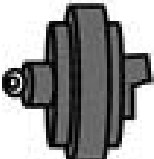
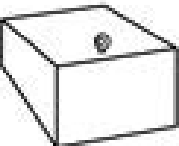
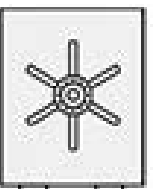




Regulations Which Reduce Gun Access Are Effective




- ▶ When DC began requiring **gun licensing in 1976**, firearm suicides **dropped 23%**, with no replacement (Loftin et al. 1991)
- ▶ Webster et al. (2004) found that **child access prevention laws**, requiring safe storage of firearms, decreased suicide rates among **14-17 year-olds by 8.3%**
- ▶ 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.

Safe Storage Options

Retain Possession

Option	Description	Notes
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	Option	Description	Notes
	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

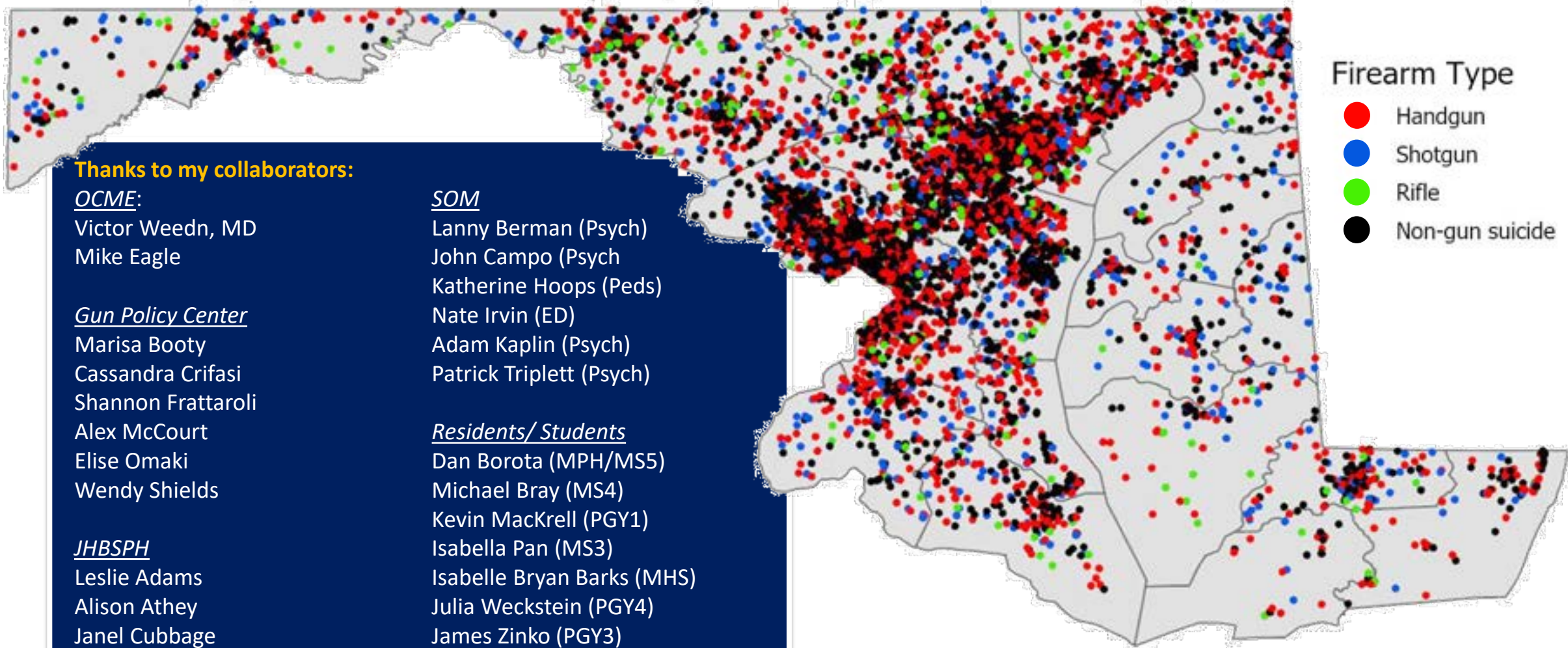
MARYLAND'S SAFE STORAGE MAP:
<https://mdpgv.org/safestoragemap>

A white lifebuoy with blue stripes is hanging from a metal railing. The background is dark and out of focus, suggesting an outdoor setting at night or in low light. The railing consists of several horizontal bars. The lifebuoy is made of foam and has a rope attached to it.

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**
- ▶ **Screening** for firearm access, **regulating** access to firearms, **requiring safe storage**, and generally **decreasing firearm prevalence** will likely save lives

Maryland Suicide Completion by Firearm Type, 2003 - 2018



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