



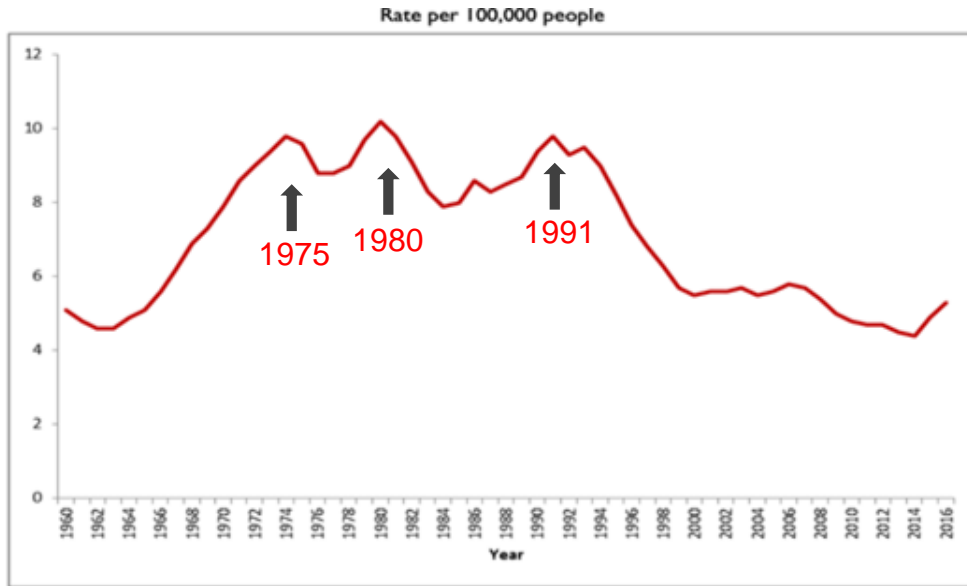
Gun ownership as a risk factor for homicide in the home

(Kellermann et al., 1993)

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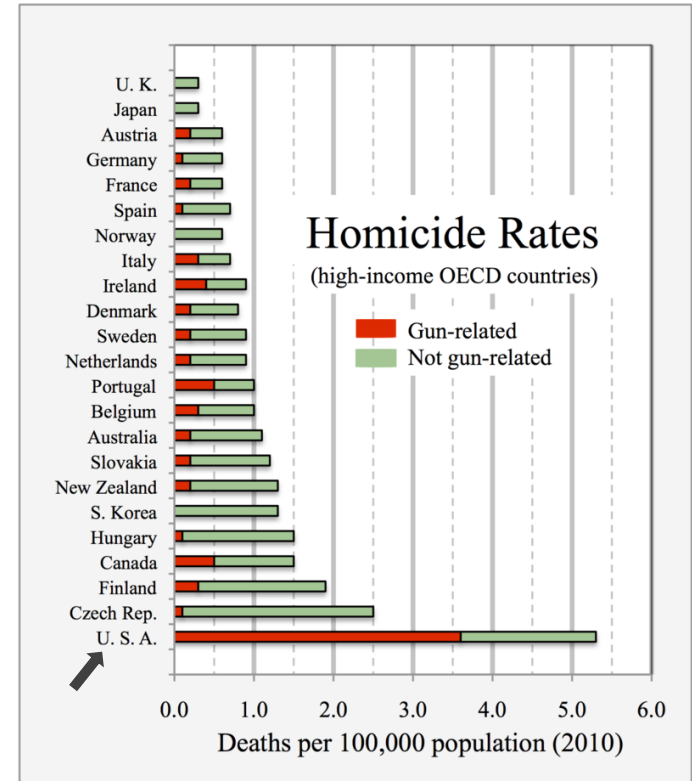
Background & Significance

Homicides in United States



Source: Sourcebook of Criminal Justice Statistics, Table 3.106.2012; Federal Bureau of Investigation, Crime in the United States 2016, Table 1.

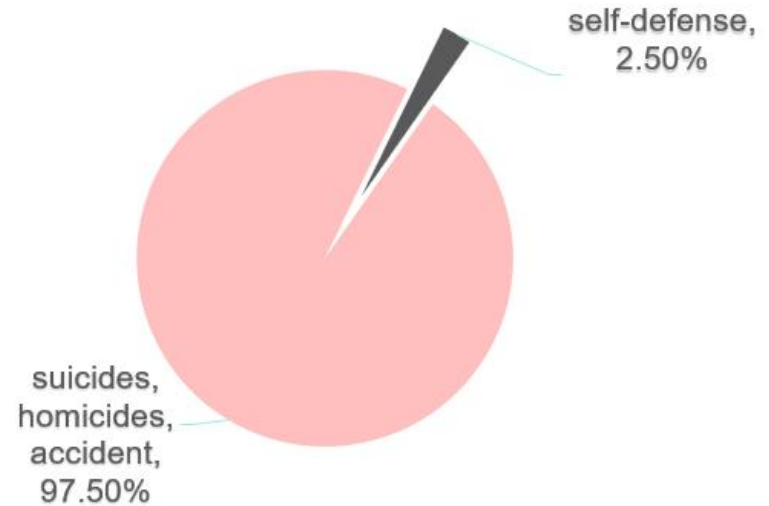
(James, 2018)



(Grinshteyn, 2010)

Guns for Self-protection?

Is it true?



(Kellermann & Reay, 1986)

Gun-ownership & Homicides Rate



(Kellermann et al., 1993)

People who keep guns at home have a higher risk of homicide in the home

(Miller, Hemenway, & Azrael, 2007)

In U.S., the state with higher levels of household gun ownership had higher homicide rates

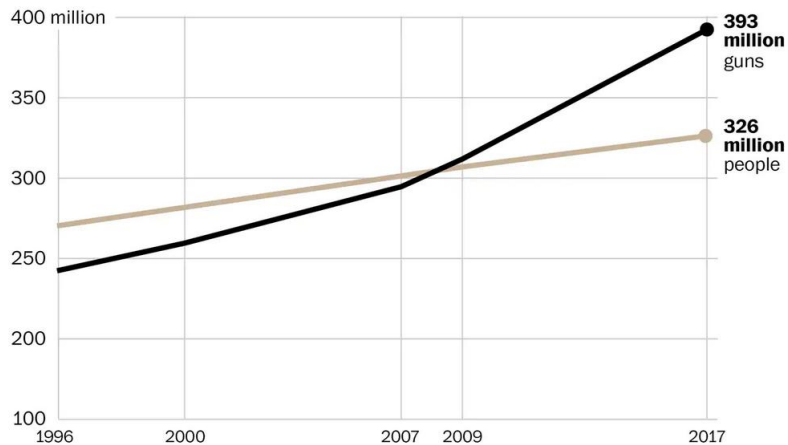
(Hemenway & Miller, 2000)

Among the 26 developed countries, there are usually more homicides in the regions which have less gun control

Gun-ownership & Homicides Rate

More guns than people

Number of civilian firearms in the U.S. vs total U.S. population

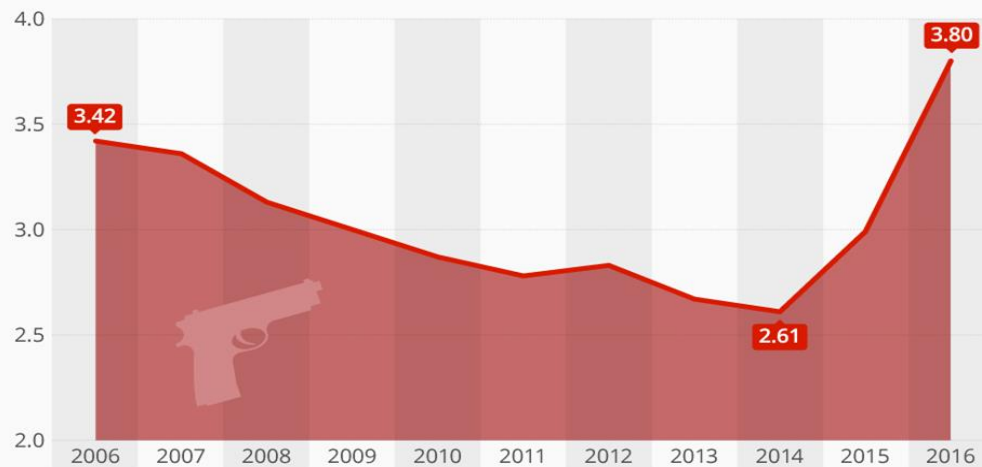


Sources: Congressional Research Service (1994 – 2009),
Small Arms Survey (2017), U.S. Census

WAP0.ST/WONKBLOG

(“Small Arms Survey,” 2017)

Homicides by firearm per 100,000 population in the United States



@StatistaCharts

Source: FBI

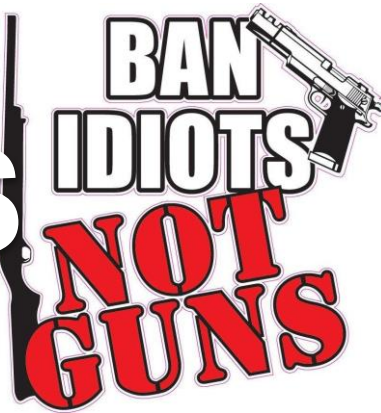
statista

(“FBI – Crime in the U.S.,” 2016)

Ban Guns or not



V/\$



Study Design

(Case Control study)

Selection of Cases



All homicides between 08/23/1987 ~ 08/23/1992 **1860 homicides**

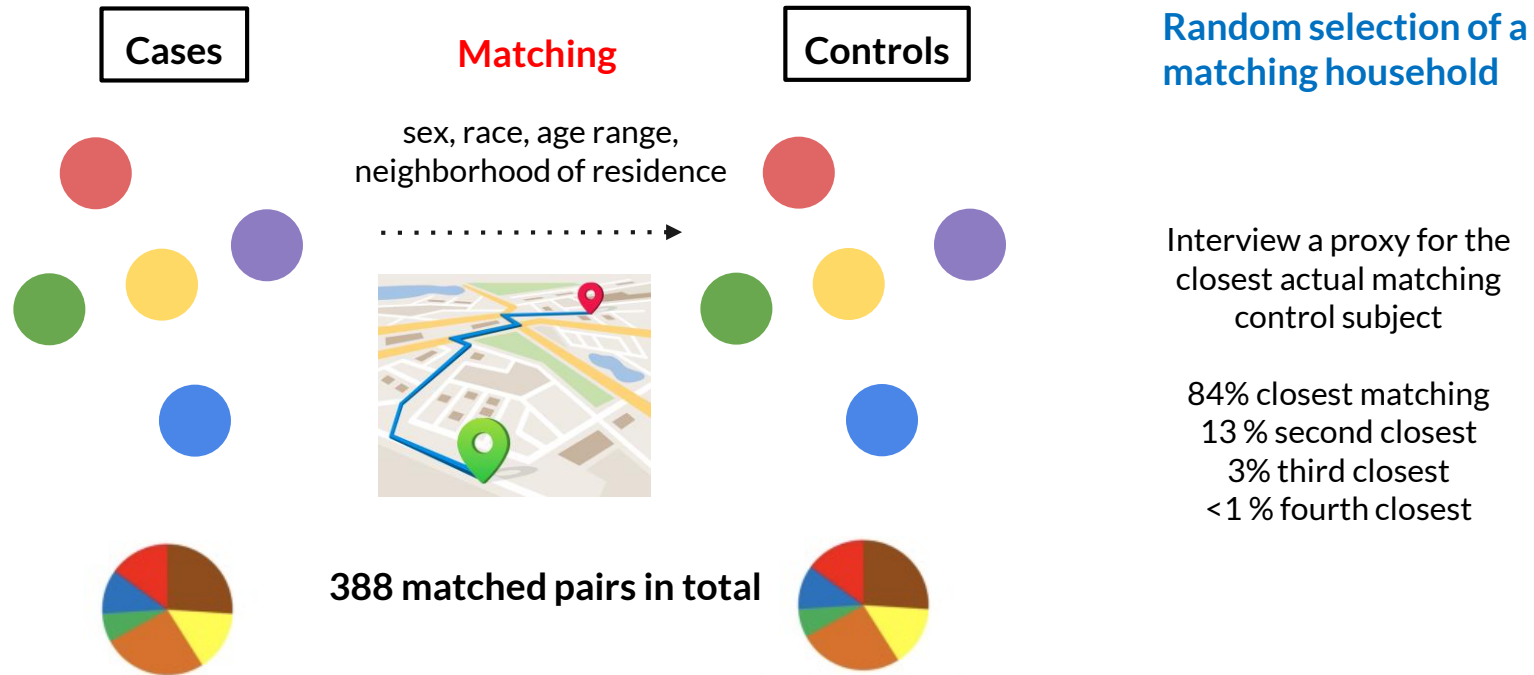
homicides took place in the home of victim **444 homicides**

Excluding criteria

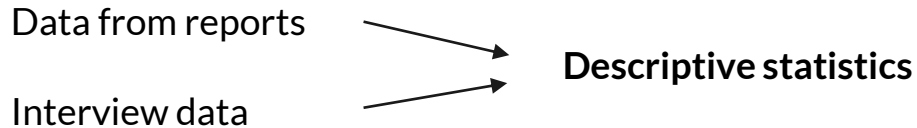
420 cases for study
(persons close to the victim served as case proxies)

Crime report +
Interviews to collect data

Selection of Controls



Statistical Analysis



- (1) Univariate analysis → **Crude OR**
Mantel-Haenszel chi-square analysis
- (2) Multivariate analysis → **Adjusted OR / Confounder**
conditional logistic regression
- (3) Stratification → **Effect Measure Modifier**
conditional logistic regression with control for covariates

Background

Study Design

Results

Discussion

Q&A

Results

Comparability of Case Subjects and Controls

Similarity

- Sex, race age, education and socioeconomic status of the victims and controls were similar.

Difference

- Case subjects were more likely to have rented their homes and to have lived alone.

CHARACTERISTIC	CASE SUBJECTS	CONTROLS
Sex (%)		
Male	63.1	63.1
Female	36.9	36.9
Race or ethnic group (%)		
White	32.9	34.5
Black	62.1	61.6
Native American, Eskimo, Aleut	1.0	0.5
Asian or Pacific Islander	2.8	2.8
Other	1.0	0.5
Age group — yr (%)		
15–24	13.1	13.1
25–40	40.2	40.5
41–60	26.0	26.0
≥61	20.6	20.4
Median years of education of household head	12	12
Median socioeconomic status of household head†	4	4
Type of dwelling (%)		
House	54.6	60.3
Other	45.4	39.7
Rented	70.4	47.3
Owned	29.6	52.7
Median no. of residents/room	0.5	0.6
Lived alone (%)	26.8	11.9
Telephone interview (%)	40.2	12.6
Proxy respondents in- terviewed	100	48.2

Univariate Analysis

VARIABLE	CASE SUBJECTS	CONTROLS	CRUDE ODDS RATIO (95% CI)*
no. (%)†			
Behavioral factors			
Any household member drank alcoholic beverages	277 (73.3)	217 (55.9)	2.4 (1.7–3.3)
Case subject or control drank alcoholic beverages	238 (62.8)	162 (41.9)	2.6 (1.9–3.5)
Drinking caused problems in the household	Alcohol 92 (24.8)	22 (5.7)	7.0 (4.2–11.8)
Any household member had trouble at work because of drinking	32 (9.0)	3 (0.8)	10.7 (4.1–27.5)
Case subject or control had trouble at work because of drinking	20 (5.5)	1 (0.3)	20.0 (4.9–82.4)
Any household member hospitalized because of drinking	41 (11.4)	9 (2.3)	9.8 (4.2–22.5)
Case subject or control hospitalized because of drinking	28 (7.6)	2 (0.5)	14.0 (4.7–41.6)
Any household member used illicit drugs	111 (31.3)	23 (6.0)	9.0 (5.4–15.0)
Case subject or control used illicit drugs	Illicit-drug 74 (20.3)	16 (4.2)	6.8 (3.8–12.0)
Any physical fights in the home during drinking	92 (25.3)	13 (3.4)	8.9 (5.2–15.3)
Any household member hit or hurt in a fight in the home	117 (31.8)	22 (5.7)	7.9 (5.0–12.7)
Any family member required medical attention because of a fight in the home	62 (17.3)	8 (2.1)	10.2 (5.2–20.0)
Any adult household member involved in a physical fight outside the home	Previous violence 103 (29.9)	70 (18.8)	2.1 (1.4–3.0)
Any household member arrested	193 (52.7)	90 (23.4)	4.2 (3.0–6.0)
Case subject or control arrested	132 (36.0)	60 (15.7)	3.5 (2.4–5.2)

Alcohol

Illicit-drug

Previous violence

Environmental factors

Home rented	271 (70.4)	183 (47.6)	5.9 (3.8–9.2)
Public housing	41 (11.1)	38 (9.8)	1.5 (0.7–3.3)
Case subject or control lived alone	103 (26.8)	46 (11.9)	3.4 (2.2–5.1)
Deadbolt locks	243 (68.8)	292 (75.3)	0.8 (0.5–1.0)
Window bars	71 (19.2)	81 (20.9)	0.8 (0.5–1.3)
Metal security door	95 (25.4)	104 (26.8)	0.9 (0.6–1.3)
Burglar alarm	26 (7.1)	43 (11.1)	0.6 (0.4–1.0)‡
Controlled security access to residence	52 (13.9)	38 (9.8)	2.3 (1.2–4.4)
Dog or dogs in home	94 (24.2)	87 (22.4)	1.1 (0.8–1.6)
Gun or guns in home	174 (45.4)	139 (35.8)	1.6 (1.2–2.2)
Handgun	135 (35.7)	90 (23.3)	1.9 (1.4–2.7)
Shotgun	50 (13.6)	65 (16.8)	0.7 (0.5–1.1)
Rifle	45 (12.2)	54 (13.9)	0.8 (0.5–1.3)
Any gun kept unlocked	105 (29.6)	69 (17.8)	2.1 (1.4–3.0)
Any gun kept loaded	93 (26.7)	48 (12.5)	2.7 (1.8–4.0)
Guns kept primarily for self-defense	125 (32.6)	86 (22.2)	1.7 (1.2–2.4)

Gun in the home

Six variables were retained in the final conditional logistic-regression model

Multivariate Analysis

VARIABLE	ADJUSTED ODDS RATIO (95% CI)
Home rented	4.4 (2.3–8.2)
Case subject or control lived alone	3.7 (2.1–6.6)
Any household member hit or hurt in a fight in the home	4.4 (2.2–8.8)
Any household member arrested	2.5 (1.6–4.1)
Any household member used illicit drugs	5.7 (2.6–12.6)
Gun or guns kept in the home	2.7 (1.6–4.4)

- Each variable was strongly and independently associated with an increased risk of homicide in the home.
- After matching for four characteristics (sex, race, age, neighborhood of residence) and controlling for the effects of five more (variables in the left table):

One or more firearms in the home was strongly associated with an increased risk of homicide in the home

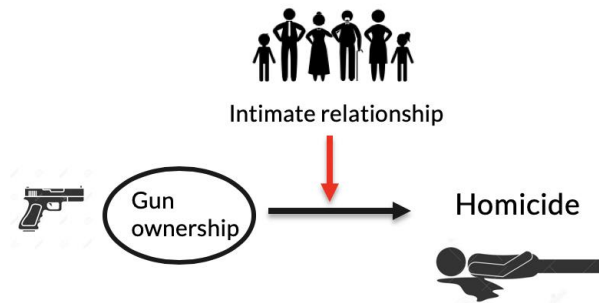
Stratified Analysis

SUBGROUP	NO. OF PAIRS	ADJUSTED ODDS RATIO (95% CI)*
Sex		
Female	121	3.6 (1.6–8.1)
Male	195	2.3 (1.1–4.6)
Race		
White	103	2.7 (1.0–6.9) [†]
Black	196	2.9 (1.5–5.7)
Age (yr)		
15–40	169	3.4 (1.4–8.0)
≥41	147	2.3 (1.2–4.6)
Suspect related to or intimate with victim		
Yes	138	7.8 (2.6–23.2)
No	178	1.8 (1.0–3.4)
Evidence of forced entry		
Yes	46	2.5 (0.7–8.4)
No	219	2.8 (1.5–5.2)
Victim resisted assailant		
Yes	141	3.0 (1.3–6.2)
No	105	3.1 (1.2–8.1)
Method of homicide		
Firearm	159	4.8 (2.2–10.3)
Other	157	1.2 (0.5–2.7)

Homicide in the Home in Relation to **Gun Ownership** (Outcome) (Exposure)

Effect Measure Modification

Gun ownership was most strongly associated with homicide **at the hands of a family member or intimate acquaintance.**



Background

Study Design

Results

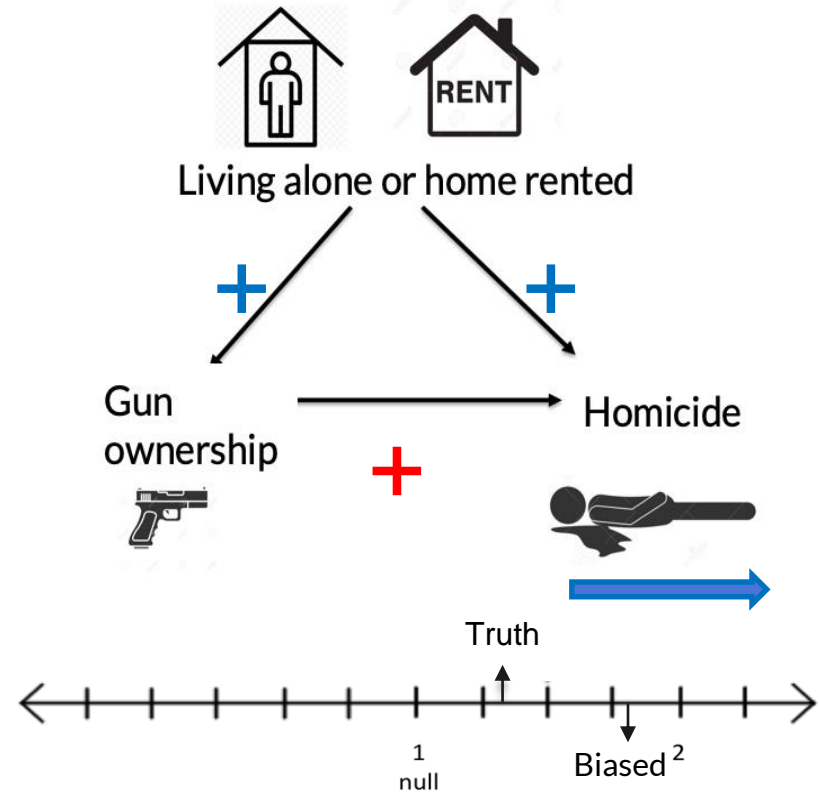
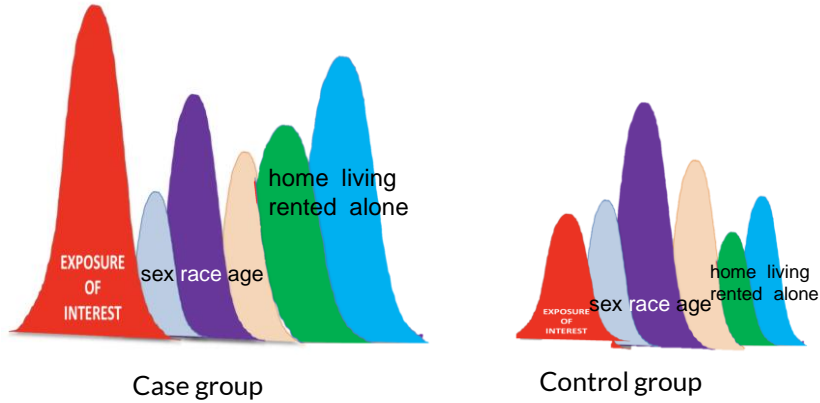
Discussion

Q&A

Discussion

Confounder

Matching



Selection bias

444 homicides 388 matched pairs 316 final model



Information bias

Tests:

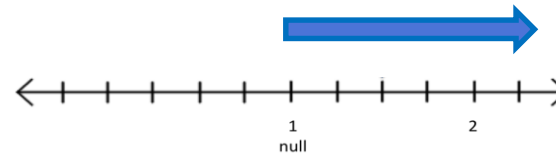
Alcoholism, Gun ownership

Recall bias:

Tragedy, Memory loss

Sensitive information:

Nondifferential misclassification



Strength and Limitations

Generalizability: Limited

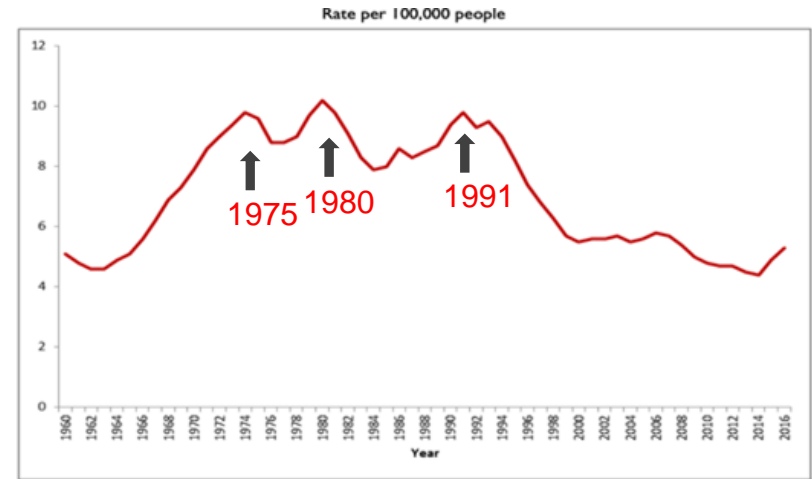
- Rural and Hispanic citizens
- Nationwide or worldwide
- Current situation in 2019

Confounding: MAYBE

- Psychological confounding
- Unknown third factor: gang members

Public Health significance

- Appropriately designed and structured
- First researches: gun issues



Source: Sourcebook of Criminal Justice Statistics, Table 3.106.2012; Federal Bureau of Investigation, Crime in the United States 2016, Table 1.

Reference:

- FBI — Crime in the U.S. (2016). Retrieved September 25, 2019, from Federal Bureau of Investigation website: <https://ucr.fbi.gov/crime-in-the-u.s>
- Grinshteyn, Erin; Hemenway, David (March 2016). "Violent Death Rates: The US Compared with Other High-income OECD Countries, 2010". The American Journal of Medicine. 129 (3): 266–273. doi:10.1016/j.amjmed.2015.10.025. PMID 26551975. (Table 4). (PDF).
- Ingraham, C. (2018). There are more guns than people in the United States, according to a new study of global firearm ownership. The Washington Post.
- James, N. (2018). Recent Violent Crime Trends in the United States. R45236.

Question:
Do you think there is a
casual relationship
between gun ownership
and homicide in the home?

Hill's guidelines:

No

- Strength of association : 2.7(small)
- Temporality: case-control study
- Biological gradient: more guns

Yes

- Consistency : literatures

Thank you !

Stratified Analysis

SUBGROUP	NO. OF PAIRS	ADJUSTED ODDS RATIO (95% CI)*
Sex		
Female	121	4.4 (1.6–11.9)
Male	195	4.4 (1.5–12.6)
Race		
White	103	6.9 (1.7–27.6)
Black	196	2.9 (1.2–7.3)
Age (yr)		
15–40	169	5.2 (1.7–16.0)
≥41	147	4.5 (1.7–12.0)
Suspect related to or intimate with victim		
Yes	138	20.4 (3.9–104.6)
No	178	1.9 (0.8–4.7)
Victim resisted assailant		
Yes	141	7.2 (2.1–25.3)
No	105	4.0 (1.0–17.0)
Evidence of forced entry		
Yes	46	1.4 (0.4–4.4)
No	219	8.1 (2.8–23.1)
Method of homicide		
Firearm	159	3.1 (1.0–9.0)
Other	157	5.4 (1.9–15.6)

Homicide in the Home in Relation to **Prior Domestic Violence**
(Outcome) (Exposure)

Effect Measure Modification

Virtually all of this increased risk was due to a marked association between prior domestic violence and homicide **at the hands of a family member or intimate acquaintance**

Some Interesting Results

CHARACTERISTIC	No. (%) OF VICTIMS
Scene	
Inside residence	373 (88.8)
Within immediate property line	47 (11.2)
Sex of victim	
Female	155 (36.9)
Male	265 (63.1)
Race or ethnic group of victim	
White	140 (33.3)
Black	260 (61.9)
Native American, Eskimo, Aleut	4 (1.0)
Asian or Pacific Islander	7 (1.7)
Other	9 (2.1)
Age group of victim (yr)	
15–24	58 (13.8)
25–40	171 (40.7)
41–60	106 (25.2)
≥61	85 (20.2)
Circumstances	
Altercation or quarrel	185 (44.0)
Romantic triangle	29 (6.9)
Murder–suicide	19 (4.5)
Felony-related	92 (21.9)
Drug dealing	32 (7.6)
Homicide only	56 (13.3)
Other	7 (1.7)

1. Most homicides occurred inside the victim's home

2. A majority of homicides in the context of quarrel or a romantic triangle, drug dealing

3. 76.7% victims were killed by a relative or someone known to them

4. 49.8% victims died from gunshot wounds

Relationship of offender to victim	
Spouse	70 (16.7)
Intimate acquaintance	58 (13.8)
First-degree relative	40 (9.5)
Other relative	12 (2.9)
Roommate	12 (2.9)
Friend or acquaintance	130 (31.0)
Police officer	4 (1.0)
Stranger	15 (3.6)
Unknown (unidentified suspect)	73 (17.4)
Other	6 (1.4)
Method of homicide	
Handgun	180 (42.9)
Rifle	10 (2.4)
Shotgun	15 (3.6)
Unknown firearm	4 (1.0)
Knife or sharp instrument	111 (26.4)
Blunt instrument	49 (11.7)
Strangulation or suffocation	27 (6.4)
Burns, smoke, scalding	10 (2.4)
Other	14 (3.3)
Victim resisted assailant	
Yes	184 (43.8)
No	140 (33.3)
Not noted	96 (22.9)
Evidence of forced entry	
Yes	59 (14.0)
No	354 (84.3)
Not noted	7 (1.7)
Legally excusable circumstances	
Yes	15 (3.6)
No	405 (96.4)

