

Some Study Design Issues in Social Epidemiology

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An Example

Does ready access to a gun increase or decrease the risk of becoming a homicide victim?

Study #1: (Kellermann, et al.)

Design	Case-control study
Cases	388 homicide victims killed in their homes, from 3 urban counties
Controls	388 non-victims, matched on age, sex, race, and neighborhood of residence
Exposure	Keeping a gun in the home

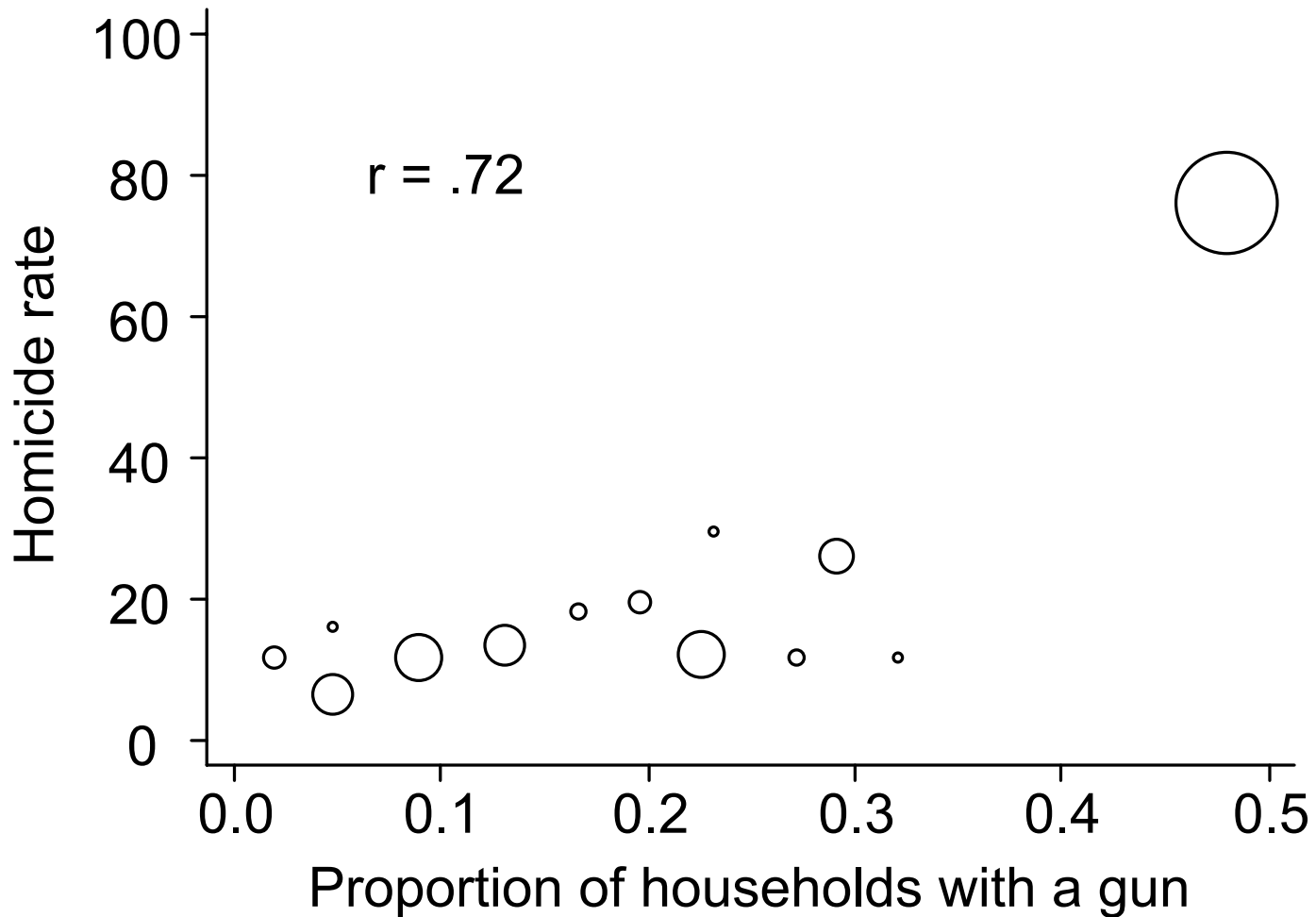
Study #1: Results

- OR = 2.7
- Adjusted for living alone, rental residence, illicit drug user in household, prior arrests, history of being hurt in fight in the home

Study #2: (Killias)

Design	Ecological study
Study units	14 countries participating in an international crime survey
Outcome	Homicide rate
Exposure	Proportion of households with a gun, per telephone survey

Study #2: Results



What's the relevant exposure?

<u>Option</u>	<u>Level</u>
Presence of a gun in the household	Individual
Proportion of households with a gun	Population (aggregate)

- Both could play a causal role
- Both are potentially modifiable
- Each design can only investigate one of them

Study #3: (Hypothetical)

Design	Multi-community case-control
Cases	Homicide victims killed in their homes, drawn from multiple communities
Controls	Non-victims from same set of communities, but NOT matched on community

Study #3: Analysis opportunities

- #1 Stratify by community, compare cases and controls as to presence of gun in household
- #2 Estimate proportion of households with guns in each community (from data on controls)






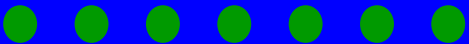
 Compare cases and controls on community prevalence of guns in households, accounting for correlated observations within communities
- #3 Consider both exposures jointly

Classes of Exposures

- **Individual-level**: e.g., age, gender, personal attributes and experiences
- **Population-level (aggregate)**: e.g., mean age, % female, prevalence of personal attributes and experiences
- **Population-level (intrinsic)**: e.g., population size, income inequality, laws and policies

(Other levels also possible: family, neighborhood, etc.)

Why can't we just treat all exposures as individual-level?

<u>Community</u>	<u>Individual-level</u>	<u>Community-level</u>
A		
B		
C		

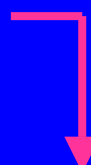
- Within a community, no variation exists on community-level measure
- Other idiosyncrasies about that community apply to everyone in it

Designs That May Have Special Relevance in Social Epidemiology

- Multi-community applications of traditional epidemiologic designs
- Ecological studies
 - Observational comparisons among communities
 - Longitudinal
 - Community trials

Longitudinal Ecological Study - U.S.

Publication of *Final Exit*



Method of suicide	1990	1991	Percent change
Poisoning	3,143	3,314	+5%
Asphyxia by bag	334	437	+31%
Gases	2,281	2,230	-2%
Hanging	4,110	4,124	0%
Drowning	408	383	-6%
Firearms	18,900	18,547	-2%
Cut/pierce	425	424	0%
Fall from height	691	719	+4%
All other	614	632	+3%
TOTAL	30,906	30,810	0%

Challenges in Multi-Level Studies

- Almost certainly need larger sample sizes
 - Premium on more communities
 - Estimating sample size / power
 - Greater dependence on existing data
- More possible kinds and sources of confounding
- Possibility of cross-level effect modification