CONNECTED IN CRIME
HOW NETWORK SCIENCE CAN HELP ADDRESS THE YOUTH GUN VIOLENCE EPIDEMIC

A.V. PAPACHRISTOS ~ YALE UNIVERSITY
CRIME EPIDEMIC
Baby dies day after she and dad shot: 'We have another tragedy'

March 19, 2013

6-month-old Jonylah Watkins died one day after she and her father, Jonathan Watkins, 29, were shot while in a vehicle in the Woodlawn neighborhood.
RISK FACTORS

being poor, young, & black
non-fatal shooting rate Chicago, 2006 to 2012

- **Total**
- **Males**
- **Males < 18**
- **Males 18 to 34**

**Race**
- **Black**
- **Hispanic**
- **White**
fatal & non-fatal shootings in chicago, 2006-2012

N of Shootings

Quartiles

0 to 6
6 to 30
31 to 59
60 to 160

N of Shootings

0 to 6
6 to 30
31 to 59
60 to 160
who gets shot?

network science
Baby dies day after she and dad shot: 'We have another tragedy'

March 19, 2013

6-month-old Jonyah Watkins died one day after she and her father, Jonathan Watkins, 29, were shot while sitting in a vehicle in the Woodlawn neighborhood.
40% of associates are victims.
westside of chicago
east palo alto, CA
ROAD MAP

the idea ~ gun violence as a bloodborne pathogen

recent findings ~ concentration & exposure

youth in these networks

gun violence prevention implications
THE IDEA

gun violence as a bloodborne pathogen
fatal & non-fatal shootings in chicago, 2006-2012
why gun violence?
• gun violence occurs between people who know each other

• gun use/carrying associated with peer influence

• guns are durable goods

• concentration within places and populations
risky behaviors
risky behavior: co-offending

Two-Mode Co-Arrest Network

Person 1

Person 2

Arrest A

One-Mode Co-Offending Network

Person 1

Person 2
THE FINDINGS

social concentration and exposure
violence concentrates socially
Boston

6% of population

85% of all gunshot injuries

Papachristos, Hureau, & Braga 2012
• 6 % of total population
• 40 % of arrested population
• 70 % of all shootings
• 89% in a single network

Papachristos, Wildeman, & Roberto 2014
five year average **non-fatal gunshot victimization rate** (per 100,000)

![Bar chart showing non-fatal gunshot victimization rates for City, Arrested Not in Network, and In Network. The rates are 62.14, 345.62, and 740.84 respectively.]

*Papachristos, Wildeman, & Roberto 2014*
violence concentrates socially

exposure to violence matters
\[ E_i = \frac{\sum_{j=1}^{N} W_{ij} Y_j}{\sum_{j=1}^{N} W_{ij}} \]

for \( i, j = 1, \ldots, N \)

\( i \neq j \)

Following (Fujimoto & Valente 2012)
$P(victimization)$

% associates victim
$P(\text{victimization})$ associates victim
Russian Roulette

Predicted Probability of Gunshot Victimization by Network Exposure to Guns for 14 to 24 year old Men

Note: Predicted probabilities are estimated with remaining variables held constant at their mode.
cincinnati, OH

largest component
east palo alto, CA
what about the youth?
homicide victims in Chicago, 1994 to 2009

N of homicides

- 18 - 24
- < 17
average age = 26.9
modal age = 18.0

age of individuals in Chicago network
Age of shooting victims in Chicago network

Average age all shootings = 23.3

Average homicides = 28.67
age of victims in Chicago network

- Average age all shootings = 23.3
- Average homicides = 28.6
- Modal age all shootings = 21.0
Men, Age 6 to 17 by Race/Ethnicity

- Black, Gang Member
- Black, Not in Gang
- Hispanic, Gang Member
- Hispanic, Not in Gang
- White, Gang Member
- White, Not in Gang

Predicted Probability of Victimization

Exposure to Gunshot Victims @ Distances <= 2

mean = 0.10
what about the guns?
Geodesic Distance to Nearest Gun in the Co–Offending Network — Men, Average by Age

Youth (ages 18–24)

Average in Network

Average for Men
leveraging for violence prevention
focused vs. broad-sweeping
Group Violence Reduction Strategy (VRS)
mapping the violence landscape
mapping the violence landscape

identifying individuals at risk
effects of VRS call-ins in Chicago

quasi-experimental design

• N = 149 treatment factions v. N = 428 matched control factions
• propensity score matching: 20 covaraites
• shooting behavior 12 months before/after call-in
the **one-year** effect of VRS Call-Ins

- 23 percent reduction in total fatal and non-fatal shootings
- 32 percent reduction in the likelihood of their members being a victim
THANK YOU

@AVPapachristos


COLLABORATORS: ELIZABETH ROBERTO, DAVID KIRK, CHRISTOPHER WILDEMAN, DAVID HUREAU, ANTHONY BRAGA, ROBIN ENGEL, BEN GREEN, JEFF FAGAN, & TRACEY MEARES