Injury Control
Research Center
for Suicide Prevention

Developing Comprehensive, Integrated Approaches to Suicide Prevention

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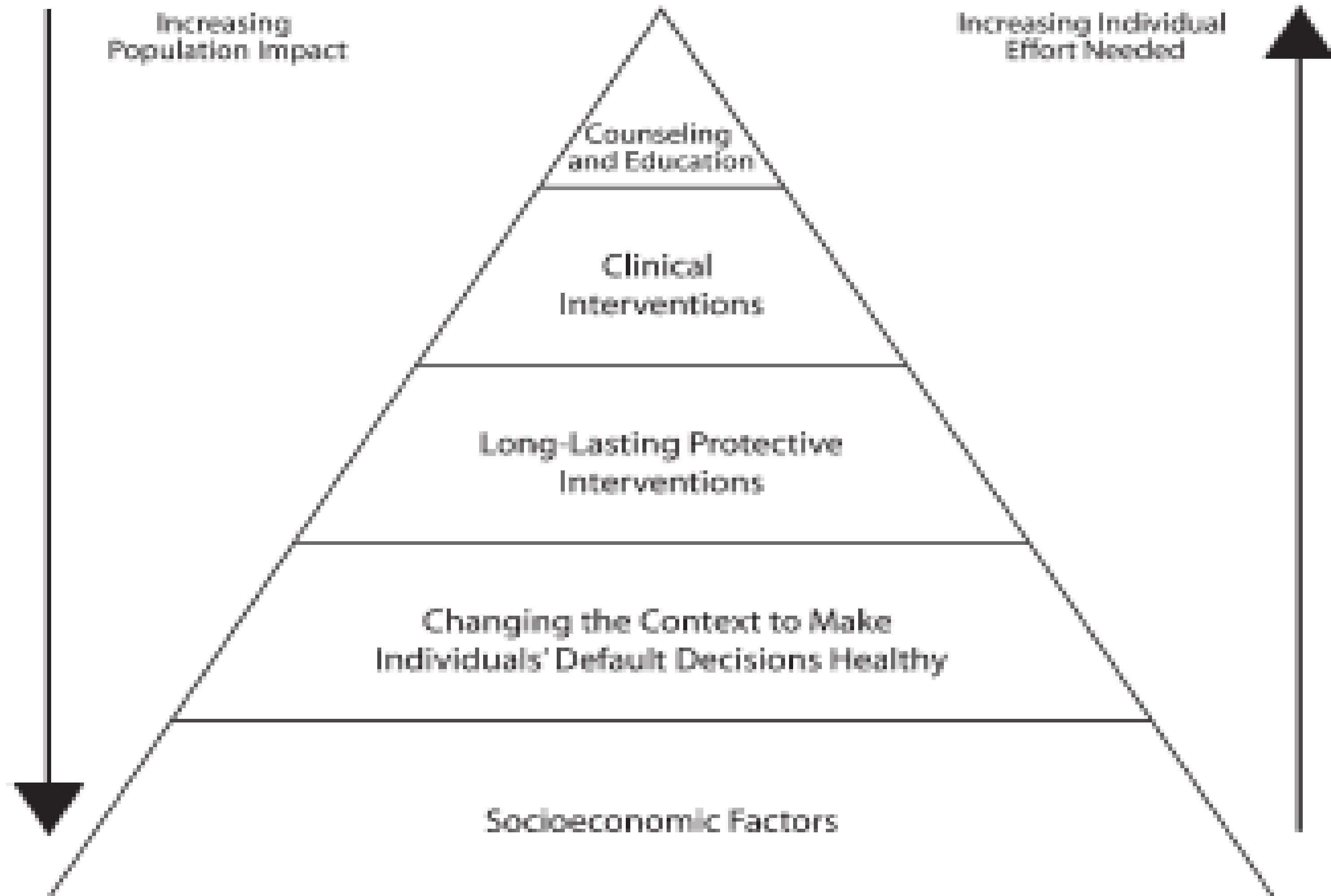
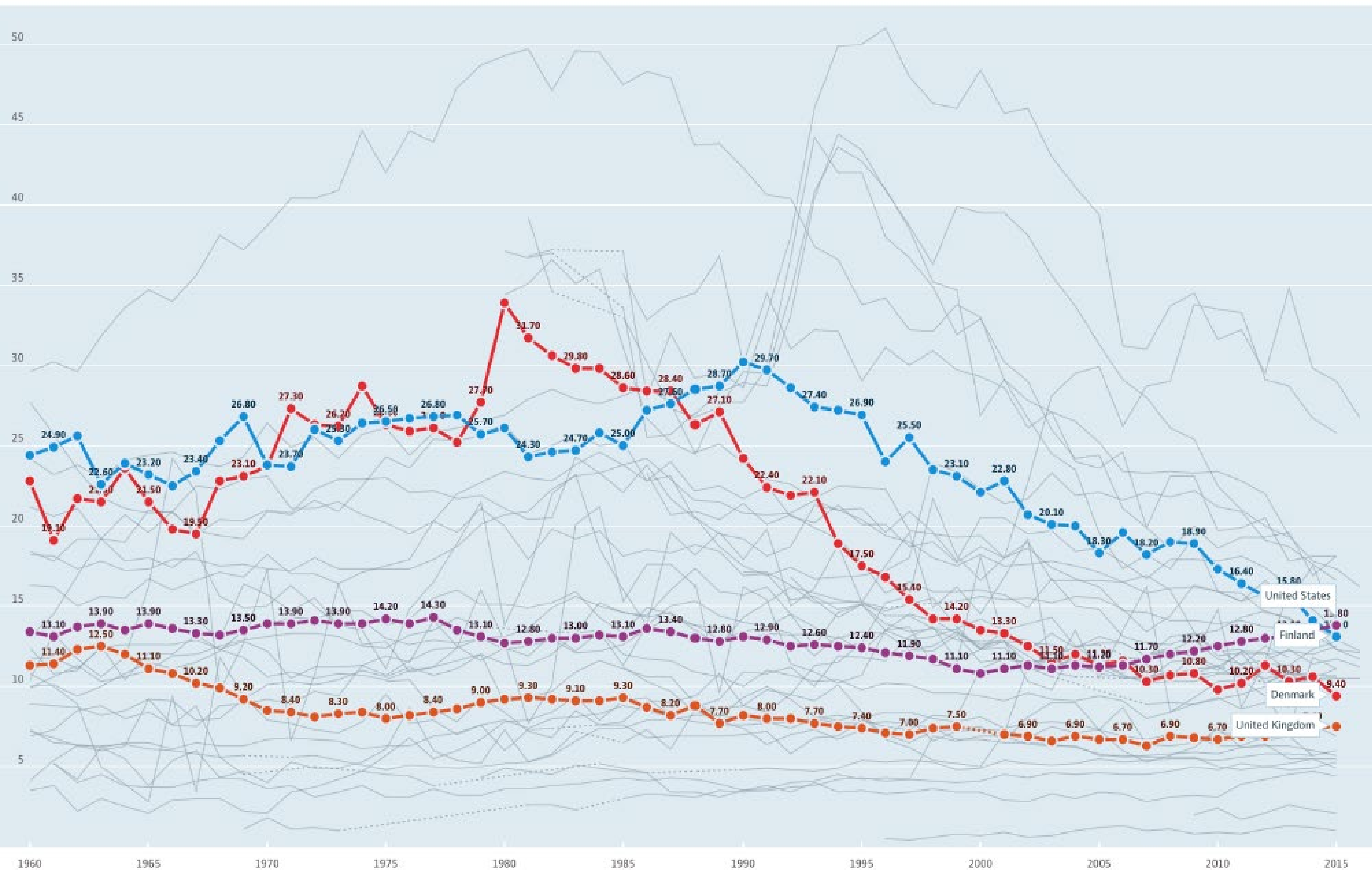
The Health Impact Pyramid



Frieden TH: A Framework for Public Health—The Health Impact Pyramid. *Am J Public Health* 2010; *100*:590-595.



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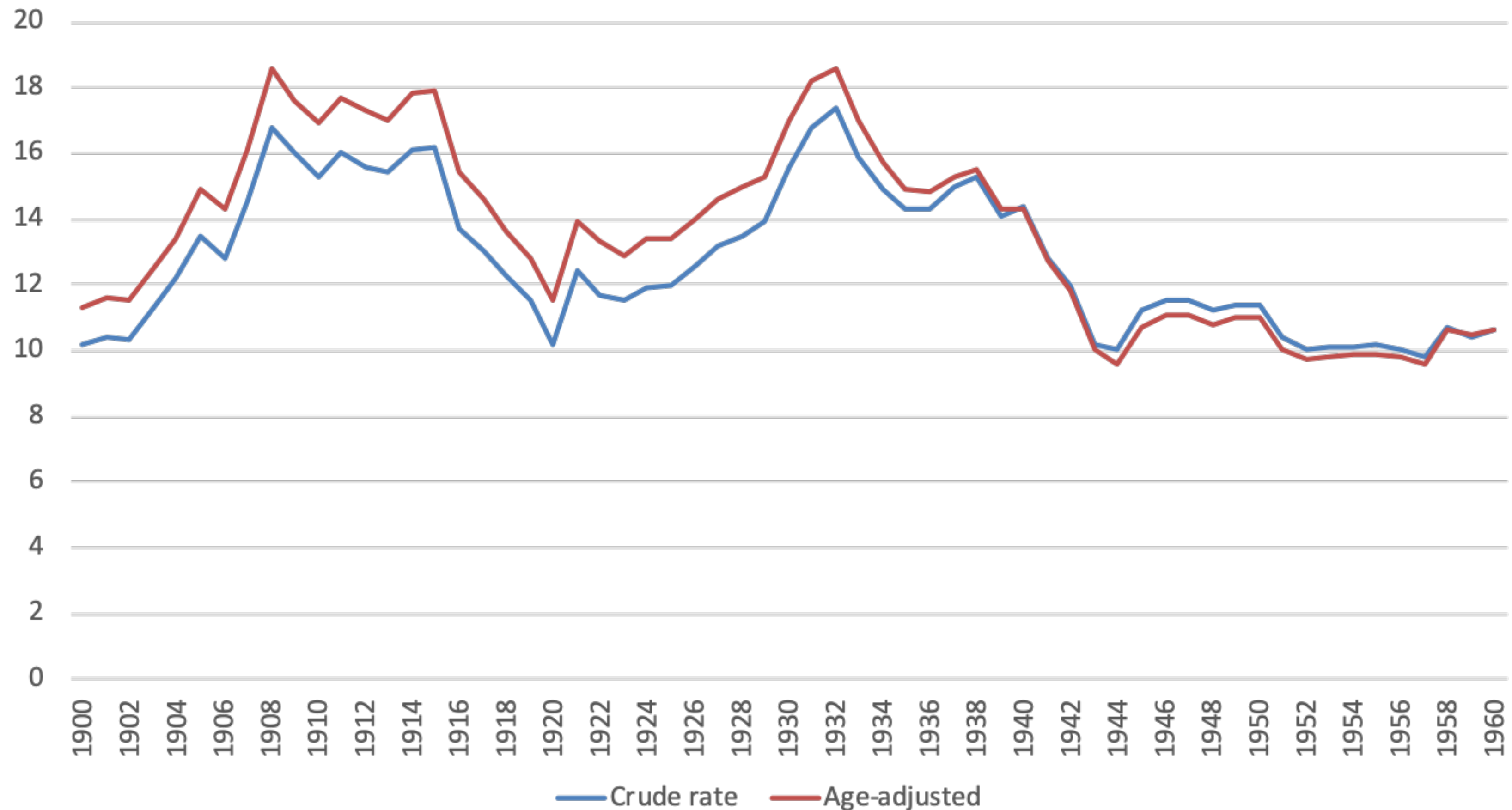
OECD; downloaded 10.10.18; https://data.oecd.org/healthstat/suicide-rates.htm

U.S. Suicide Rates – 1900-1960

(crude & age-adjusted rates per 100,000)



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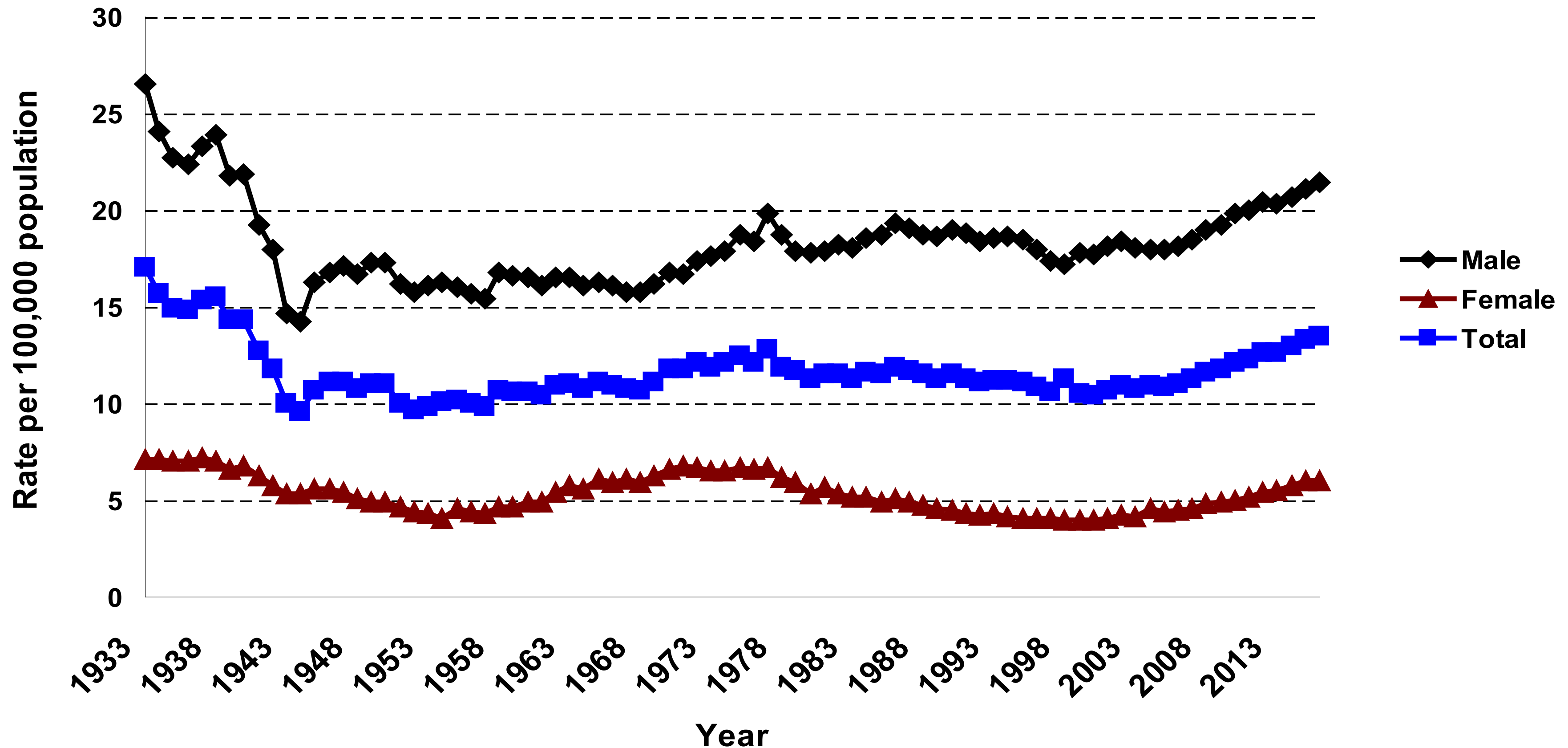
L.I. Dublin: *Suicide – A Sociological and Statistical Study*. 1963
National Office of Vital Statistics

Suicide among all persons by sex – United States 1933-2016



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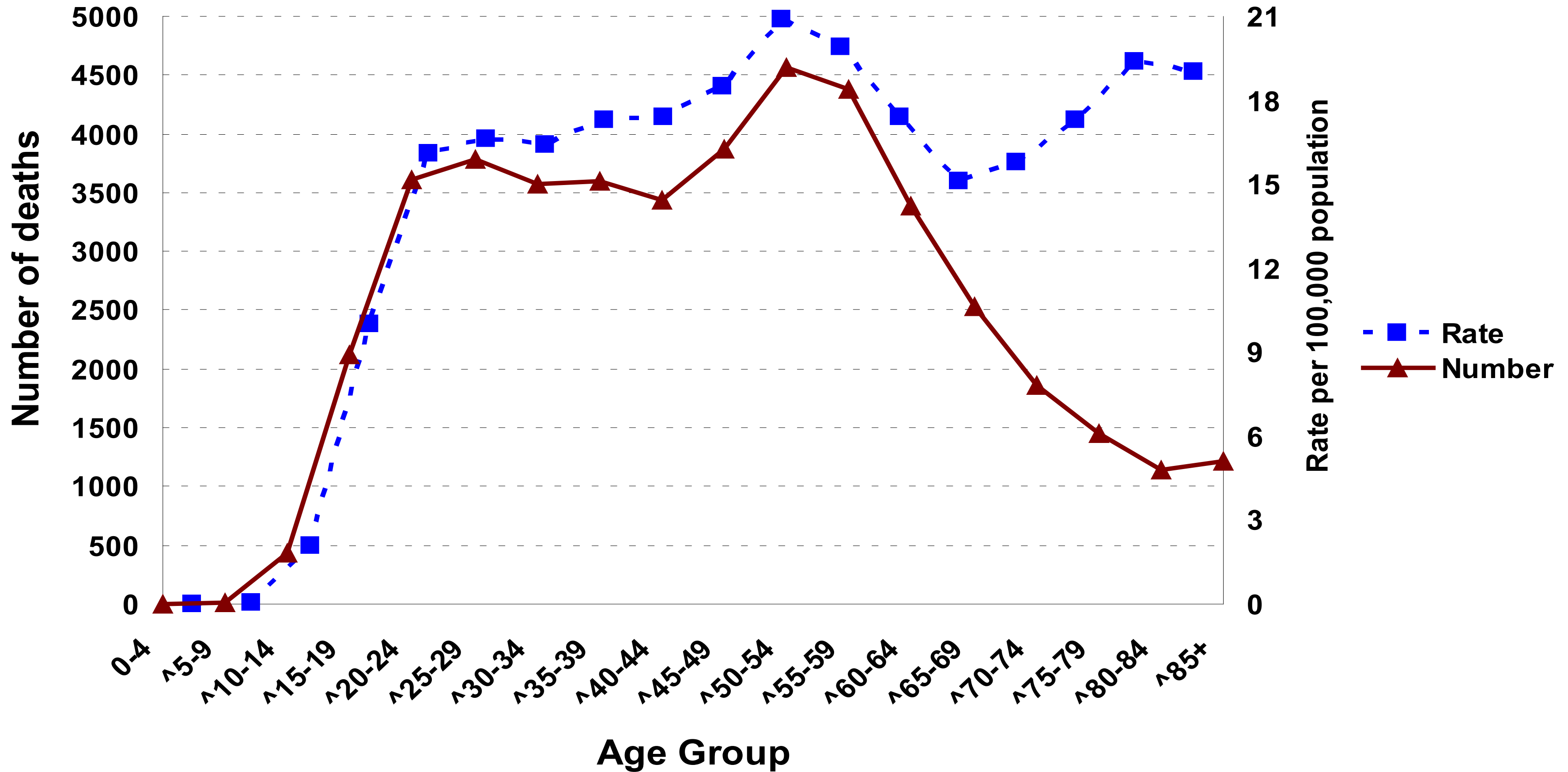
Crosby: www.cdc.gov/injury/wisqars/leading_causes_death.html

Suicides and suicide rates among all persons – United States, 2016



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Crosby: www.cdc.gov/injury/wisqars/leading_causes_death.html

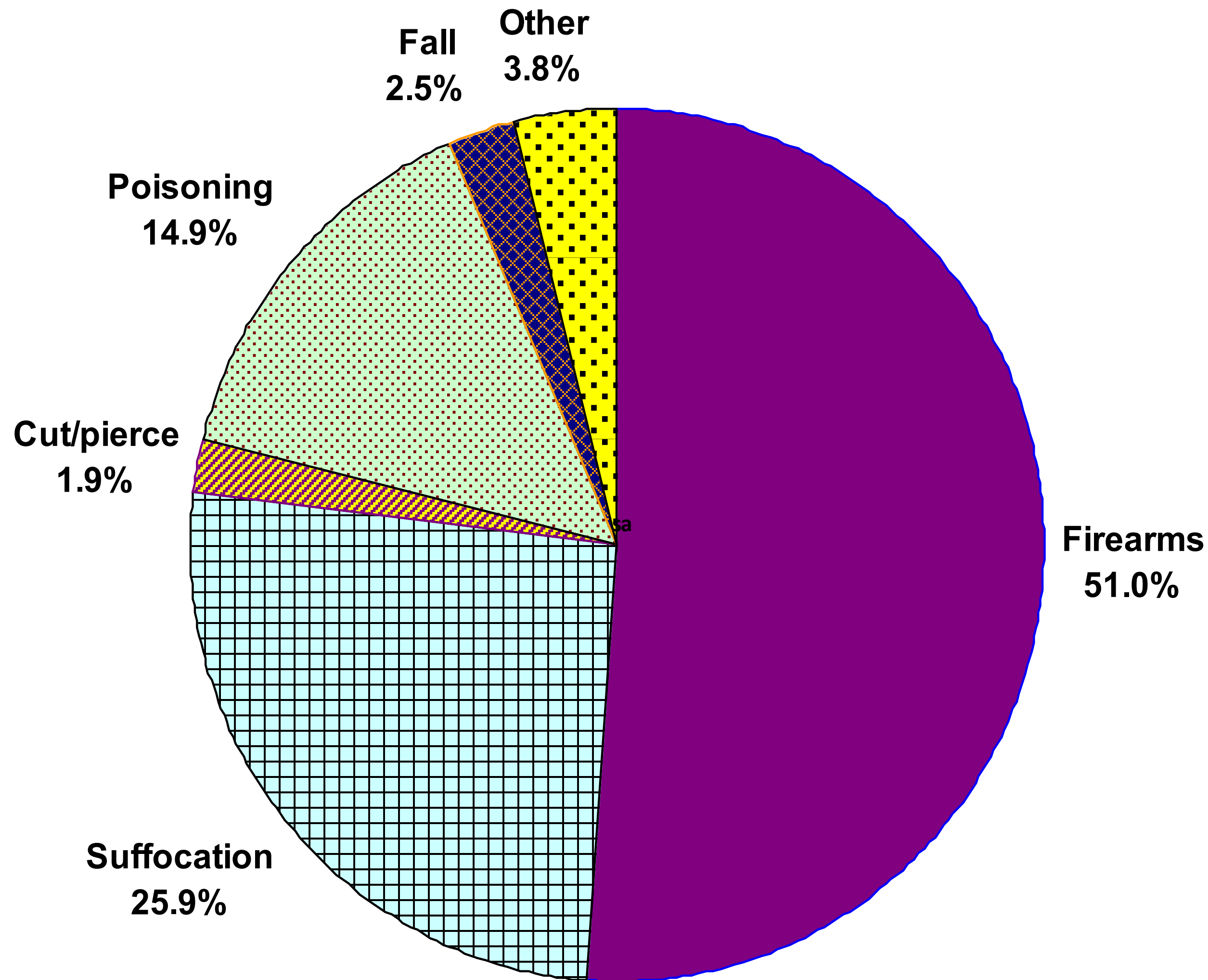
Changing Methods of Suicide—US Early to mid-20th Century

Method	1901-1905*	1911-1915*	1926-1930**	1955-1959†
Firearms; explosives	24.2%	30.0%	35.1%	47.1%
Poisons; gases	42.1	39.9	31.1	20.8
Strangulation	15.0	14.6	18.1	20.5
Cutting	5.7	6.4	5.4	2.6
Drowning	5.1	5.6	5.2	3.7
Jumping	1.2	1.9	3.1	3.5
Other	6.5	1.6	2.0	1.9

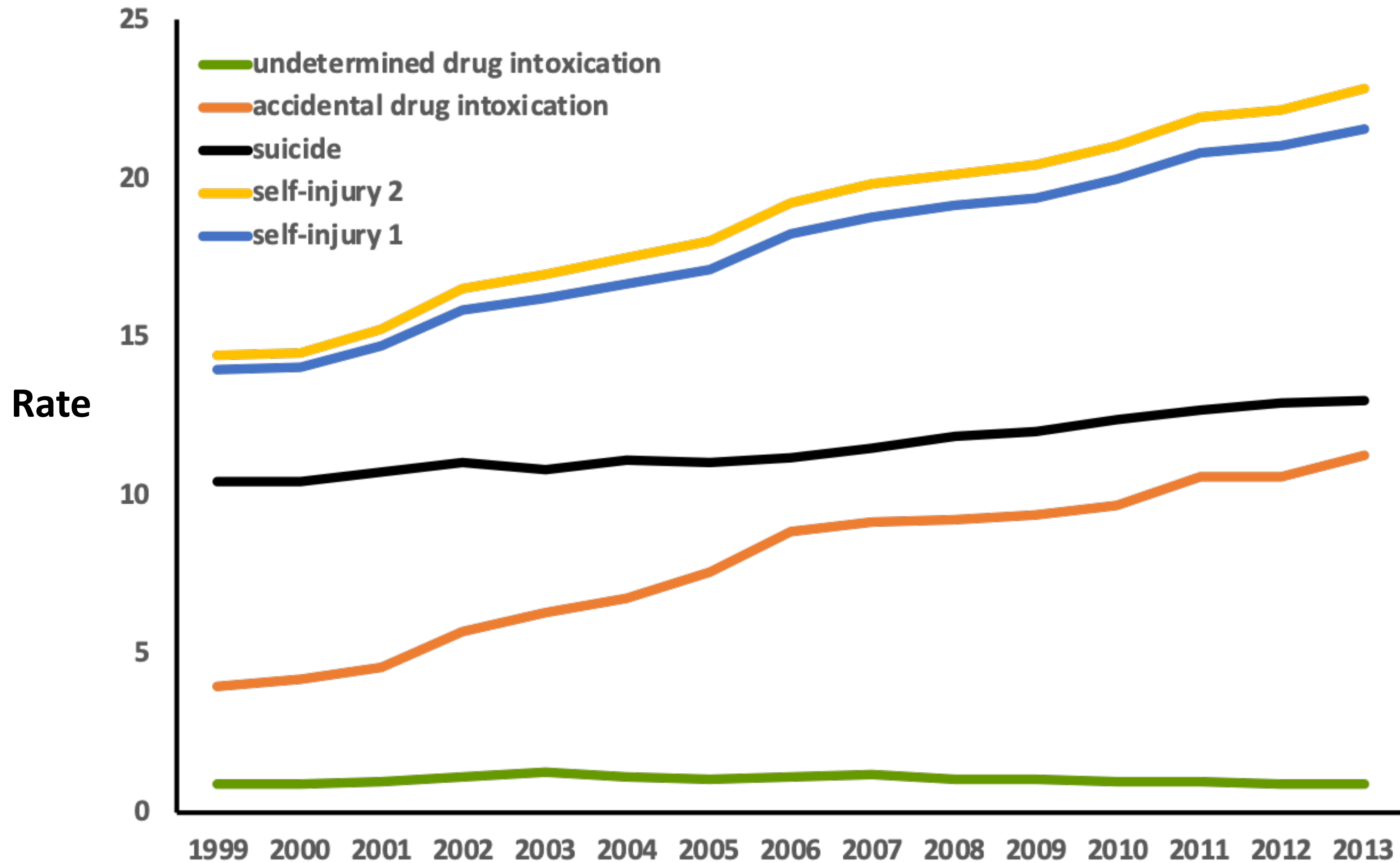
*U.S. Registration Area **U.S. Registration States
† All States
National Office of Vital Statistics

L.I. Dublin: *Suicide – A Sociological and Statistical Study*. 1963

Suicide by Method – United States, 2016



Self-Injury Mortality – Suicide & Drug Intoxication Death Rates per 100,000 population, US, 1999-2013



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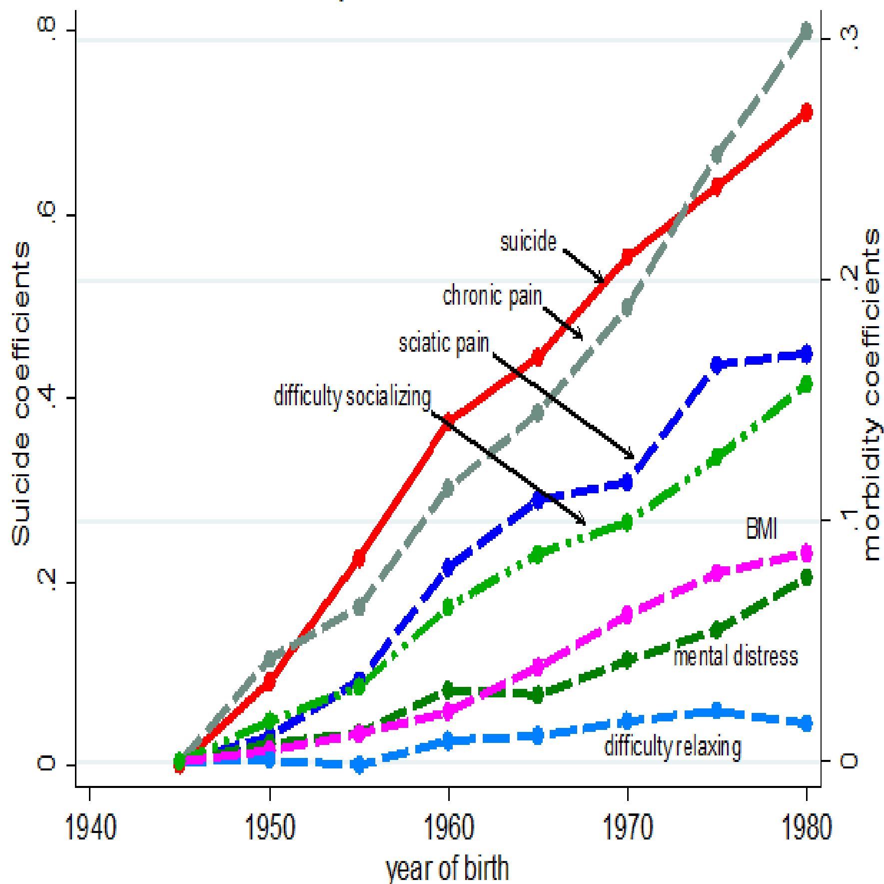
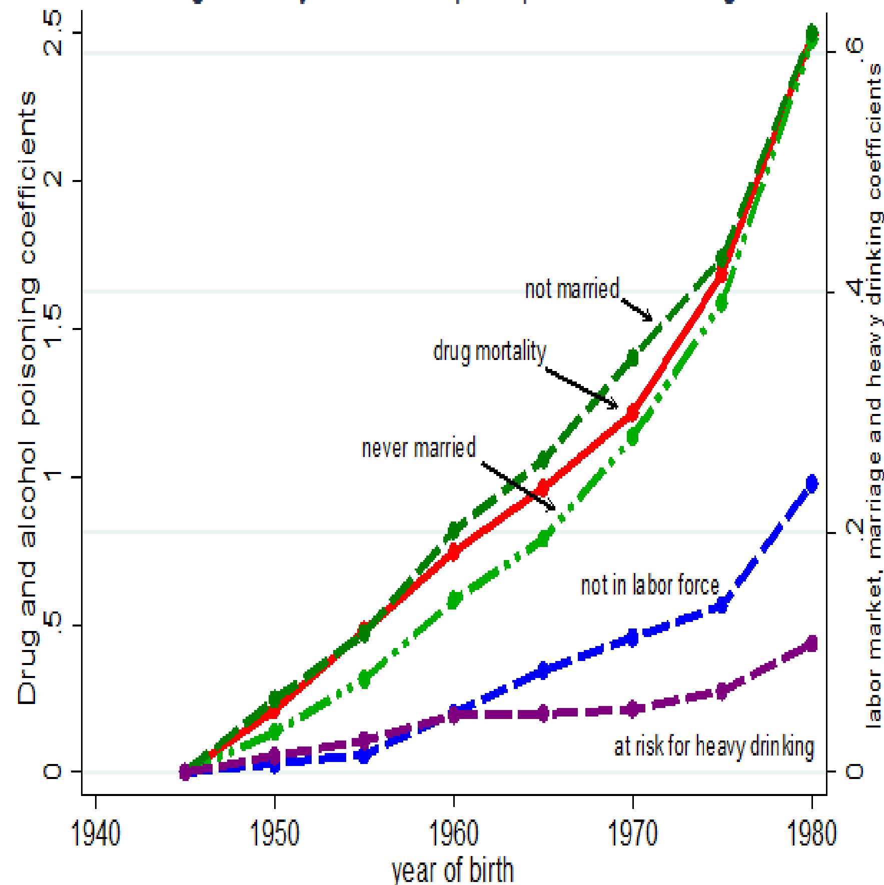
Rockett & Caine. JAMA Psychiatry 2015, Nov;*72*:1069-70.
doi: 10.1001/jamapsychiatry.2015.1418.

Estimates of *cumulative deprivation*, white non-Hispanics without Bachelor's degree, ages 25-64





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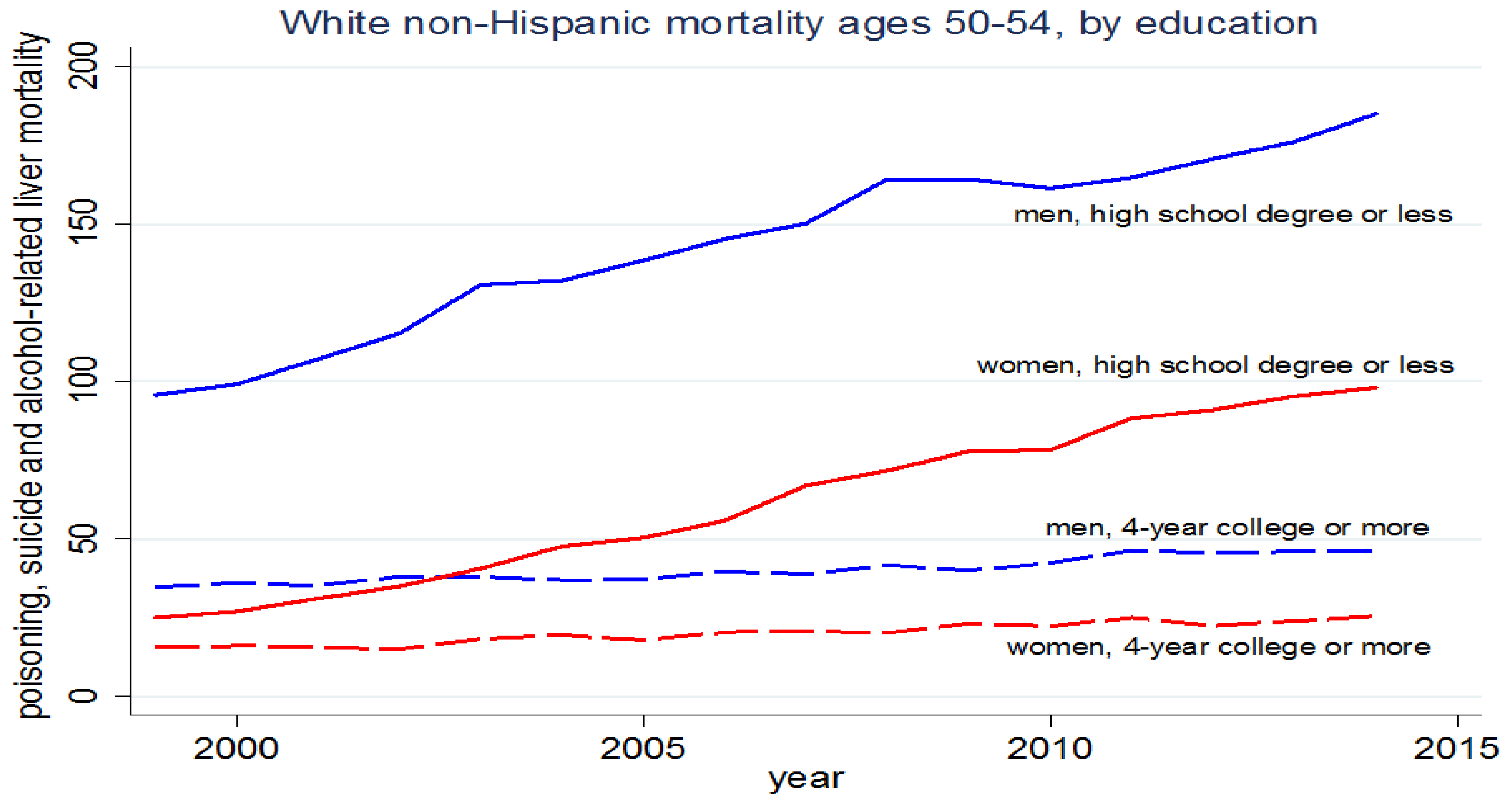
Case & Deaton: *Mortality & morbidity in the 21st century.*
Brookings Papers on Economic Activity. Draft, 03/17/17

Drug, alcohol, suicide mortality



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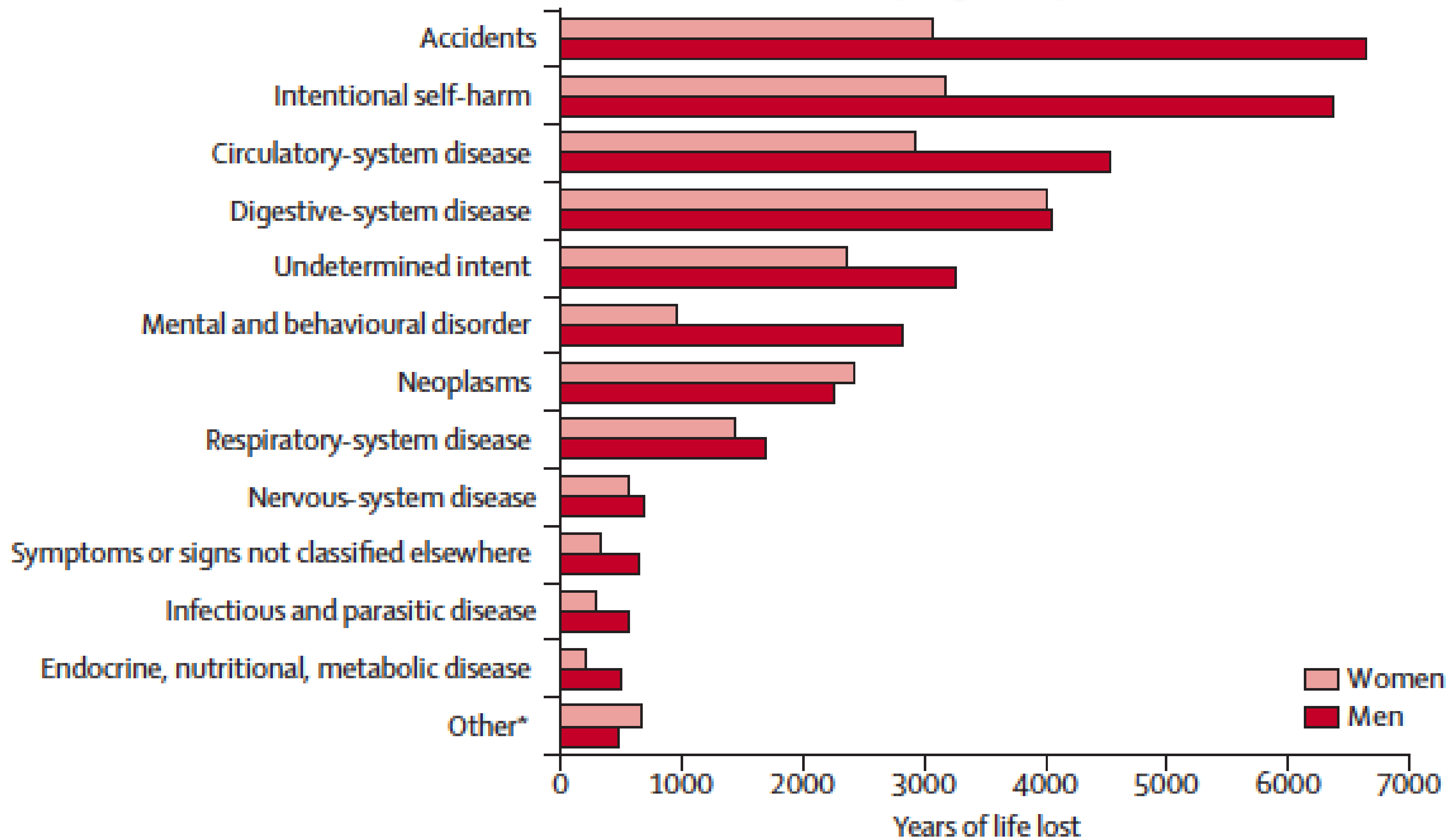
Case & Deaton: *Mortality & morbidity in the 21st century.*
Brookings Papers on Economic Activity. Draft, 03/17/17

Total years of life lost among men and women who had "self-harmed" (England)



*Assault and other external or unknown causes, musculoskeletal-system disease, other neoplasms, genitourinary-system disease, or diseases of the blood or immune systems.

Bergen, Hawton et al. Lancet 2012

Common Barriers to Suicide Prevention *among Suicidal Persons*
The Public Health Rationale

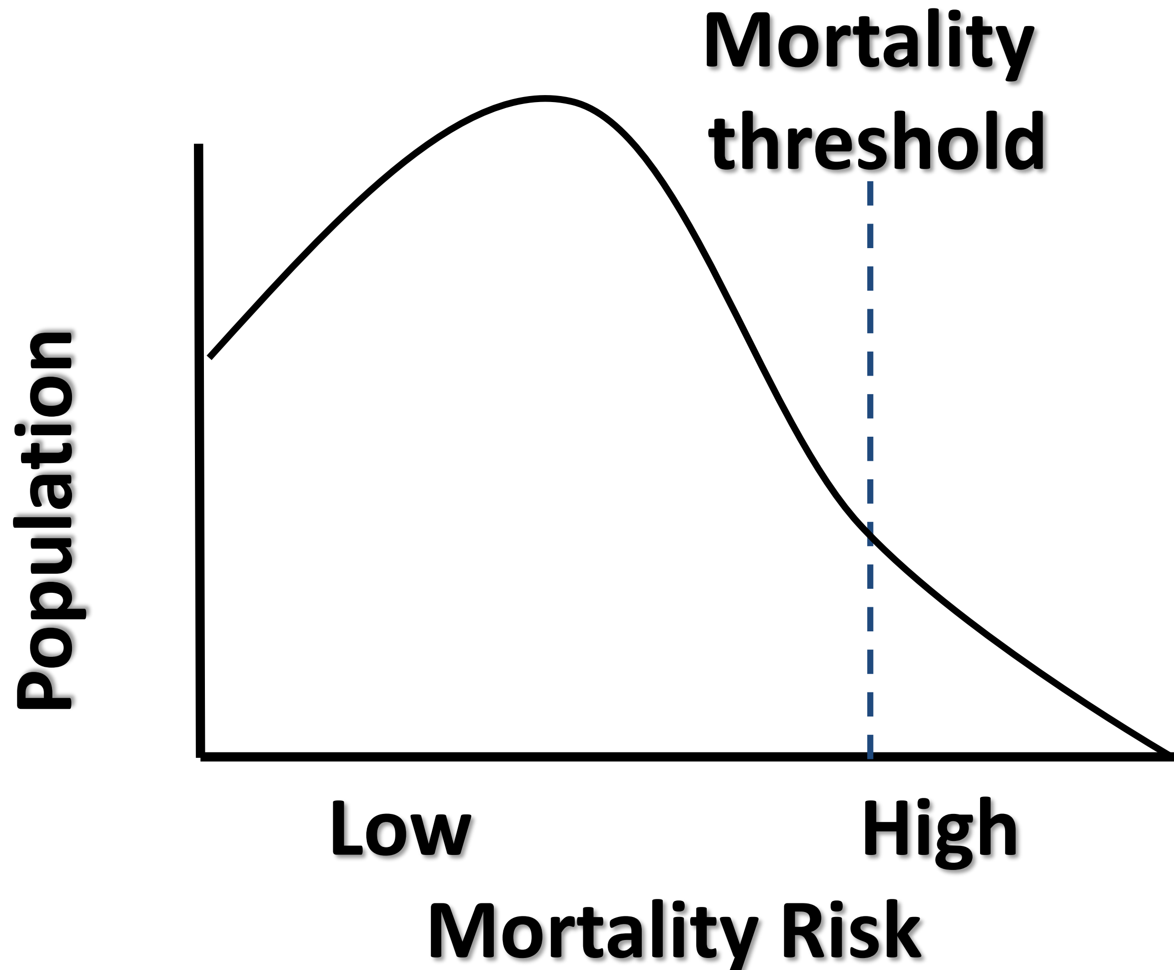
- **People intent on suicide often do not seek help.**
- **Seemingly "normal" people kill themselves.**
- **Fatal attempts often are first attempts.**
- **So-called "risk factors" are common; suicide is uncommon, such that risk factors are NOT predictive (i.e., they fail as warning signs of an attempt).**

The high-risk conundrum…
…finding <u>THE NEEDLE</u> in a stack of needles!

- **The U.S. suicide rate is nearly *14 per 100,000 per year* in the general population, or 0.14 per 1000, or 0.013 per 100. That means *probabilistically* you can say with ~99.9% likelihood that any person from the general population will *not* kill him/herself in the coming year.**

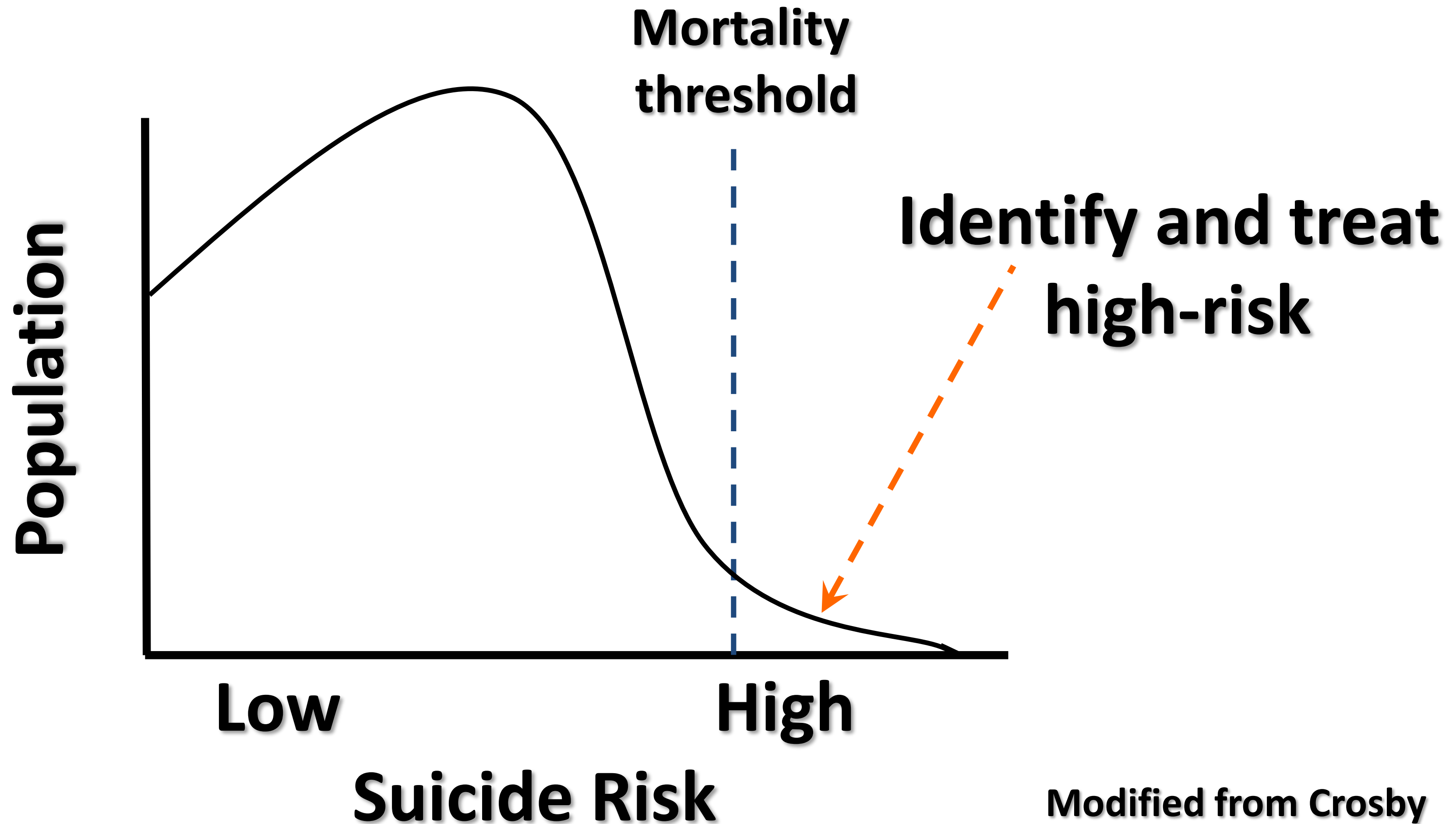
- **If the suicide rate is 50x times higher, *~700 per 100,000* among clinically depressed people discharged after a suicide attempt, it is ~7 per 1000, or ~0.7 per 100 depressed individuals. *Probabilistically* you can say with ~99.3% likelihood that any such depressed person will *not* kill him/herself in the coming year—*despite the need for treatment!***

Rose—Population Distribution of Disease



Modified from Crosby

"Indicated" Approach to Prevention



Modified from Crosby

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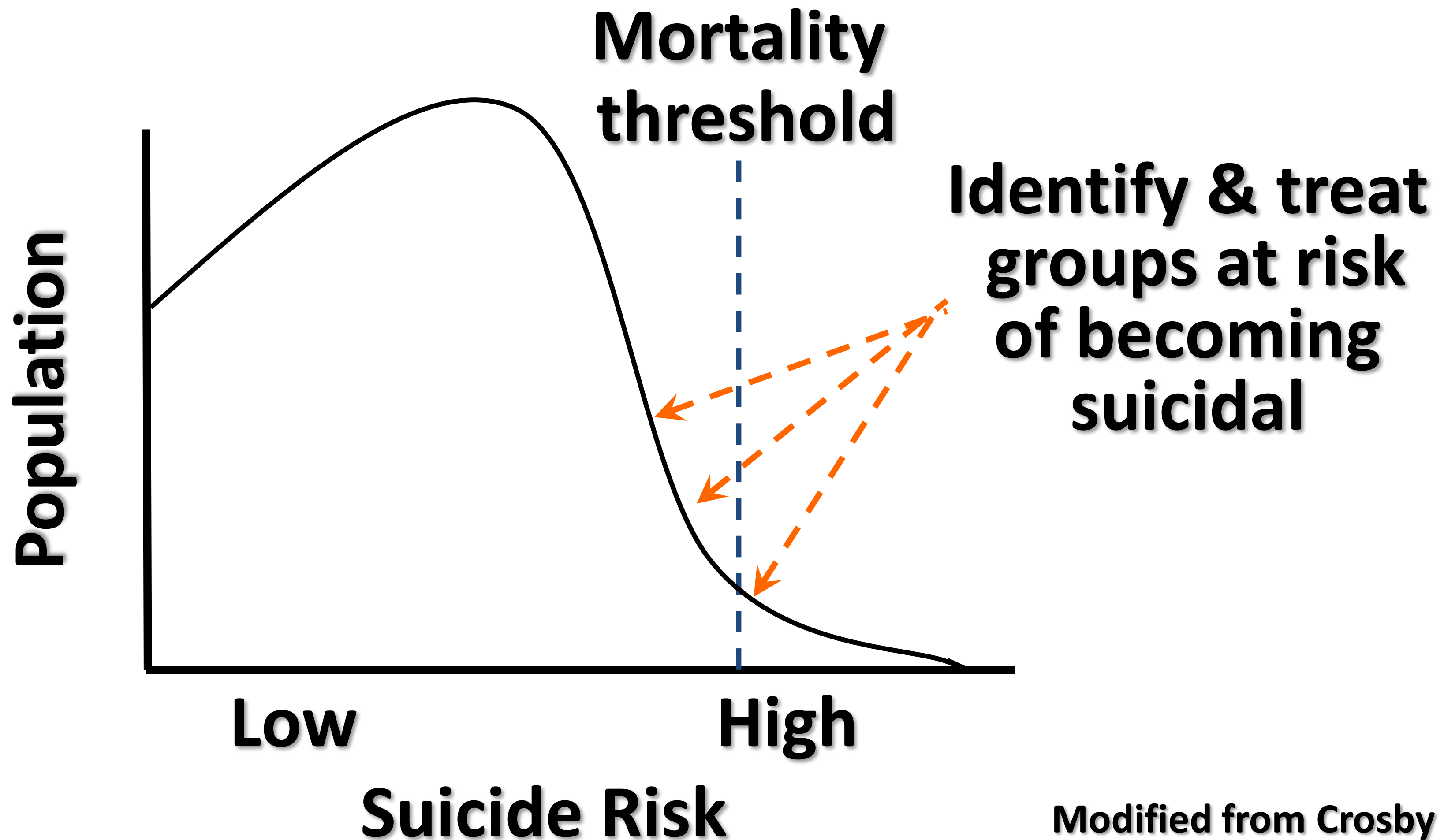
“Selective” Approach to Prevention



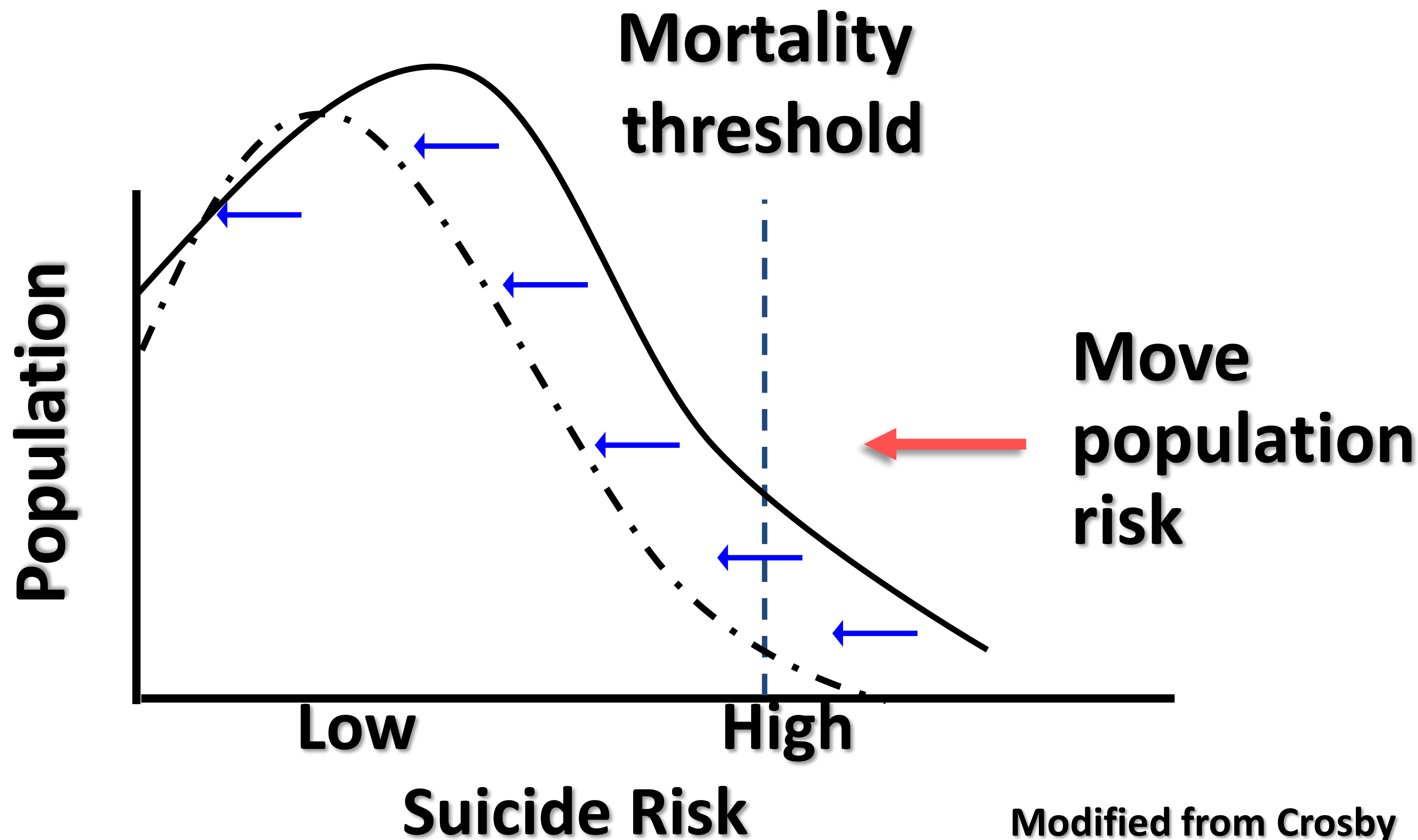
Two fundamental differences **between** ***selective & indicated*** **public health preventive interventions and "clinical treatments"**

1. **Public health preventive interventions *reach into communities* to find and engage those who require treatment. They *do not wait* for patients to come in the door of the clinic.**
2. **To be most effective, public health approaches should involve *co-owning community partners.***

Universal Prevention

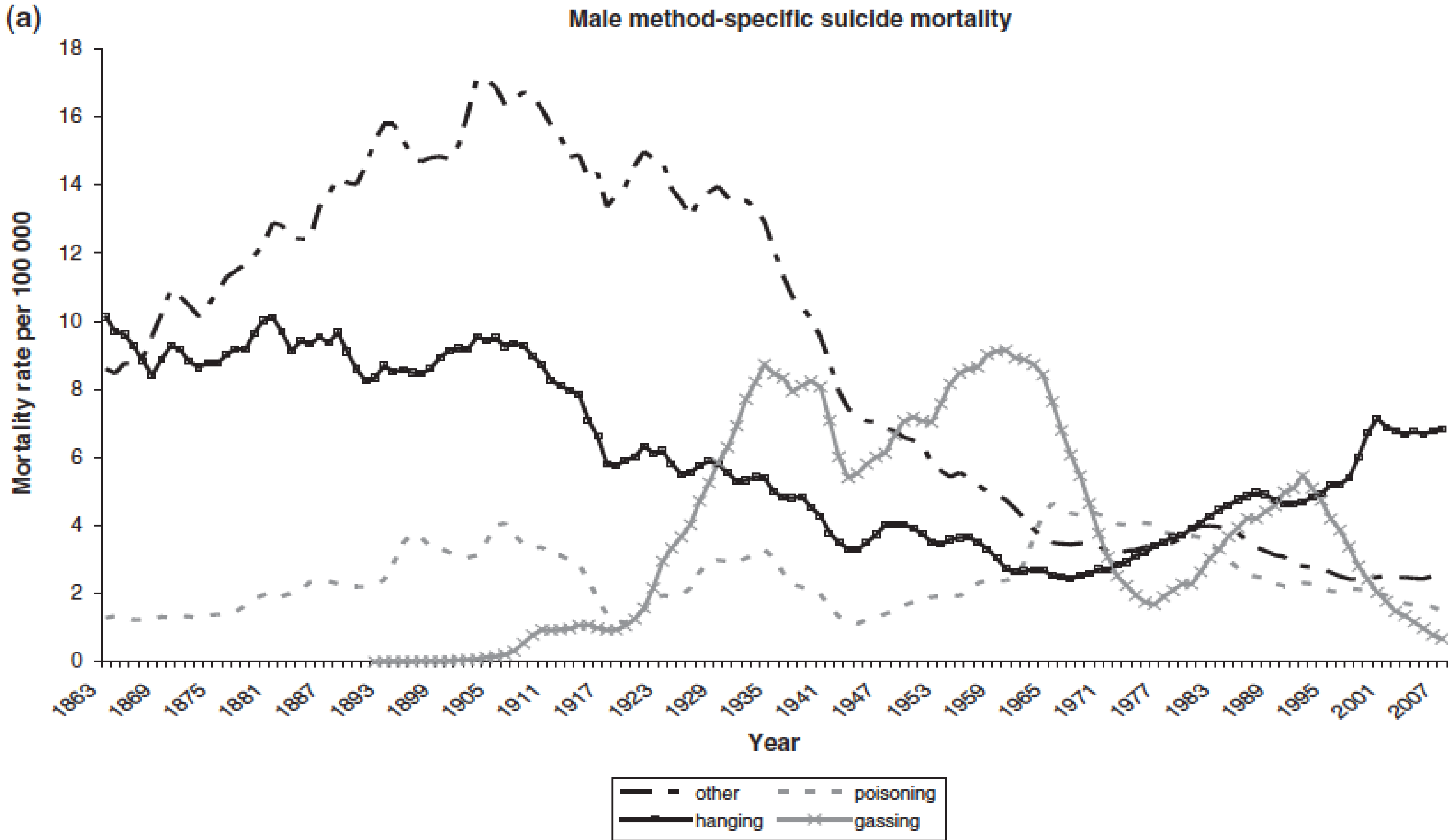
Focused on the *entire population* as the target. Prevention through promoting health and mental health, and broadly reducing risk. *Interventions may not depend on individual actions (e.g., means safety; tax codes) & may target cultural values and norms.*

Universal Approach to Prevention



Modified from Crosby

Suicide in England and Wales, 1861-2007



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Thomas & Gunnell, Int J Epi, 2010

Means matter…and so does *__means safety__!*

Major national trends vary with the availability of new or different methods, and means restriction can occur at a level where the impact of ‘detection failure’ is mitigated.

The application and impact of means restriction are limited by __ecological factors__ (e.g., hanging; jumping from buildings in Hong Kong) and __social forces__ (e.g., firearm access in USA).

Circumstances Preceding Suicide for Adults

NVDRS 2003-2011 Sample (n=630, m=w; ages 35-64 y/o)

Circumstances	Males (%)	Females (%)	Total	Chi-Square
Intimate Partner Prob.	35.2	32.7	34.0	0.45
Job/Financial	37.1	21.6	29.4	18.4***
Any job	24.8	11.4	18.1	18.9***
Any financial	21.9	15.9	18.9	3.7*
Health	22.5	33.9	28.3	10.1**
Family	13.3	23.2	18.3	10.2**
Criminal/Legal	19.4	11.8	15.6	7.0**
MH/SA	67.9	82.2	75.1	17.2***
Tx for MH/SA	25.4	44.4	34.9	25.1***
Prior SI/SA	36.8	59.7	48.3	33.0***

*p<.05; **p<.01; ***p<.001

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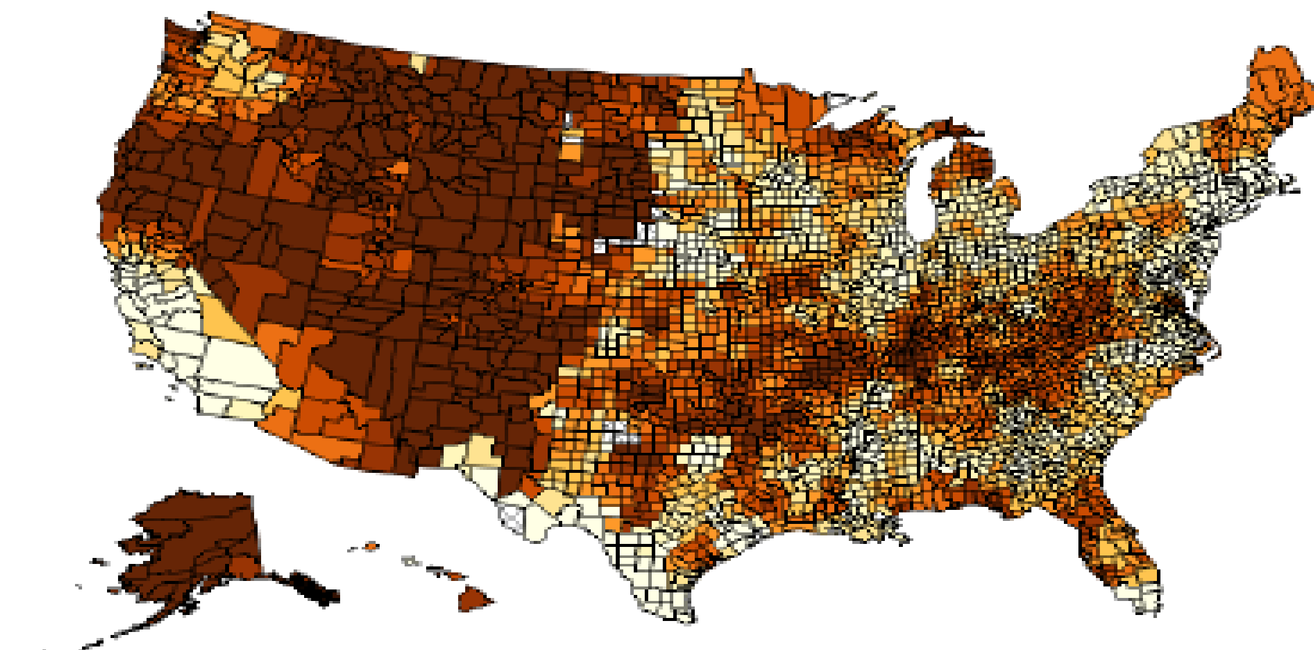
Stone, Holland, Schiff, McIntosh. Am J Prev Med 2016.

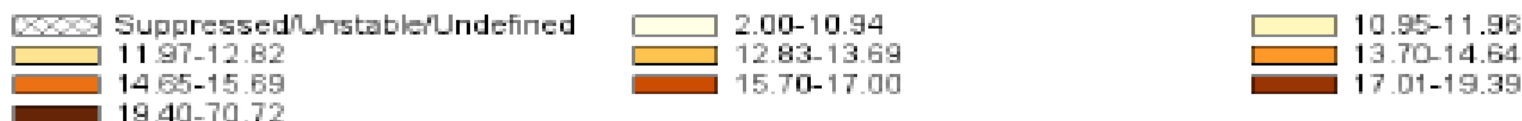
2008-2014, United States

Smoothed Age-adjusted Death Rates per 100,000 Population

All Injury, Suicide, All Races, All Ethnicities, Both Sexes, All Ages

Annualized Age-adjusted Rate for United States: 12.26





Reports for All Ages include those of unknown age.

* Rates based on 20 or fewer deaths may be unstable. These rates are suppressed for counties (see legend above); such rates in the title have an asterisk.

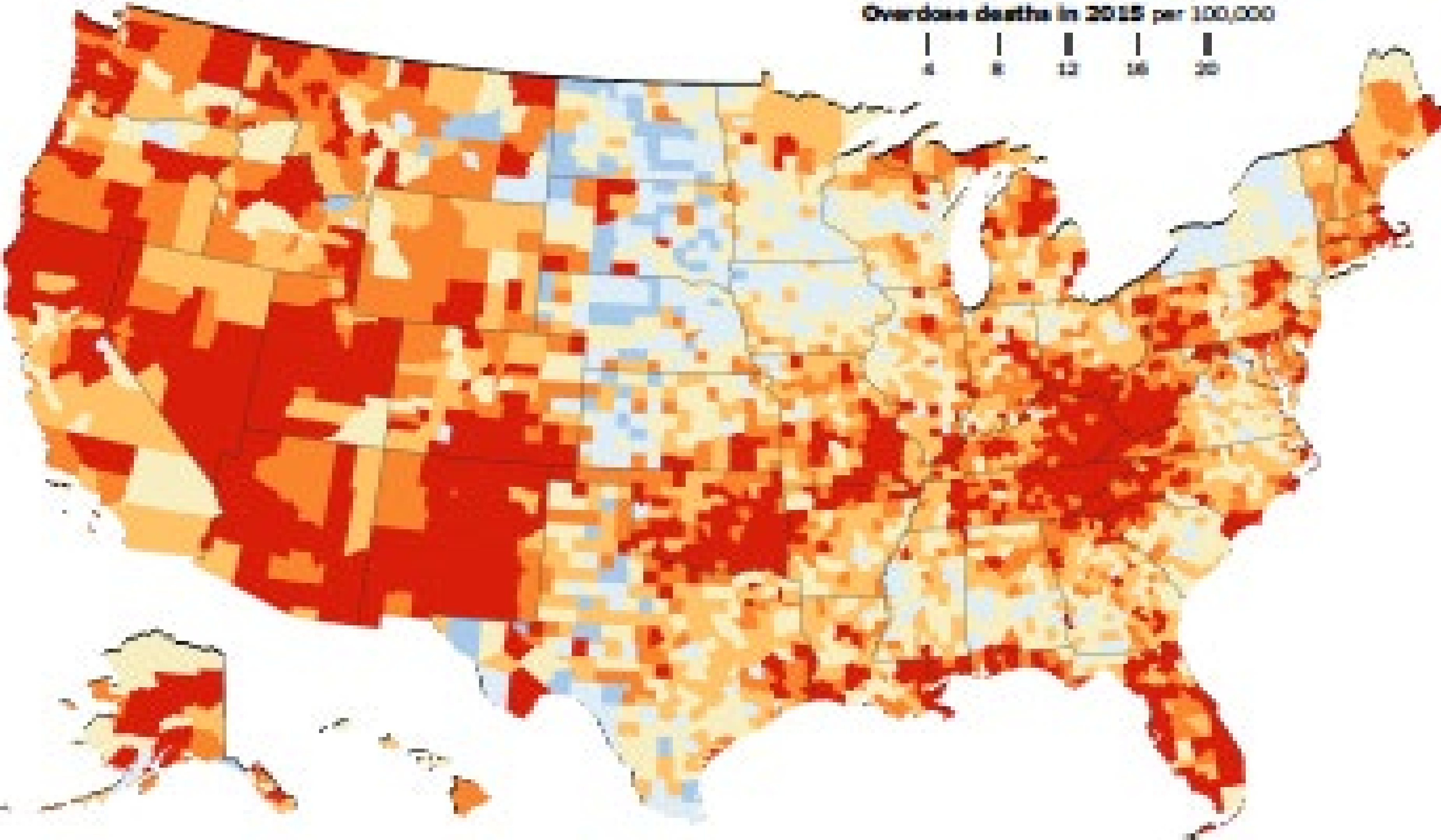
The standard population for age-adjustment represents the year 2000, all races, both sexes.

Rates appearing in this map have been geospatially smoothed.

Produced by: the Statistics, Programming & Economics Branch, National Center for Injury Prevention & Control, CDC

Data Sources: NCHS National Vital Statistics System for numbers of deaths; US Census Bureau for population estimates.

US Overdose Death Rate by County—2015



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NY Times based on CDC data—downloaded 26 October 2017

US Overdose Death Rate by County—2016

(NY Times based on CDC Data – downloaded 29 December 2017)

Wash. Mont. N.D. Minn. Ore. Idaho S.D. Wis. Mich. Wyo. Iowa Neb. Nev. Utah Colo. Calif. Kan. Mo. Ill. Ind. Ohio Ky. W.Va. Va. Tenn. N.C. Okla. Ariz. N.M. Ark. S.C. Miss. Ala. Ga. Tex. La. Fla. Alaska Hawaii Me. Vt. N.H. Mass. N.Y. Conn. R.I. Pa. N.J. Md. Del.

2016 drug overdose deaths per 100,000 residents

In counties with fewer than 10 drug overdose deaths, the map combines observed totals with modeled estimates.

Building Comprehensive, Integrated Approaches to Prevention (Colorado)

The focus for preventing premature death from self-injury is not the same as the focus for 'clinical' mental health care!

"Distressed"

"Severely Distressed"

USAF Suicide Prevention Program

1996 ➛ ~2007

- <u>Public health-community orientation</u>: "The Air Force Family"
- <u>Broad involvement of key leaders</u>: Medics-Mental Health, Public Health, Personnel, Command, Law Enforcement, Legal, Family Advocacy, Child & Youth, Chaplains, CIS; Walter-Reed Army Inst. Of Research; CDC
- <u>Consistent leadership involvement</u>
- <u>11 initiatives</u> clustering in four areas
  – Increase awareness and knowledge
  – Increase early help seeking
  – Change social norms
  – Change selected policies
- <u>*Common Risk Model*</u>

Table 3 Comparison of effects of risk for suicide and related adverse outcomes in US Air Force population before (1990-6) and after implementation of programme (1997-2002)

Outcome	Relative risk (95% CI)	Risk reduction (1–relative risk)	Excess risk (relative risk–1)
Suicide	0.67 (0.57 to 0.80)	33%	—
Homicide	0.48 (0.33 to 0.74)	51%	—
Accidental death	0.82 (0.73 to 0.93)	18%	—
Severe family violence	0.46 (0.43 to 0.51)	54%	—
Moderate family violence	0.70 (0.69 to 0.73)	30%	—
Mild family violence	1.18 (1.16 to 1.20)	—	18%

Knox et al., BMJ 2003

Illustrative Examples of Prevention & Dealing with *Stigma* in the U.S.

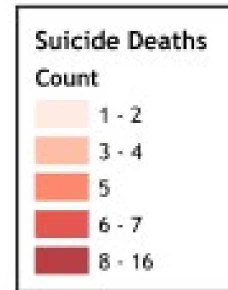
- Cardiac & vascular diseases – stimulated during the 1940s in the US by the hidden illness of President Franklin Roosevelt – emergence in the 1960s/70s of distal risk factor reduction to prevent acute events occurring decades later
- Cancers
  - 1964 in the US: Surgeon General's report on smoking
  - 1974: Betty Ford, wife of US President, discussed her mastectomy
- HIV/AIDS – 1980s; change in gay culture and social activism to promote research
- Alcohol – 1980s-present; Mothers Against Drunk Driving (MADD) leading efforts to change culture & laws

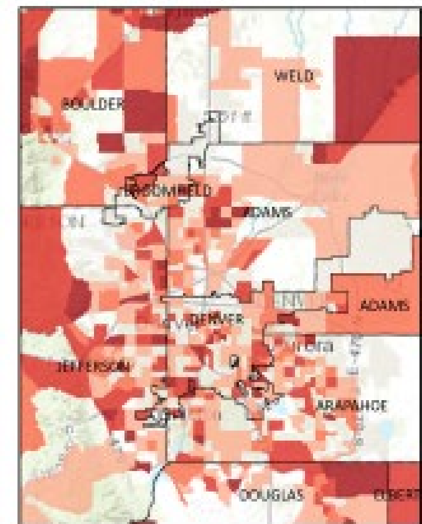
Frequency of Colorado suicides by county of residence, 2012-2016

18 Moffat
27 Routt
<3 Jackson
349 Larimer
248 Weld
21 Logan
8 Sedgwick
<3 Phillips
23 Morgan
12 Rio Blanco
23 Grand
266 Boulder
54 Broomfield
404 Adams
3 Washington
6 Yuma
5 Gilpin
528 Denver
547 Arapahoe
63 Garfield
31 Eagle
33 Summit
6 Clear Creek
527 Jefferson
262 Douglas
27 Elbert
9 Kit Carson
195 Mesa
15 Pitkin
10 Lake
31 Park
3 Lincoln
47 Delta
23 Gunnison
24 Chaffee
41 Teller
792 El Paso
3 Cheyenne
42 Montrose
71 Fremont
<3 Kiowa
3 Crowley
8 Ouray
13 Saguache
12 Custer
187 Pueblo
9 San Miguel
16 Otero
8 Bent
15 Prowers
<3 Dolores
<3 San Juan
<3 Hinsdale
<3 Mineral
15 Rio Grande
25 Alamosa
11 Huerfano
53 Montezuma
48 La Plata
18 Archuleta
10 Conejos
6 Costilla
20 Las Animas
3 Baca

Map based on Longitude (generated) and Latitude (generated). Color shows sum of D. The marks are labelled by sum of D and Cntyname. Details are shown for Cntyname. The data is filtered on state, whi
Colorado. The view is filtered on Cntyname, which keeps 64 members.

Number of Suicides by Census Tract





Source: CDPHE Vital Records Death Dataset (2010-2014)

COLORADO
Center for Health
& Environmental Data
Department of Public Health & Environment

Veteran Suicide in Colorado by Residence (Census Tract) 2004-2015

BOULDER

WELD

BROOMFIELD

ADAMS

GILPIN

DENVER

CLEAR CREEK

ARAPAHOE

JEFFERSON

PARK

DOUGLAS

ELBERT

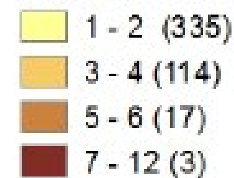
TEILLER

EL PASO

0 5 10 20 Miles

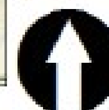
Legend

Number of vet suicides



- 1 - 2 (335)
- 3 - 4 (114)
- 5 - 6 (17)
- 7 - 12 (3)

Denver metro area



Source: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment (2004-2015)

COLORADO

Center for Health & Environmental Data

Department of Public Health & Environment

Site – Population Approaches (social geography)

Sites	Populations potentially captured	*Populations likely to be missed*
Middle and High Schools	Adolescents attending school	School dropouts; youth in legal trouble
Universities	Vulnerable individuals with new onset or recurrent mental disorders	Young adults not pursuing further education, or unemployed
Organized Work Sites	Those employed in organized work sites, men and women in the middle years	Workers in small businesses, union/hiring halls, day labor, unemployed workers, immigrant/migrant labor, underground workers
Medical Settings	Those with health insurance; those that are willing to access traditional medical settings	Un/under insured; low "utilizers" of health care (men); utilizers of nontraditional health care
Community NGOs (e.g., United Way)	Those targeted for service by the NGO funding source; those in private homeless shelters	Anyone outside perceived scope of agency
Religious/Faith Organizations	Regular attendees	Non-participants & drop outs

Site – Population Approaches (social geography)

Sites	Populations potentially captured	*Populations likely to be missed*
Governmental Agencies, VA. *including Courts & CJ Settings* (gov'tal agencies as PH venues)	Recipients of county level social support and Medicaid services, including those with SMI; shelter populations; state paid unemployment insurance; Medicare; Veterans Perpetrators & victims of IPV; probationers; groups with psychiatric and CD conditions	Chronically unemployed; persons outside traditional workforce; persons not eligible for benefits Failure to gain access to clinical MH and CD treatment settings
Social Media	Youth and young adults; ***hidden populations***	People who do not use the Internet – elders, persons with lower education or financial disadvantage

High-risk Groups and Sites to Contact Them

(tracking social ecology)

High-risk groups	Sites	Potential interventions	Comments
High Risk Youth—"drop outs," violent youth, & foster care youth	Community centers, police, jails, foster services	Comprehensive family and youth services, integrated across community and gov't systems	Missed in schools; requires careful integration and coordination not evident in most communities; funding issues central: INSURANCE BARRIERS
People with severe, persisting mental disorders	Mental health treatment settings; courts, jails, prisons	Fostering of early interventions; assertive community treatments; linkages among courts, clinics, and other agencies	Comprehensive systems of care and assertive community follow-up; coordination of housing, courts, and mental health settings critical to success
Men & women with alcohol and substance disorders; perpetrators of domestic violence; victims of DV	CD treatment settings; courts & jails	Integration of mental health and prevention services into CD programs; *court integrated mental health services*	Dependent on development of integrated MICA services; rapid access to care for those in need crucial; INSURANCE BARRIERS

High-risk Groups and Sites to Contact Them
(tracking social ecology)

	Sites	Potential interventions	Comments
Depressed women and men	Primary care settings	Enhanced detection, treatment, and follow up of emerging symptoms	Requires education of patients & providers *re* recognition and treatment; subsyndromal conditions important
Elders with pain, disability, despair (& depression)	Primary care offices, residential settings; Agency on Aging outreach programs	Pre-emptive treatment of pain and increasing medically related disability	Can miss socially isolated elders and elders who do not express their needs openly
Suicidal people, including patients with personality d/o, varying mood disturbances, and CD problems	ERs, ICUs, inpatient psych. and medical services – *need for novel approaches to case identification and follow-up*	High-risk groups	Those high in ideation and attempts in the context of personality disorders often are 'frequent fliers' to ERs who fail to use standard systems of care; major ethical questions; INSURANCE BARRIERS

Prevention of death from self-injury – suicide, drug deaths, alcohol related diseases – must form a mosaic…

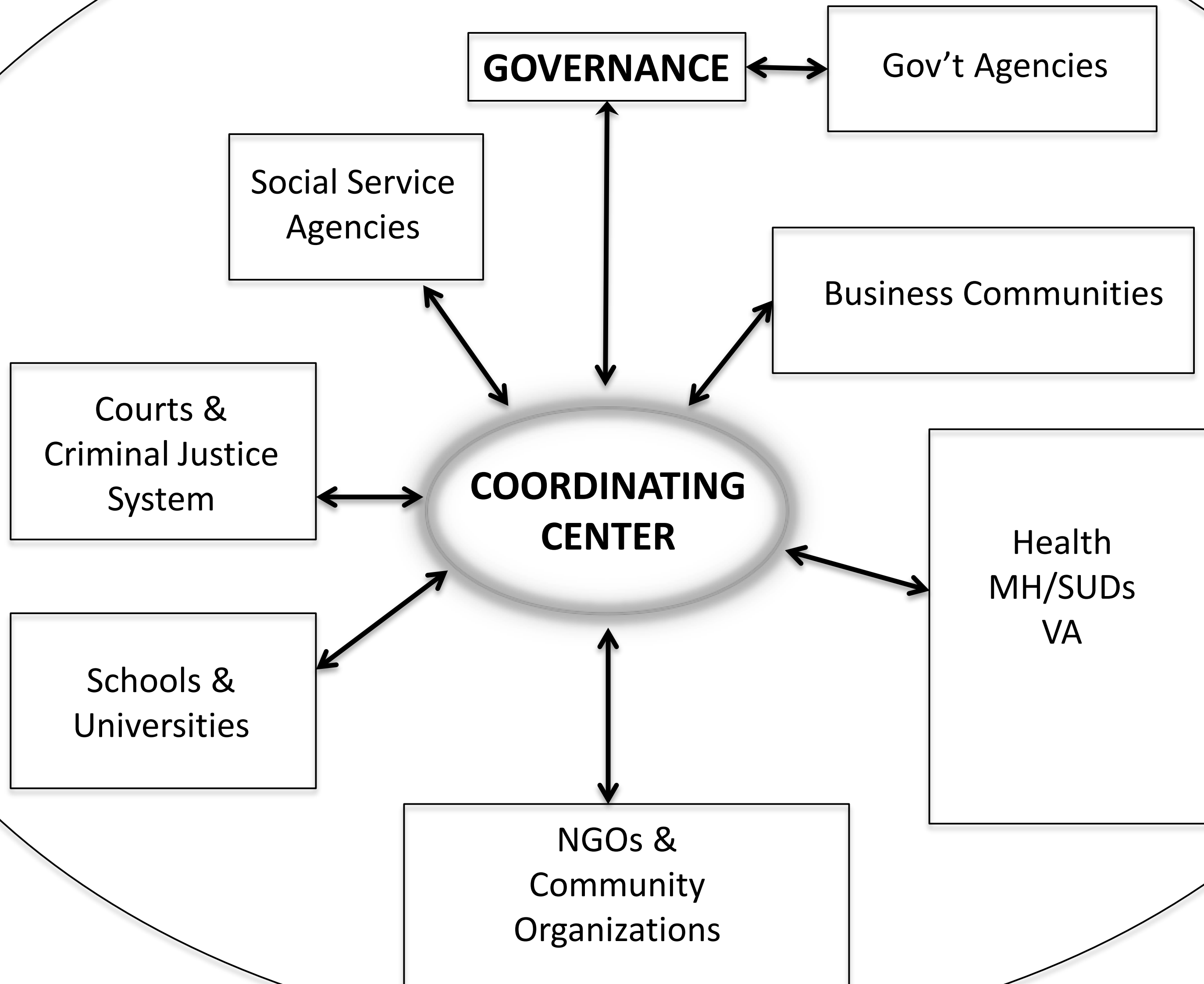
…built within the contexts of local geography (community settings) and the social ecology of populations – and of individuals, as well as families. Effective prevention will involve multiple complementary components. This mosaic cannot be built or effectively sustained outside the domains of people's lives!

Practical Steps for Prevention Programming – 1

- **Nurture, initiate, build, maintain *political will***
- **Define who, where, & which method – assess changing epidemiology across space & time**
- **Inventory current efforts & resources**
  - **Government**
  - **Health systems**
  - **Communities**
- **Define the gaps: Which populations are covered and which are missed?**
- **Assess capacity & infrastructure to support diverse prevention efforts**
- **Determine who is needed to develop strategic plan and implement future efforts—team building**
- ***Community-integrated strategic planning***

Practical Steps for Prevention Programming – 2

- Organization & governance
  - Accountability
  - Coordinating center (operations & data)
  - Coalitions and collective ownership
- Geospatially distributed, age-specific, inclusive prevention 'mosaics' based on strategic plan & local mapping
  - "Placement" of evidence-based & 'best bet' prevention initiatives within the context of community settings, social media, and health systems
- Evaluation Paradigms
  - *Pre-defined parameters for evaluation* built into the planning and design of the program components
  - Upstream indicators of activities and outcomes – common risk markers – and downstream indicators of activities and outcomes
  - Anticipated extent of change, power analyses predetermine dimensions of program component size to attain meaningful/measurable outcomes
- Implementation
  - Stepped development – site-specific initiation and spread
  - Integration of research processes – coordinated staff and functional activities

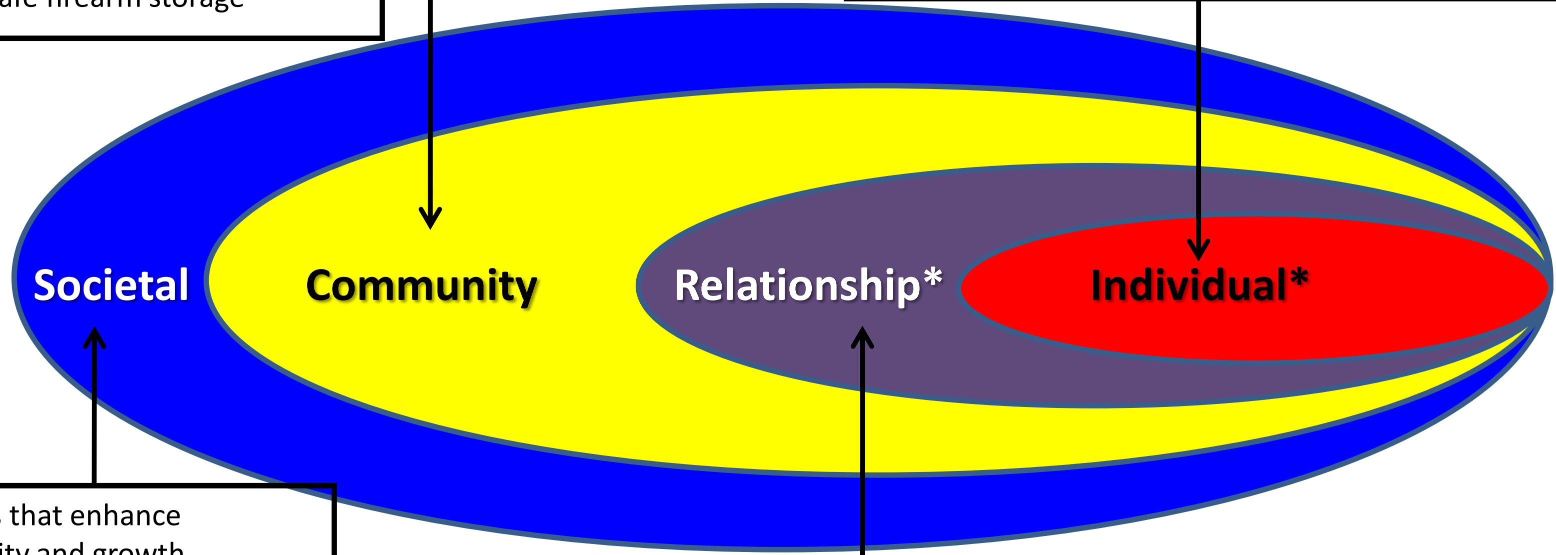

Collaborative Community Prevention
GOVERNANCE
Gov't Agencies
Social Service Agencies
Business Communities
Courts & Criminal Justice System
COORDINATING CENTER
Health
MH/SUDs
VA
Schools & Universities
NGOs & Community Organizations

Ecological model: Protective factors (P) and interventions to prevent violence to self and others

(Caine 2014)

(P) Coordinated community support systems
(P) Robust local faith & service organizations
Strengthen educational systems, vocational training programs—for youth & adults
Enhance neighborhoods & home ownership, & community safety
Combat "culture of violence"
Promote help-seeking & victim support
Reduce access to lethal means and illicit drugs; promote safe firearm storage

(P) Robust coping & resilience; (P) sense of belonging & self-worth
Identify & treat persons suffering severe psychiatric & substance/alcohol related disorders; interventions with suicidal individuals
Prevent alcohol & substance misuse
Prevent child abuse and victimization
Rehabilitate violent persons
Reduce access to lethal means



Support policies that enhance economic stability and growth
Assure economic safety nets for food, housing, health, & education
Reduce all forms of institutional discrimination; reduce stigma regarding mental distress and disorders
Promote cultural norms that discourage violence; promote help-seeking
Reduce access to lethal methods

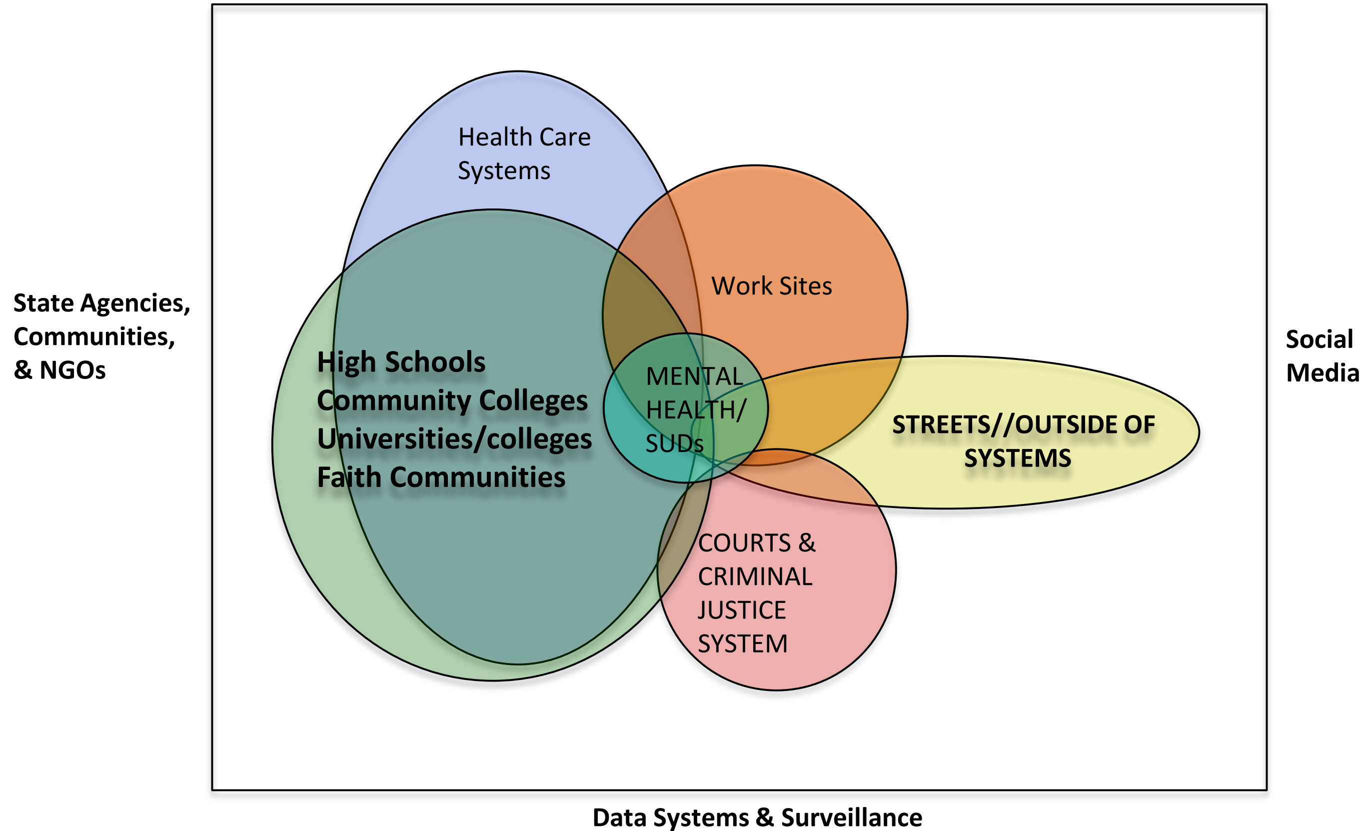
(P) Family-communal coping; (P) interpersonal connectedness; (P) intergenerational support
Support high-risk parents; intervene in fractured families
Use community, health system, & court-based screening to detect intimate & family violence
Support families to enhance health, food security, economic opportunities, & access to education & vocational skills
Promote safe storage of lethal means

***Protective factors & interventions depend on age, sex & gender, and developmental challenges**

Settings for Collaborative Community Prevention: *Youth & Young Adults*

Culture of Safety & Caring

Universal Prevention: Global & Niche Messaging; Means Safety

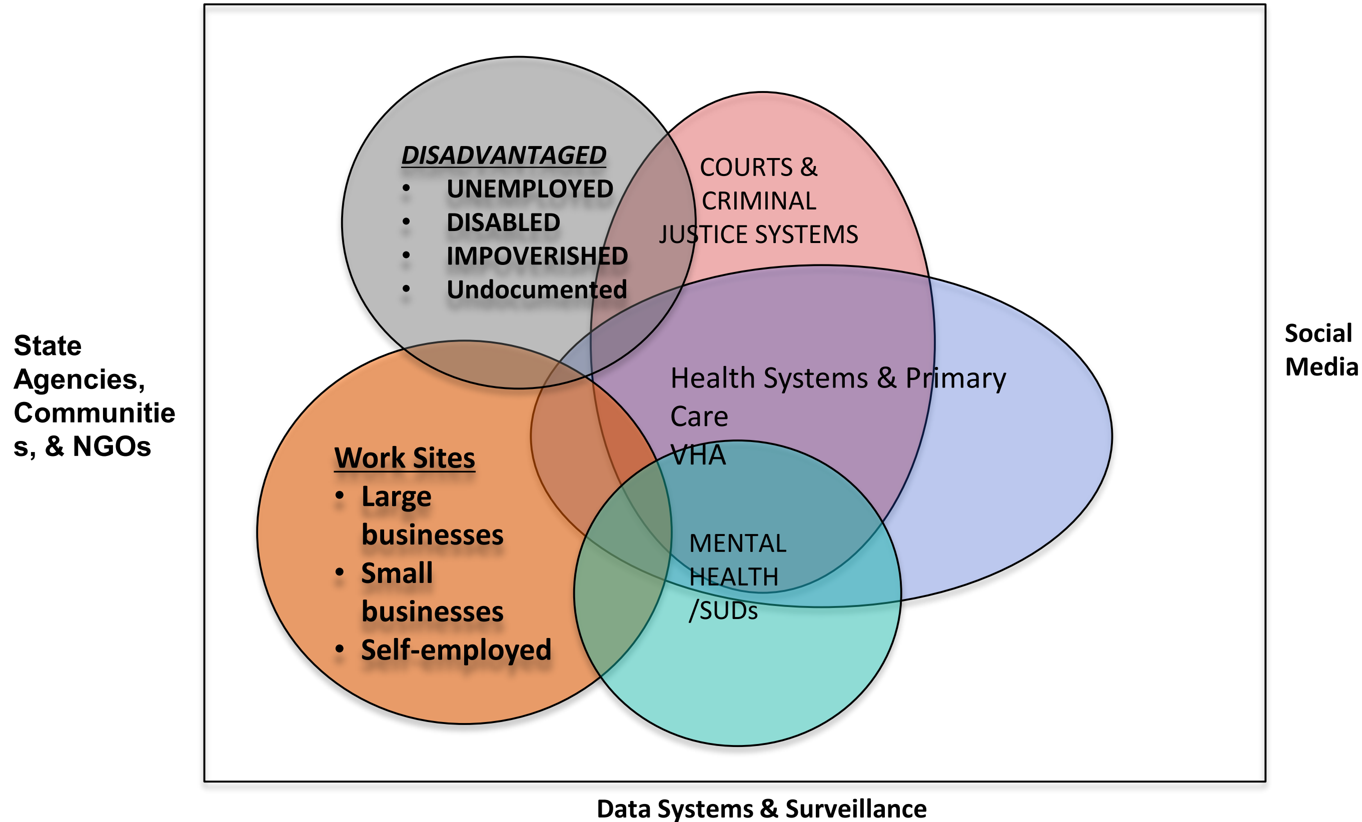


CAPs = *setting to encounter higher risk persons*

Settings for Collaborative Community Prevention: *Adults*

Culture of Safety & Caring

Universal Prevention: Global & Niche Messaging; Means Safety

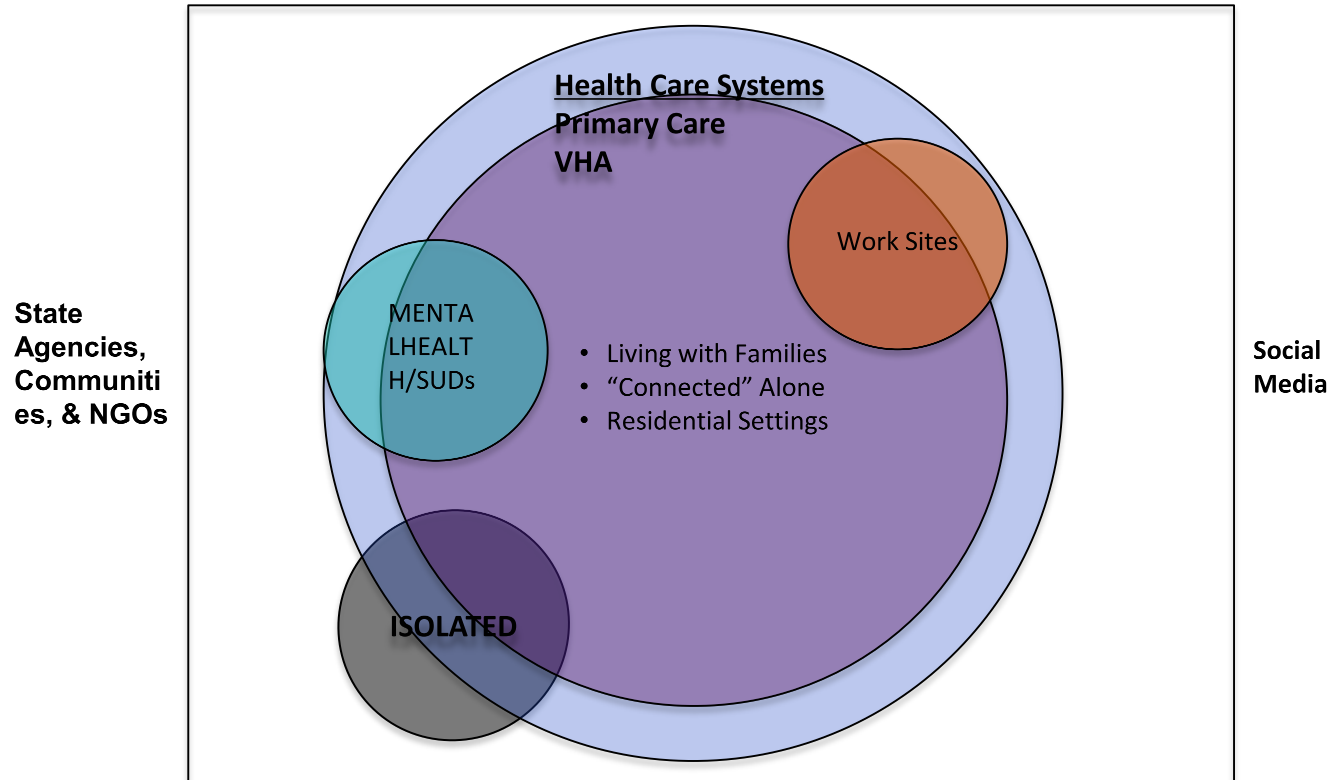


CAPs = *setting to encounter higher risk persons & higher risk groups*

Settings for Collaborative Community Prevention: *Elders*

Culture of Safety & Caring

Universal Prevention: Global & Niche Messaging; Means Safety



Data Systems & Surveillance

CAPs = *setting to encounter higher risk persons & higher risk group*

Premature Death in Early & Young Adulthood

Common Developmental Contexts for Different Adverse Outcomes

HOMICIDE

MV Death &
Self-inflicted
Poisoning
(DDSI)

SUICIDE

Legal System Involvements
Emergency Room Visits
Mental Health & Chemical Dependency Treatment Contacts

Emerging Behavioral Problems &
Mental Health Disturbances
School Difficulties
Alcohol and Substance Misuse

Disruptive Family Factors
Disadvantaged Economic & Social Factors

Accumulating
Risk

Prevention & Intervention Opportunities

Indicated & Clinical

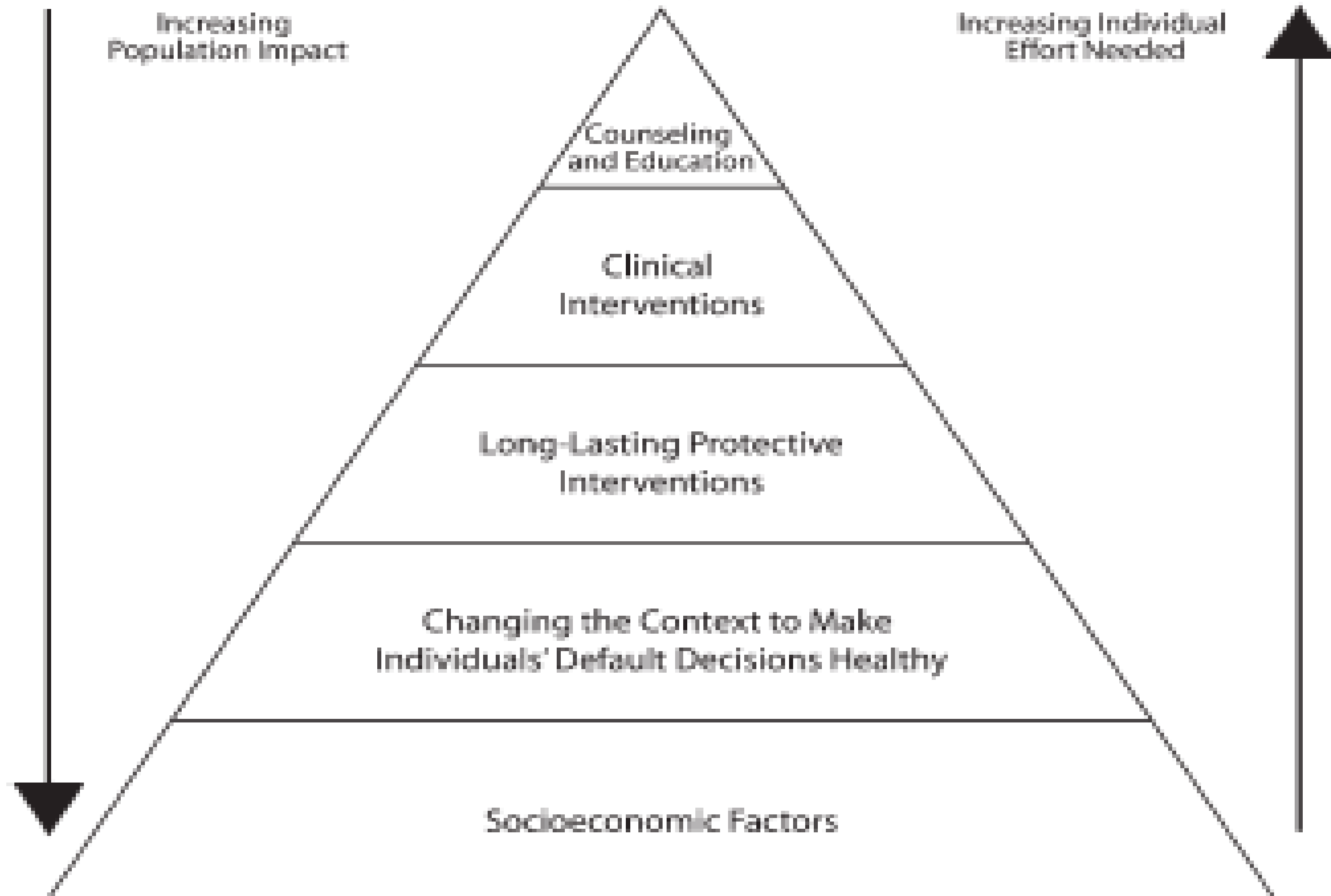
Selective
& Indicated

Universal &
Selective

Outcomes!

- **Without scientifically collected and scrutinized *data*, policy implementation will be limited to "intuition," which is subject to multiple observer and interpreter biases.**
- **Without well-designed trials and *rigorous evaluation studies*, it will be impossible to assess whether *intuitively appealing "face valid" interventions* save lives and warrant broad dissemination across communities.**

The Health Impact Pyramid



Frieden TH: A Framework for Public Health—The Health Impact Pyramid. *Am J Public Health* 2010; *100*:590-595.

Injury Control
Research Center
for Suicide Prevention

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