The social in context: On rational directions in quantitative population health science

Sandro Galea

Boston University School of Public Health

BOSTON UNIVERSITY

Population Health Science

Katherine M. Keyes and Sandro Galea

OXFORD

1. What are we trying to do?

http://graphics8.nytimes.com/images/2009/03/11/opinion/13population.480.jpg

> Public health is what we, as a society, do collectively to assure the conditions for people to be healthy

Institute of Medicine. The Future of Public Health. National Academy Press; Washington, D.C.: 1988

2. Is this what we do?

The New York Times

HEALTH

In Single Gene, a Path to Fight Heart Attacks

By GINA KOLATA JUNE 18, 2014

PHARMA & HEALTHCARE 6/19/2014 @ 7:00AM | 13,561 views

Mutations That Prevent Heart Attacks Upend The Search For New Drugs

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Thu, Jun 19, 2014, 3:38pm EDT - US Markets close in 22 mins

Broken gene found to protect against heart disease

Loss-of-function mutations in APOC3 gene lower blood lipids and lower risk of coronary artery disease

"And that's why the budget I send this Congress on Monday will include a new Precision Medicine Initiative that brings America closer to curing diseases like cancer and diabetes, and gives all of us access, potentially, to the personalized information that we need to keep ourselves and our families healthier."

President Barack Obama
January 30, 2015

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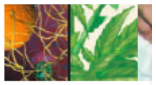
Vol. 102, N.° 10, pp. 573-



The NE

Personalized medicine: inevitable

Perspective

JULY 22, 2010

The Path to Personalized Medicine

Margaret A. Hamburg, M.D., and Francis S. Collins, M.D., Ph.D.

Major investments in basic science have created
an opportunity for significant progress in
clinic
hund

the NIH and the FDA will invest
in advancing translational and

Journal of Diabetes Science and Technology
Volume 3, Issue 4, July 2009
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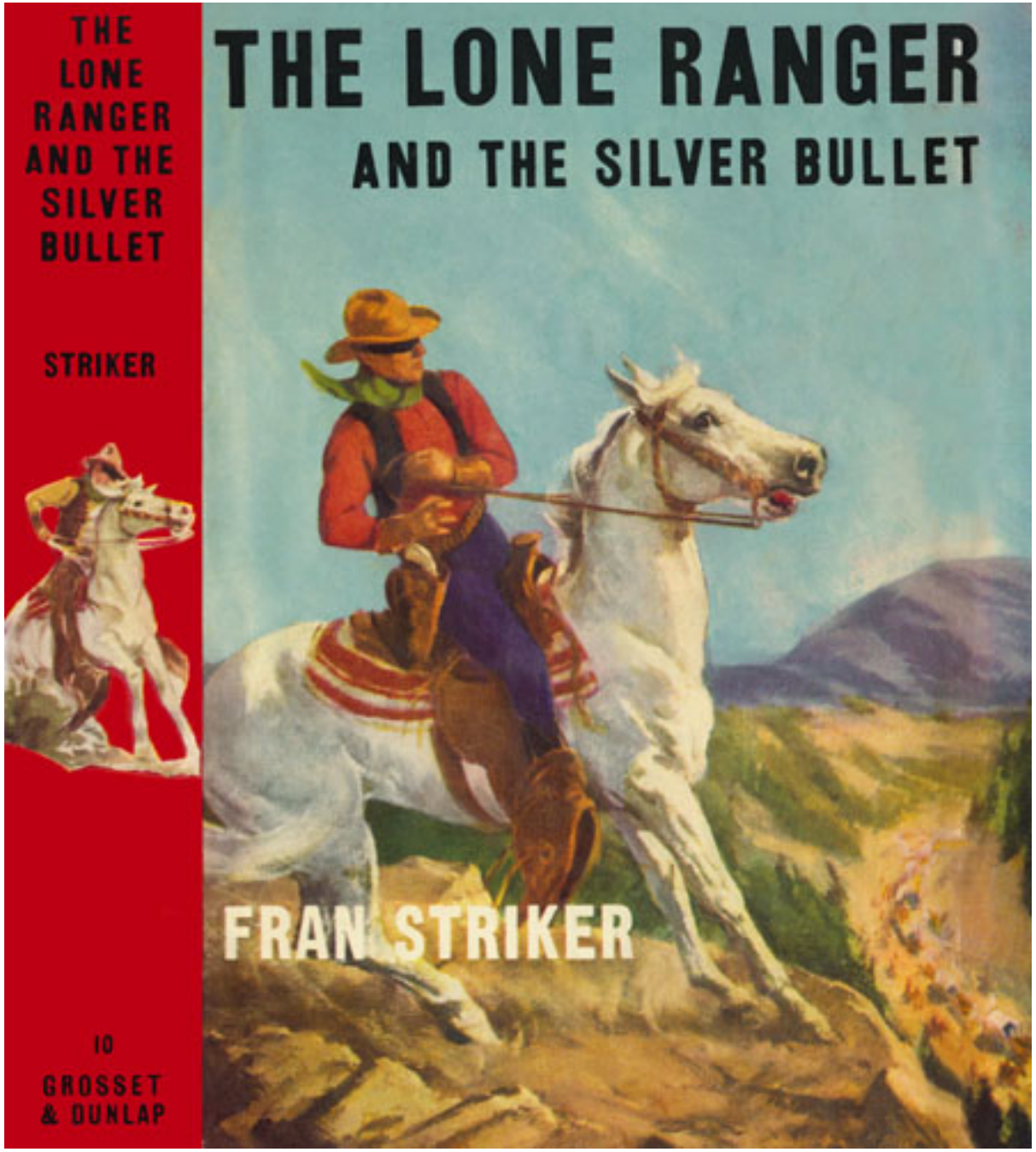
SYMPOSIUM

The Case for Personalized Medicine

Edward Abrahams, Ph.D.,[1] and Mike Silver, Ph.D.[2]


THE LONE RANGER AND THE SILVER BULLET
STRIKER
10
GROSSET & DUNLAP
THE LONE RANGER
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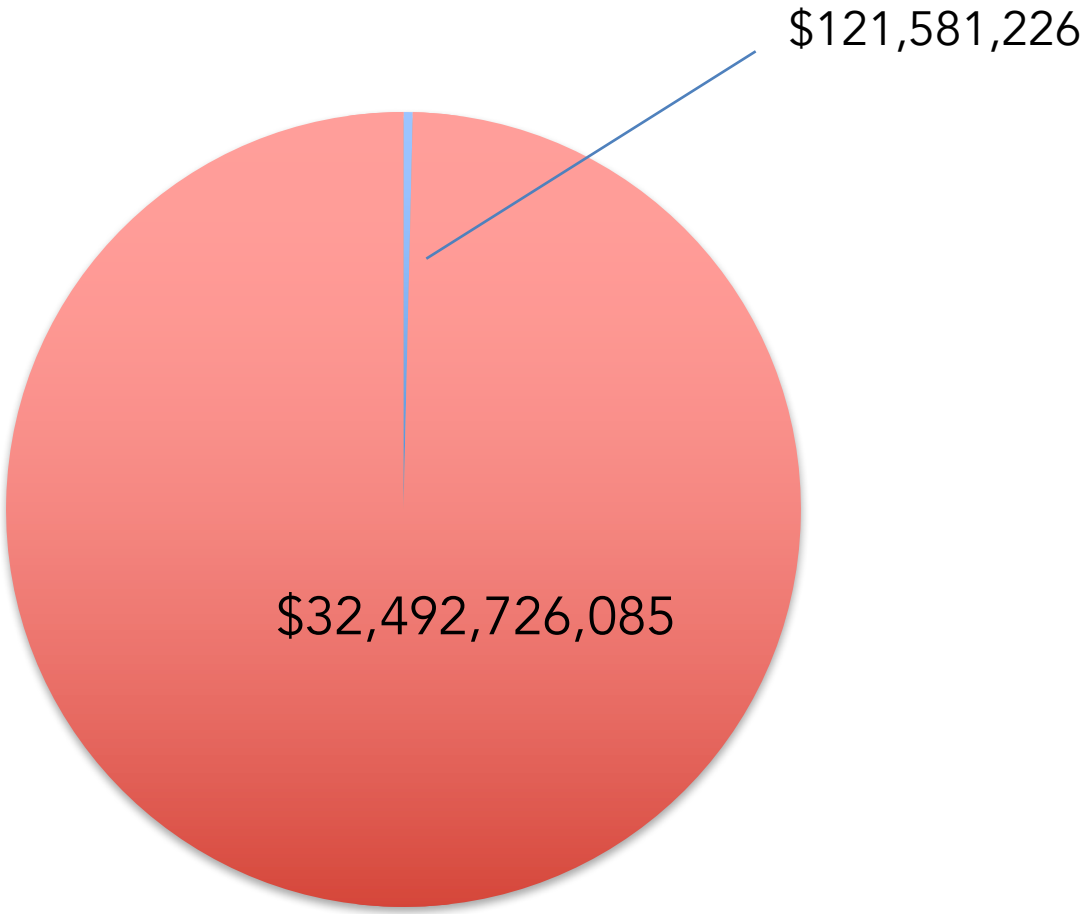
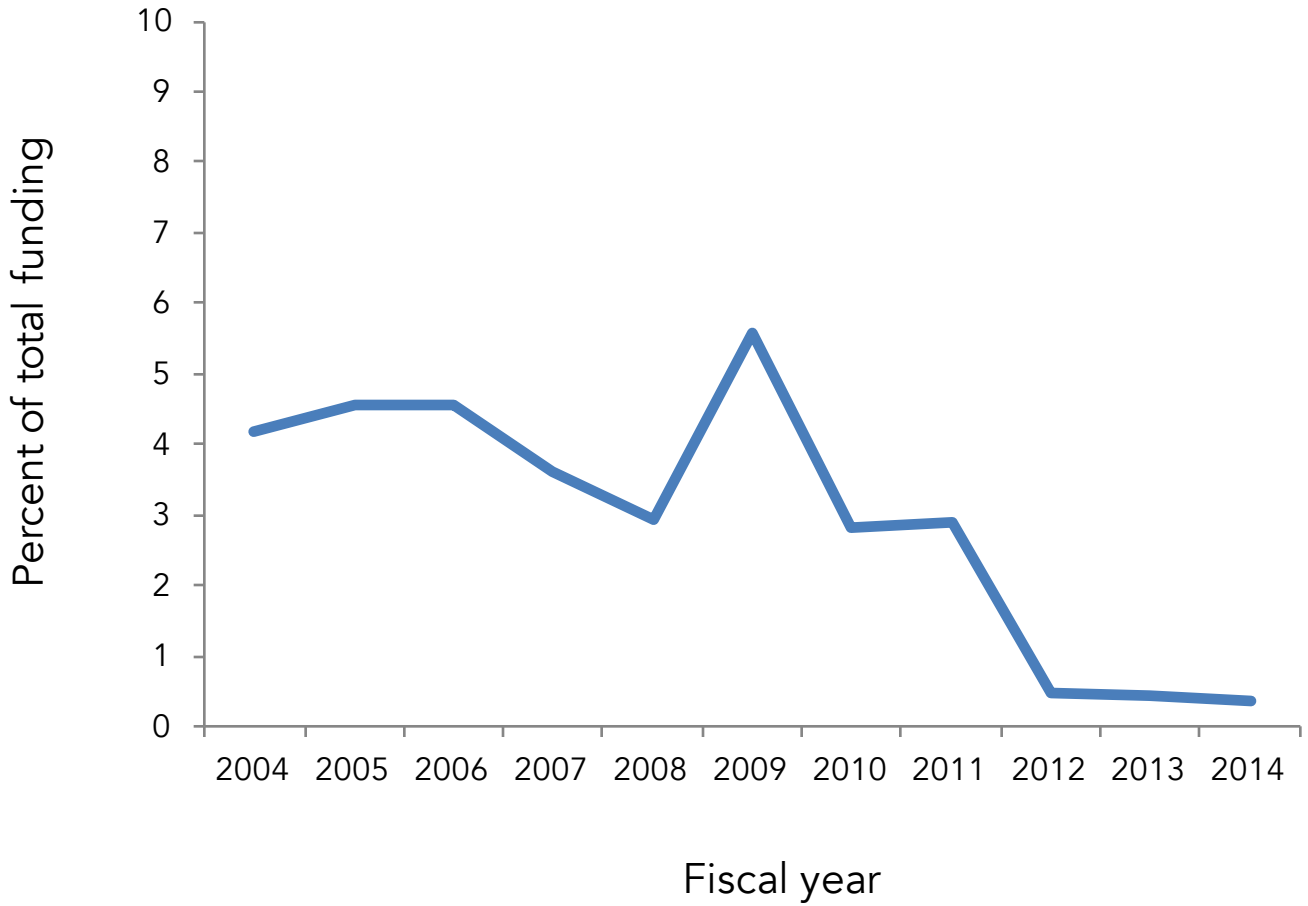
FRAN STRIKER

Among NIH funding for the current fiscal year, only 0.4% was awarded to projects with the terms "population" or "public" in the title



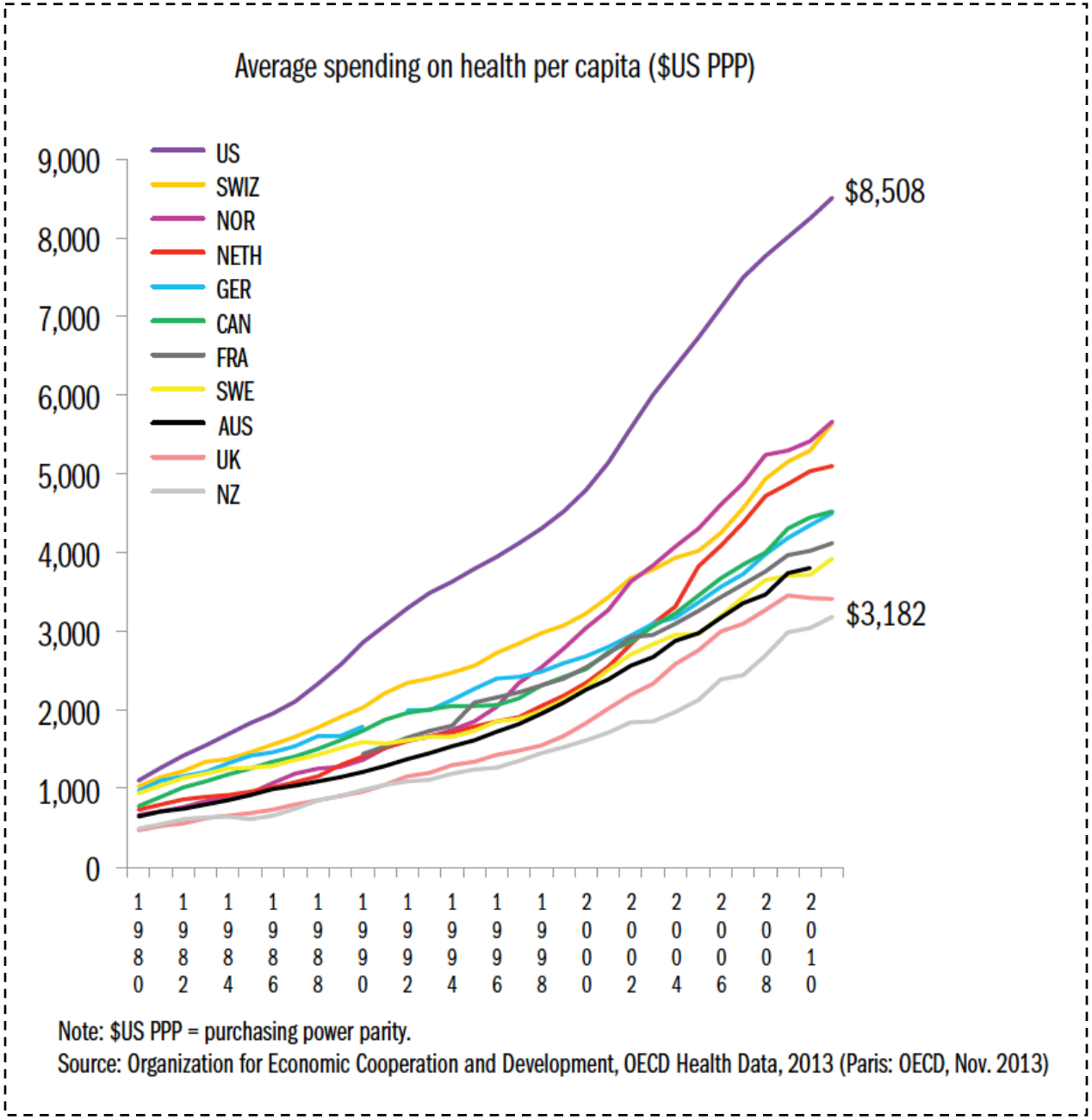
NIH RePORTER. Current projects from FY 2014-2015 for which funding data is available. <http://projectreporter.nih.gov/> Accessed on June 22, 2015.

Proportion of NIH funding awarded to projects with the terms "population" or "public" in the title, 2004-2014



NIH RePORTER. Search results for projects for which funding data is available. <http://projectreporter.nih.gov/reporter.cfm> Accessed on November 20, 2014.

3. What does this get us?



http://www.commonwealthfund.org/~/media/files/publications/fund-report/2014/jun/1755_davis_mirror_mirror_2014.pdf

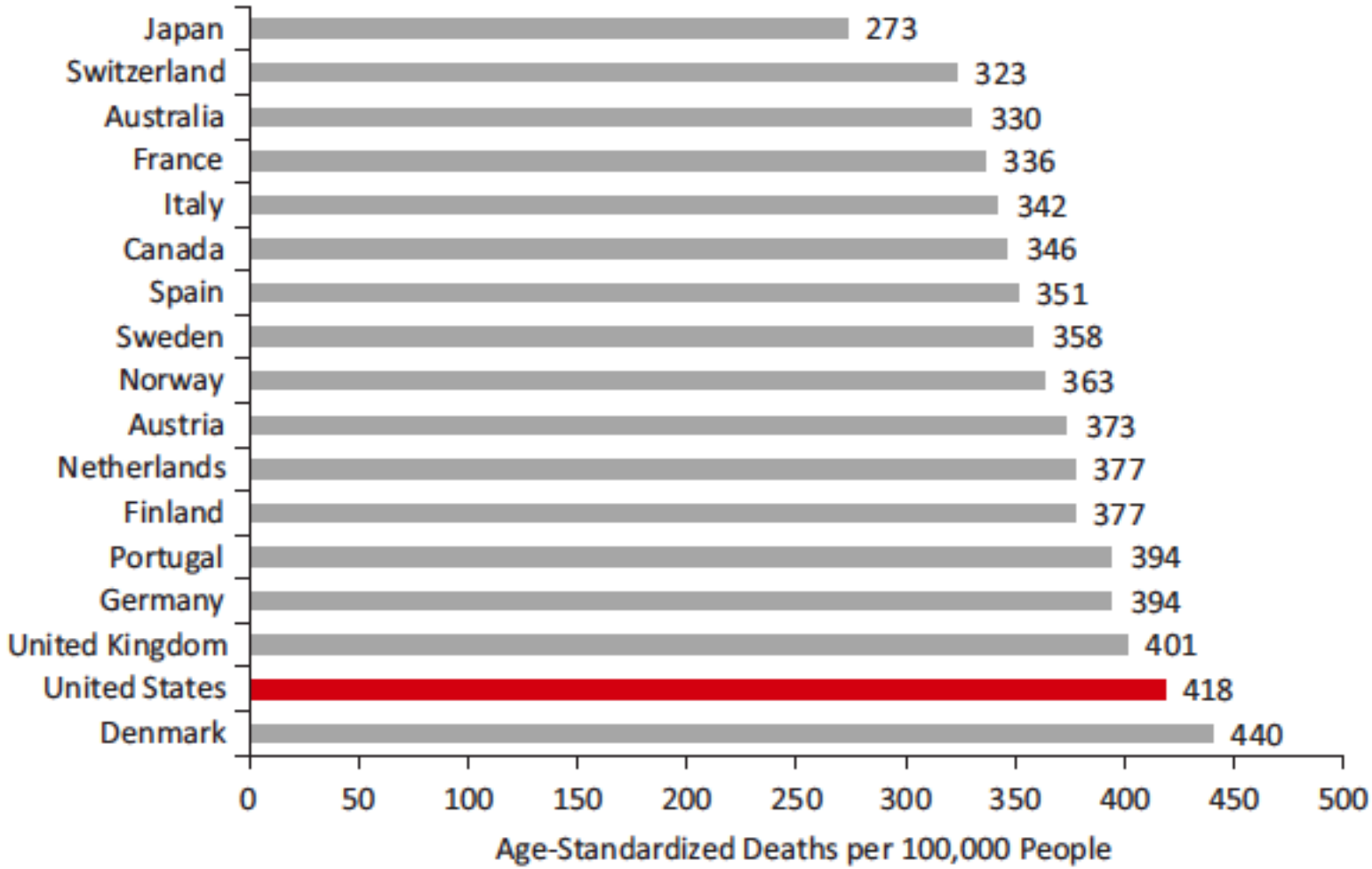


FIGURE 1-1 Mortality from noncommunicable diseases in 17 peer countries, 2008.
SOURCE: Data from World Health Organization (2011a, Table 3).

US Health in International Perspective. Shorter lives, poorer health. S Woolf, L Aron, eds. NRC and IOM. 2012.

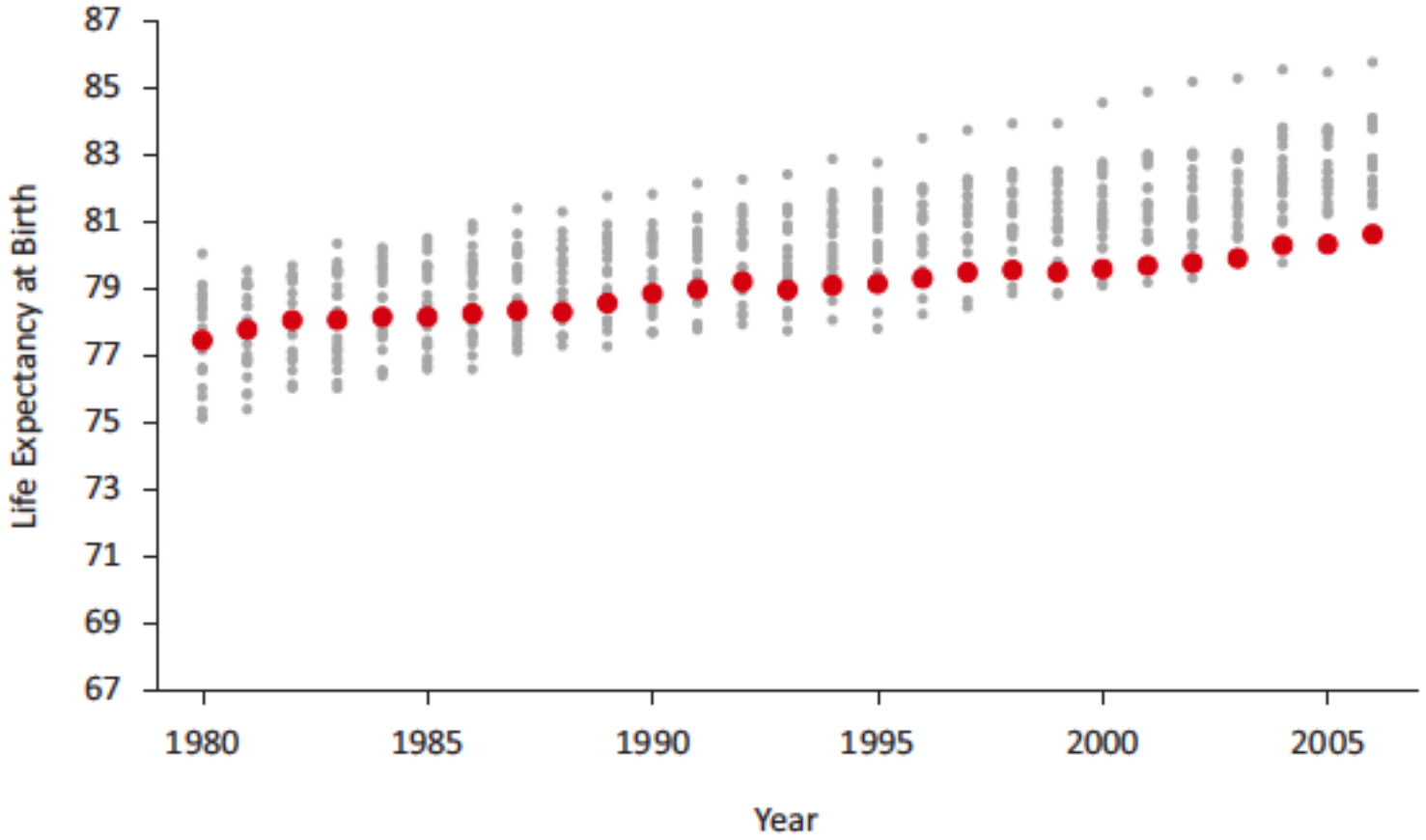


FIGURE 1-6 U.S. female life expectancy at birth relative to 21 other high-income countries, 1980-2006.

NOTES: Red circles depict newborn life expectancy in the United States. Grey circles depict life expectancy values for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and West Germany.

SOURCE: National Research Council (2011, Figure 1-4).

US Health in International Perspective. Shorter lives, poorer health. S Woolf, L Aron, eds. NRC and IOM. 2012.

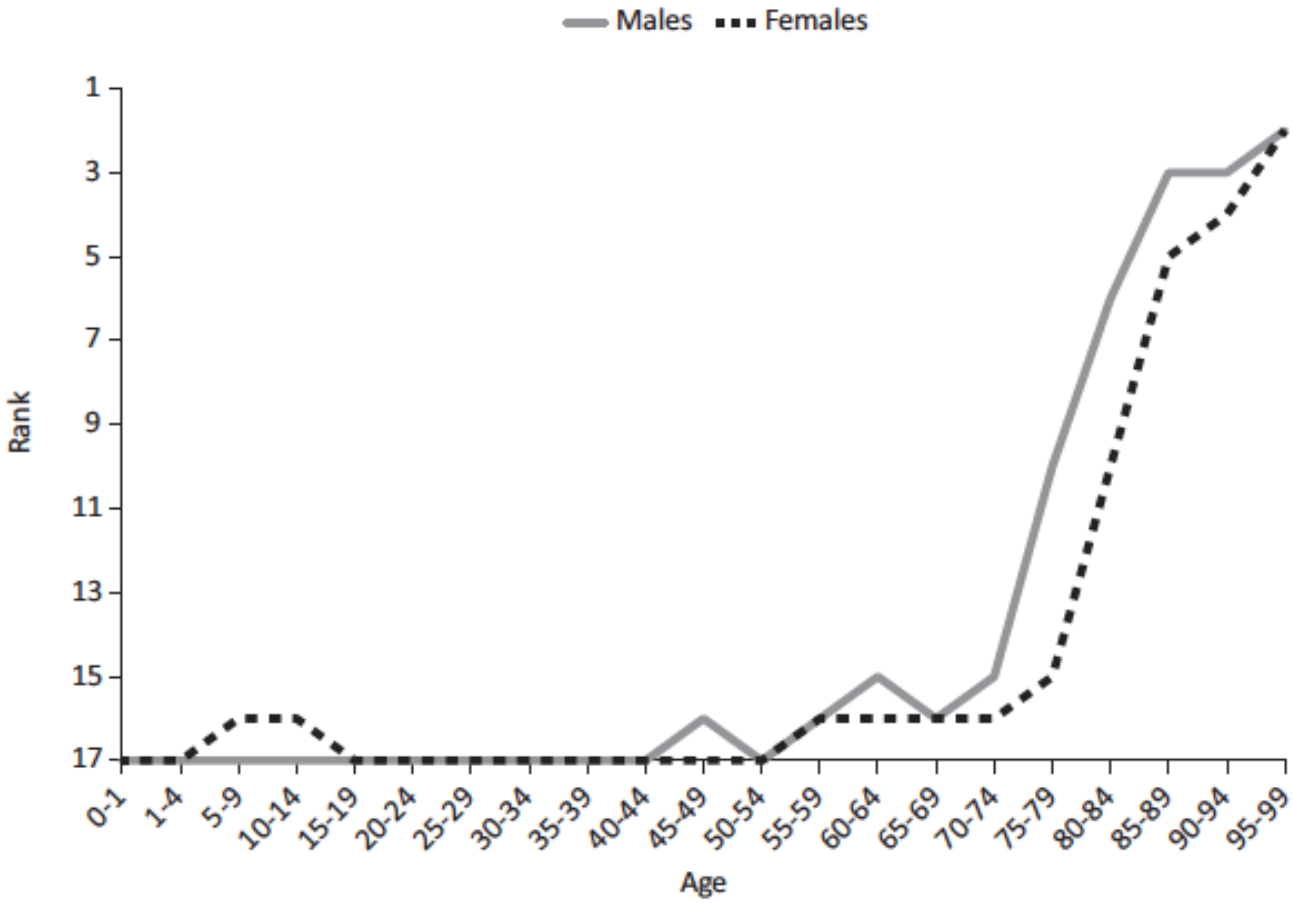


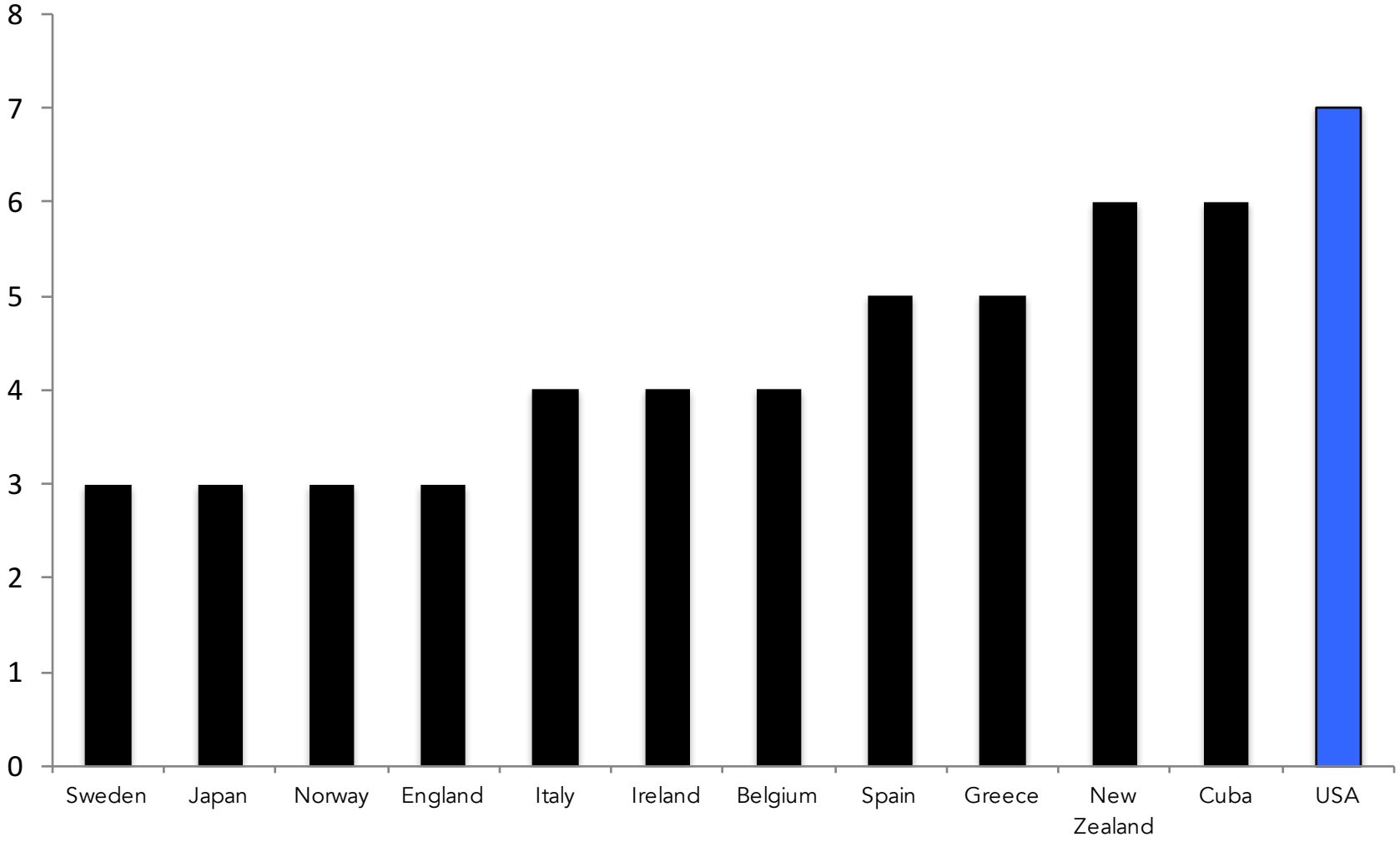
FIGURE 1-9 Ranking of U.S. mortality rates, by age group, among 17 peer countries, 2006-2008.

NOTES: The top rank is number 1, indicating the lowest death rate, and the bottom rank is number 17, indicating the highest death rate. Rankings are based on all-cause mortality rates for 2006-2008. Data for this figure were drawn from (1) the Human Mortality Database, 2011, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), available at http://www.mortality.org or http://www.humanmortality.de (data downloaded July 18, 2011) and (2) Arias, Elizabeth, 2011, United States Life Tables, 2007. *National Vital Statistics Reports, 59*(9), Hyattsville, MD: National Center for Health Statistics.

SOURCE: Adapted from Ho and Preston (2011, Figure 1).

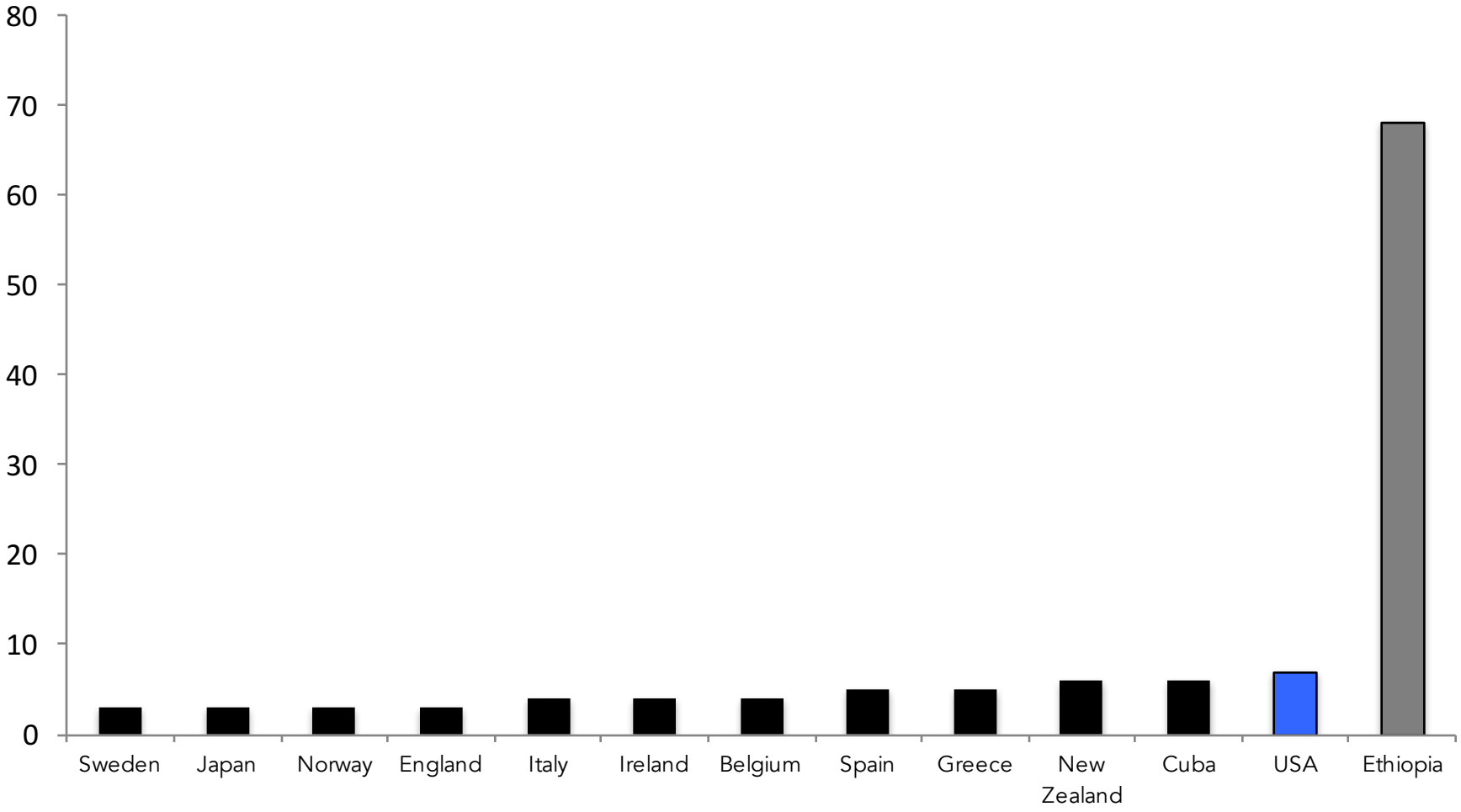
US Health in International Perspective. Shorter lives, poorer health. S Woolf, L Aron, eds. NRC and IOM. 2012.

Under five mortality rates per 1,000 live births in selected countries



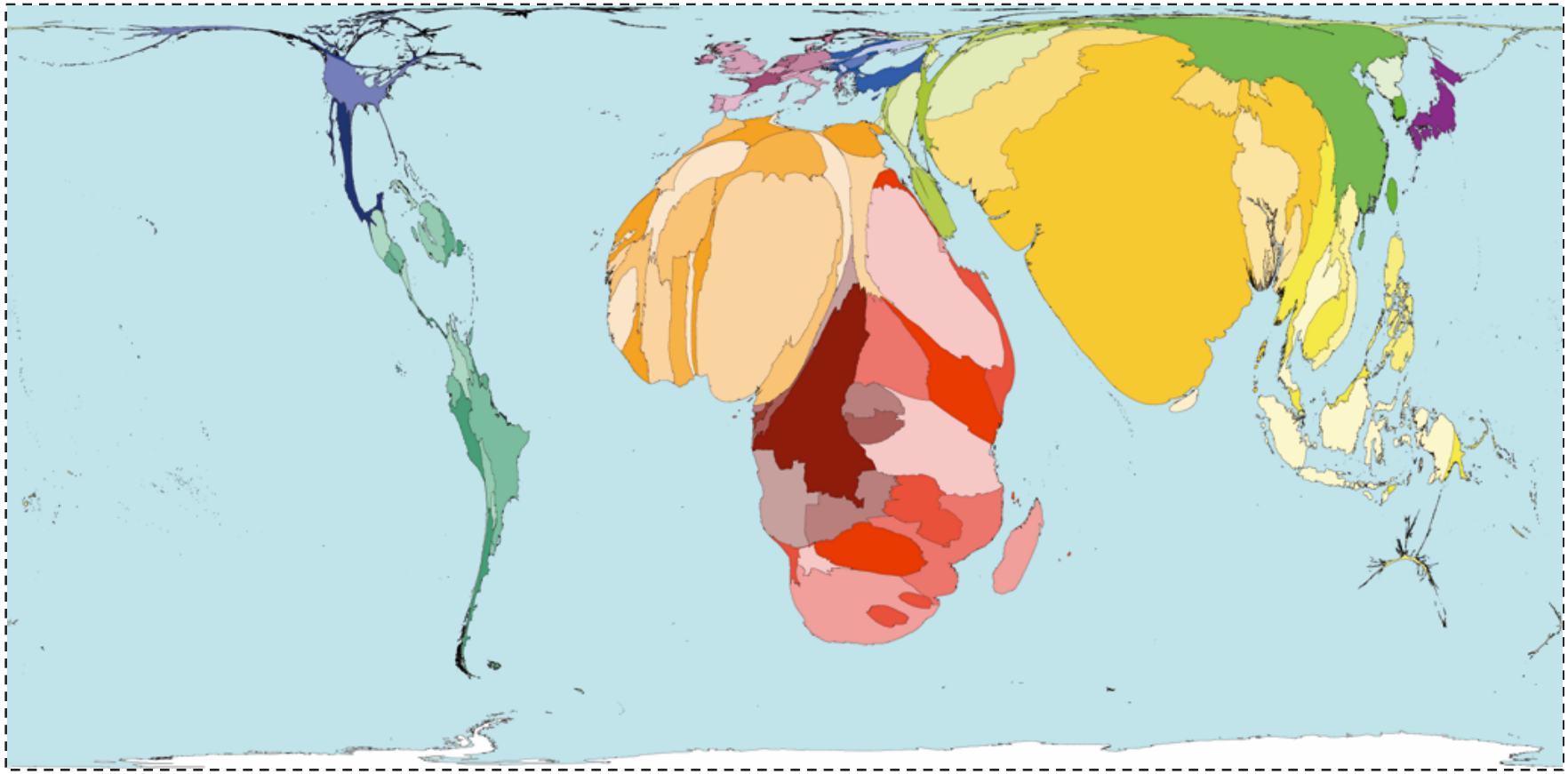
Mortality rate, under-5 (per 1,000 live births). The World Bank Data, 2012. United Nations Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division). <http://data.worldbank.org/indicator/SH.DYN.MORT> Accessed October 29, 2013.

Under five mortality rates per 1,000 live births in selected countries



Mortality rate, under-5 (per 1,000 live births). The World Bank Data, 2012. United Nations Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division). <http://data.worldbank.org/indicator/SH.DYN.MORT> Accessed October 29, 2013.

The world, by preventable deaths

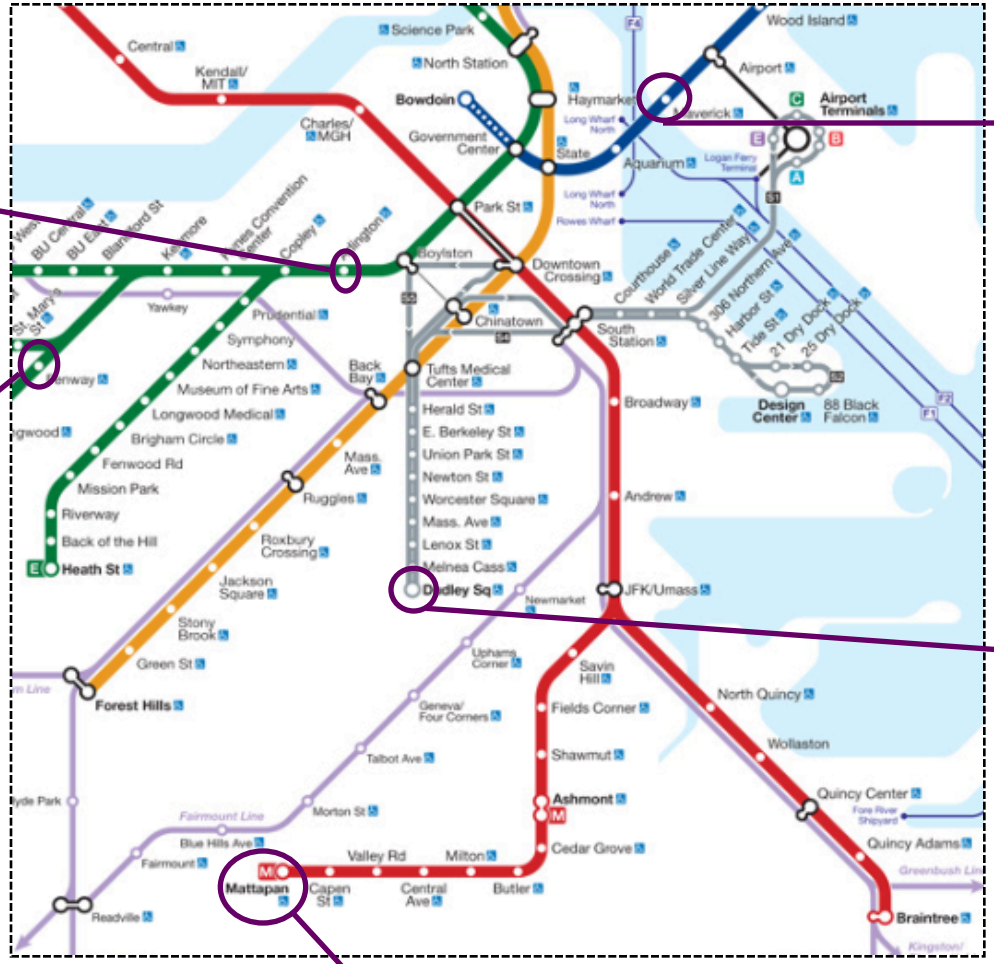


Worldmapper. <http://www.worldmapper.org/display.php?selected=1>

Percent of adults with diabetes by T stop, 2010

If you get off at Arlington: 3%

If you get off at Fenway: 2%



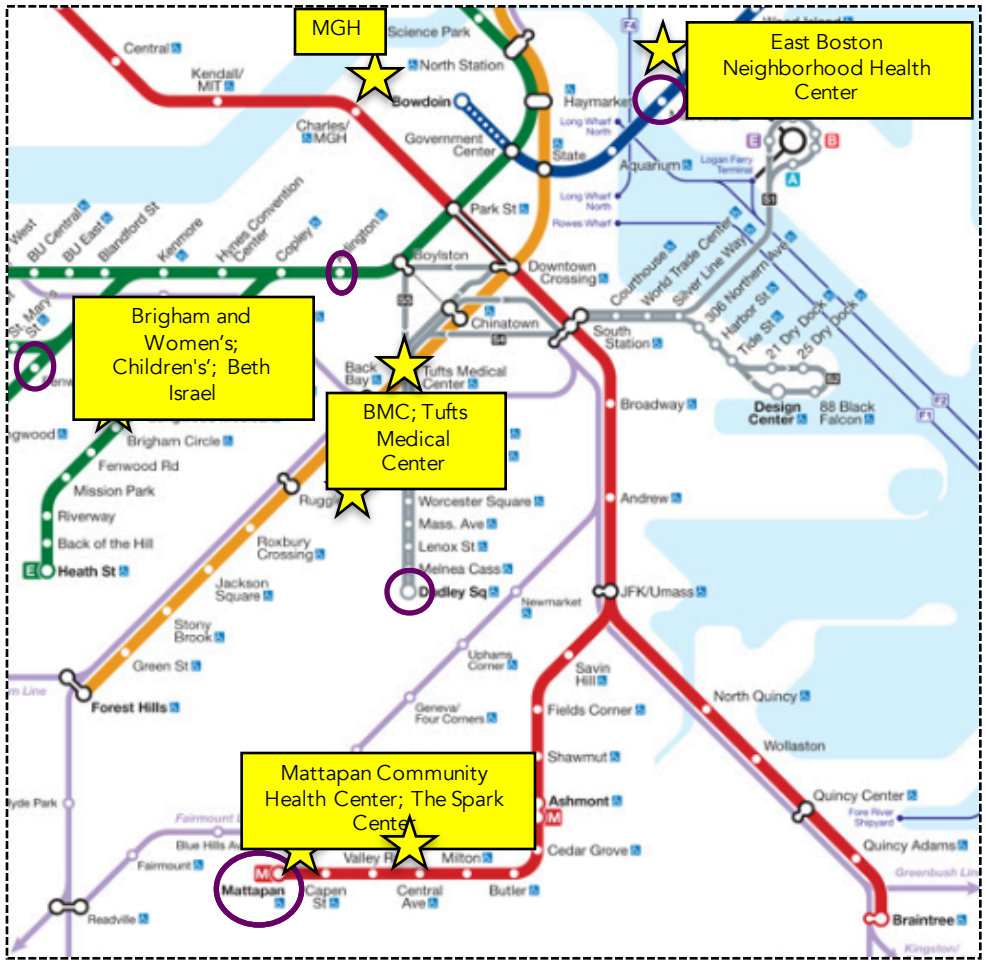
If you get off at Maverick: 11%

If you get off at Dudley Square: 11%

If you get off at Mattapan: 10%

Health of Boston 2012-2013: A neighborhood focus. Boston Public Health Commission. <http://www.bphc.org/healthdata/health-of-boston-report/Pages/Health-of-Boston-Report.aspx> Accessed February 9, 2015.

Despite geographic proximity to health services



Google Maps. <https://www.google.com/maps/> Accessed March 17, 2015.

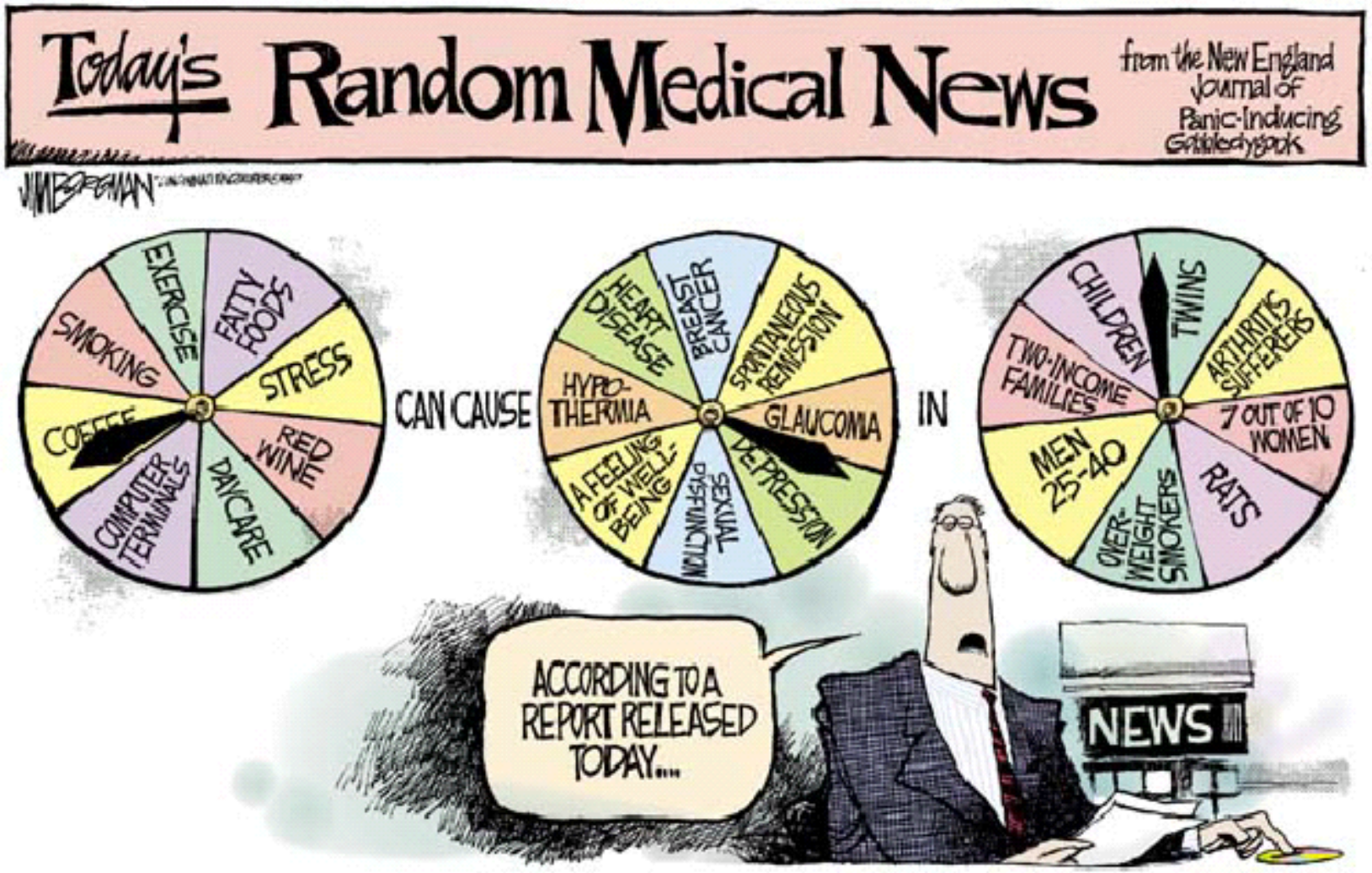


Figure 3: New England Journal of Panic-Inducing Gobbledygook.
Source: Jim Borgman, The Cincinnati Enquirer (27 April 1997, E4).

4. Why this state of affairs?

a. A fascination with *individual health*


RIPPED ABS IN 6 WEEKS
6
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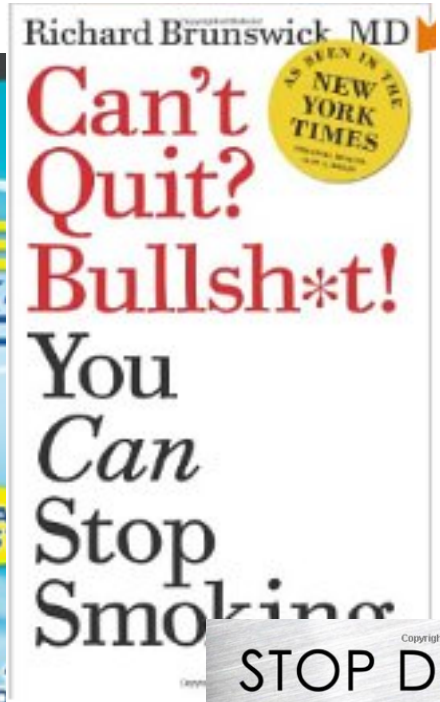
Richard Brunswick, MD
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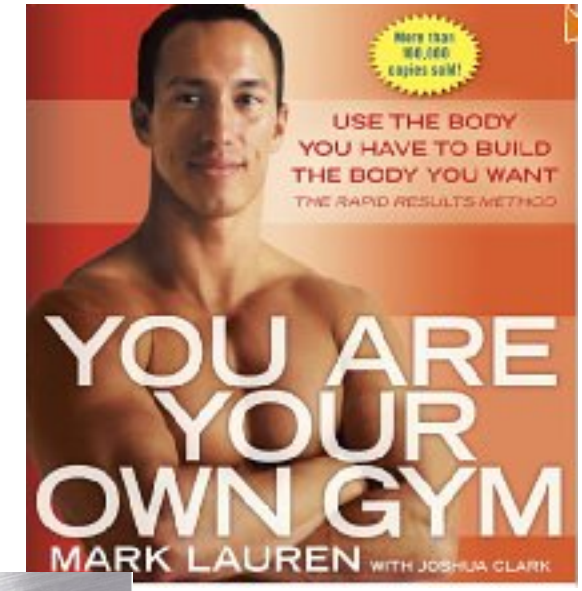
You
Can
Stop
Smoking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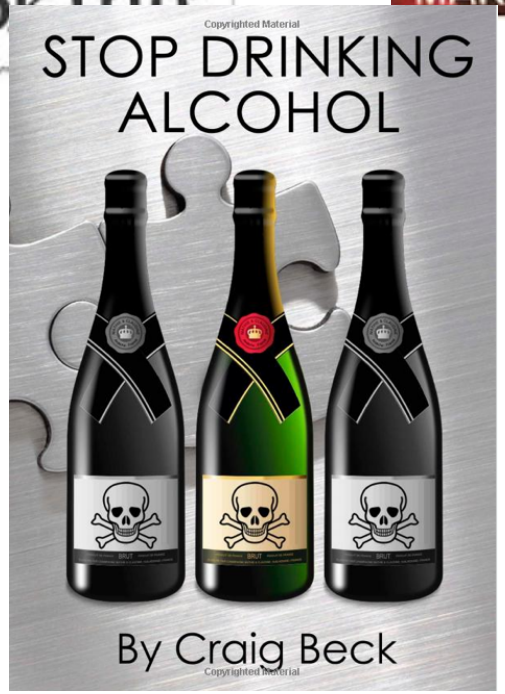
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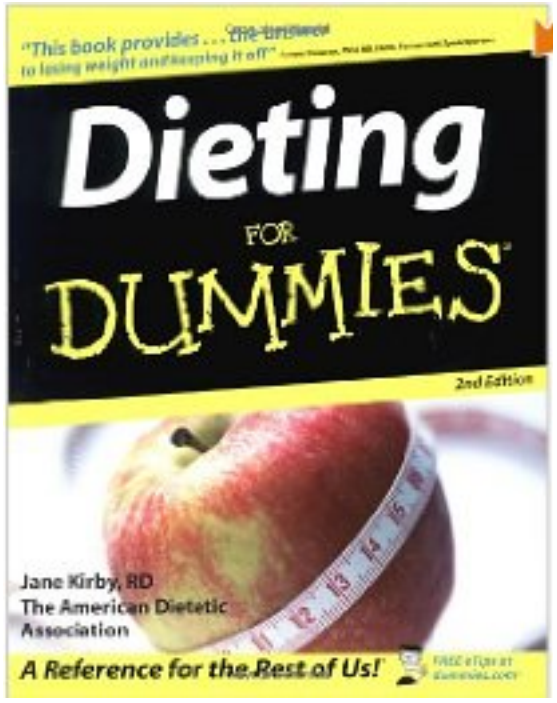
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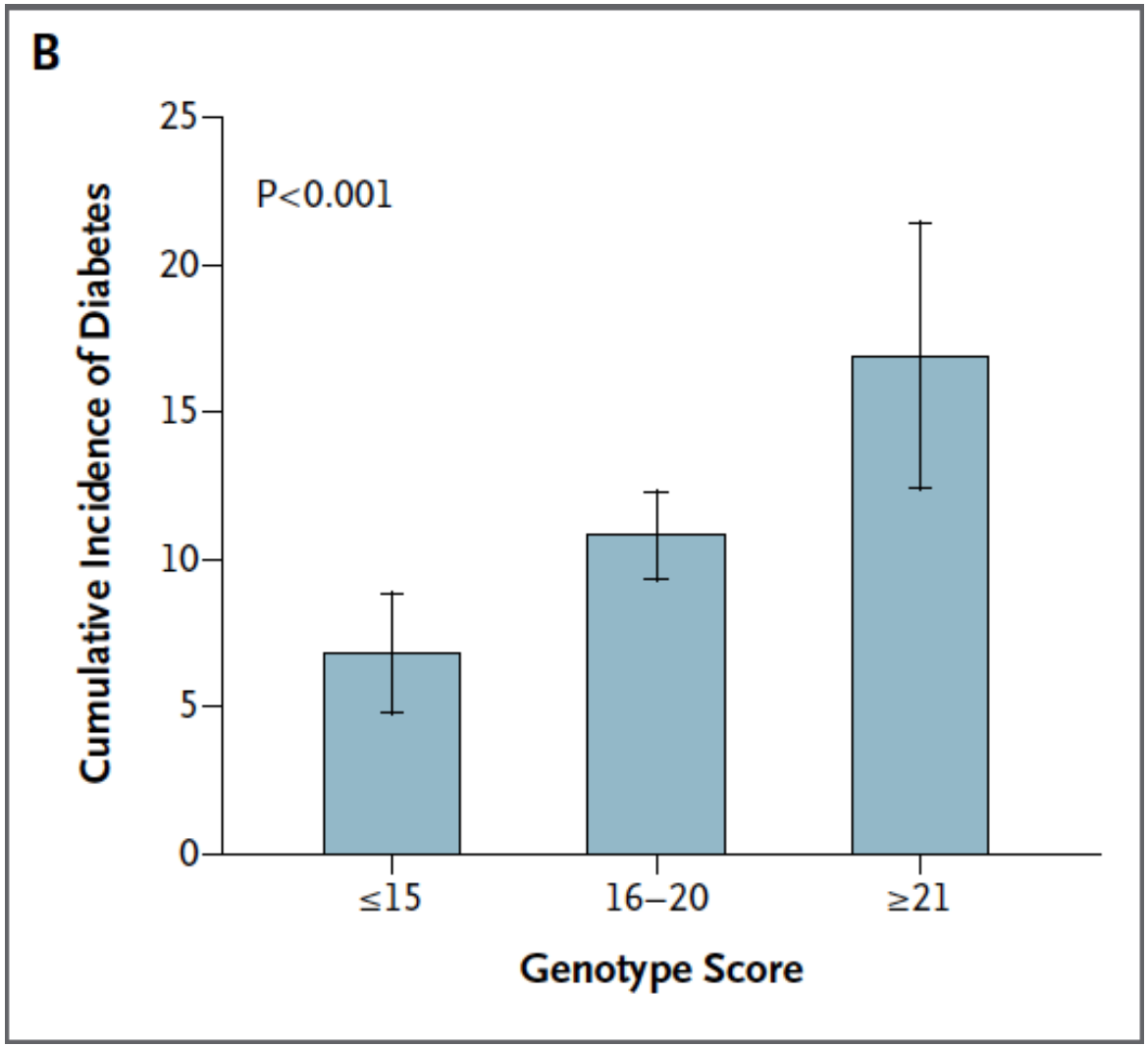
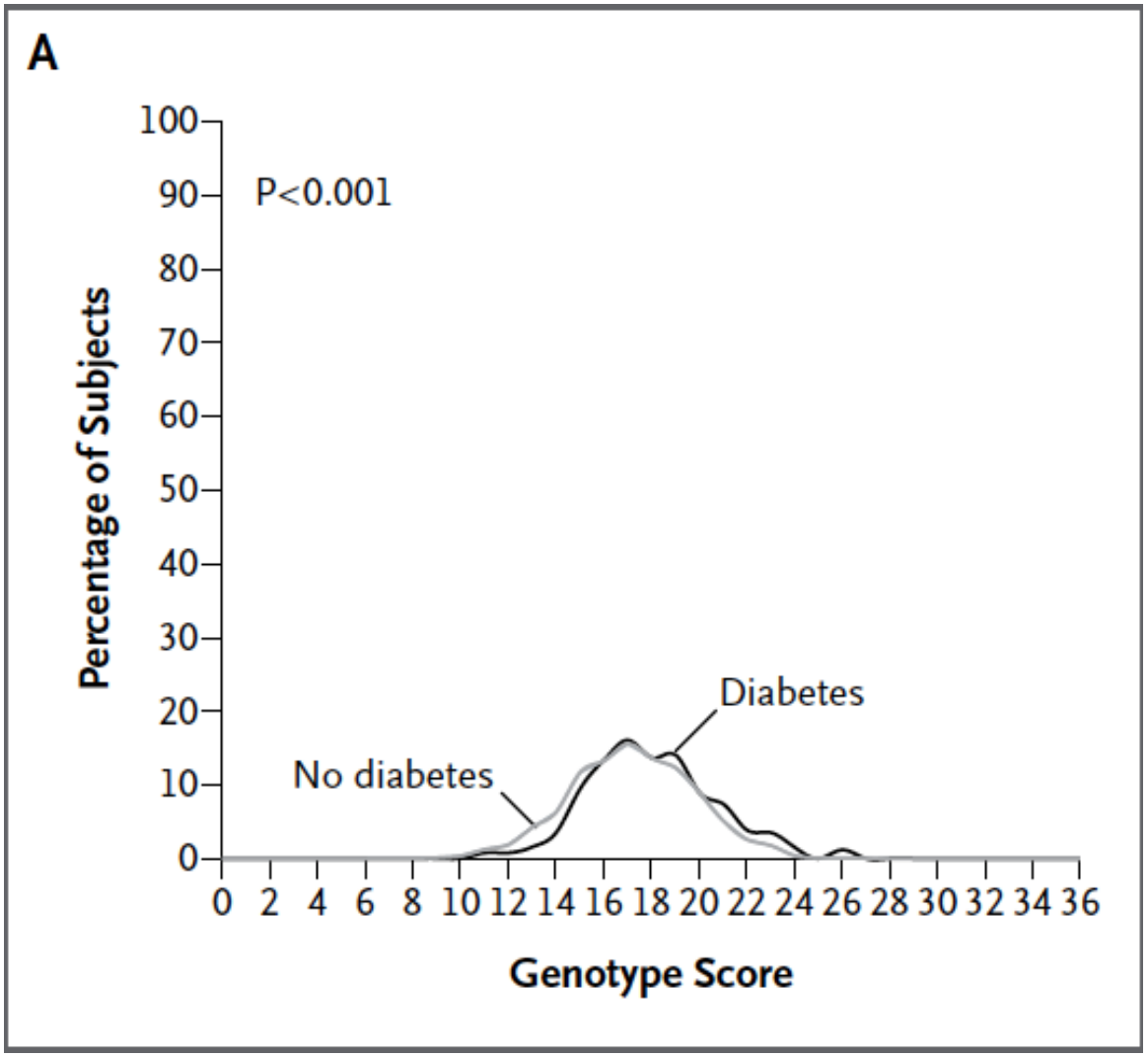
The American Dietetic Association
A Reference for the Rest of Us!



Meigs JB, Shrader P, Sullivan LM, McAteer JB, Fox CS, Dupuis J, Manning AK, Florez JC, Wilson PW, D'Agostino RB Sr, Cupples LA. Genotype score in addition to common risk factors for prediction of type 2 diabetes. N Engl J Med. 2008 Nov 20;359(21):2208-19



Meigs JB, Shrader P, Sullivan LM, McAteer JB, Fox CS, Dupuis J, Manning AK, Florez JC, Wilson PW, D'Agostino RB Sr, Cupples LA. Genotype score in addition to common risk factors for prediction of type 2 diabetes. N Engl J Med. 2008 Nov 20;359(21):2208-19

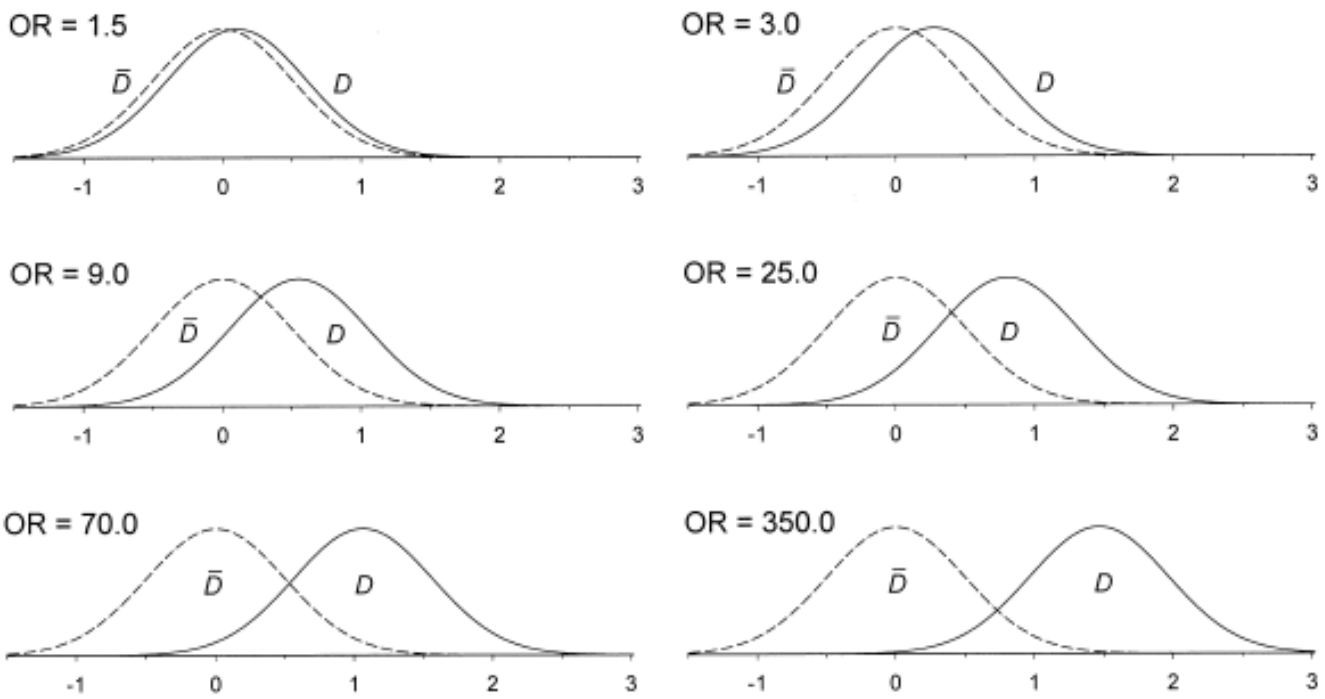


FIGURE 2. Probability distributions of a marker, X, in cases (solid curves) and controls (dashed curves) consistent with the logistic model $\text{logit}P(D = 1|X) = \alpha + \beta X$. It has been assumed that X has a mean of 0 and a standard deviation of 0.5 in controls so that a unit increase represents the difference between the 84th and 16th percentiles of X in controls. The marker is normally distributed, with the same variance in cases. The odds ratio (OR) per unit increase in X is shown.

Pepe MS, Janes H, Longton G, Leisenring W, Newcomb P. Limitations of the odds ratio in gauging the performance of a diagnostic, prognostic, or screening marker. American Journal of Epidemiology 2004; 159:882-890.

The Telegraph

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HOME » NEWS » WORLD NEWS » US ELECTION

Nate Silver: politics 'geek' hailed for Barack Obama wins US election forecast

An American political blogger, Nate Silver, has emerged as the other major winner during the US election for predicting all major results and Barack Obama's victory.

Image 1 of 2

Nate Silver, a former economist, writes the FiveThirtyEight blog for the New York Times. Photo: GETTY IMAGES

VIDEO
Romney concedes defeat

VIDEO
Obama's victory speech in full

VIDEO
Obama supporters party through night

By Andrew Hough
6:30PM GMT 07 Nov 2012

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Nate Silver, who writes the **FiveThirtyEight blog for the New York Times**, basked in worldwide adulation, after his polling correctly forecast the presidential outcome in 49 states.

The statistician, who tracked the president's statistical odds, will have correctly foreseen the result in every US state if Mr Obama's lead is maintained in Florida.

On election day, the 34 year-old, who had became a target for conservatives, also offered a 90.9 per cent probability of an Obama win in the US election.

He forecast that Mr Obama would win 332 electoral college votes compared to 206 for Mr Romney, which will be correct if the Democratic candidate wins Florida.

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US Election

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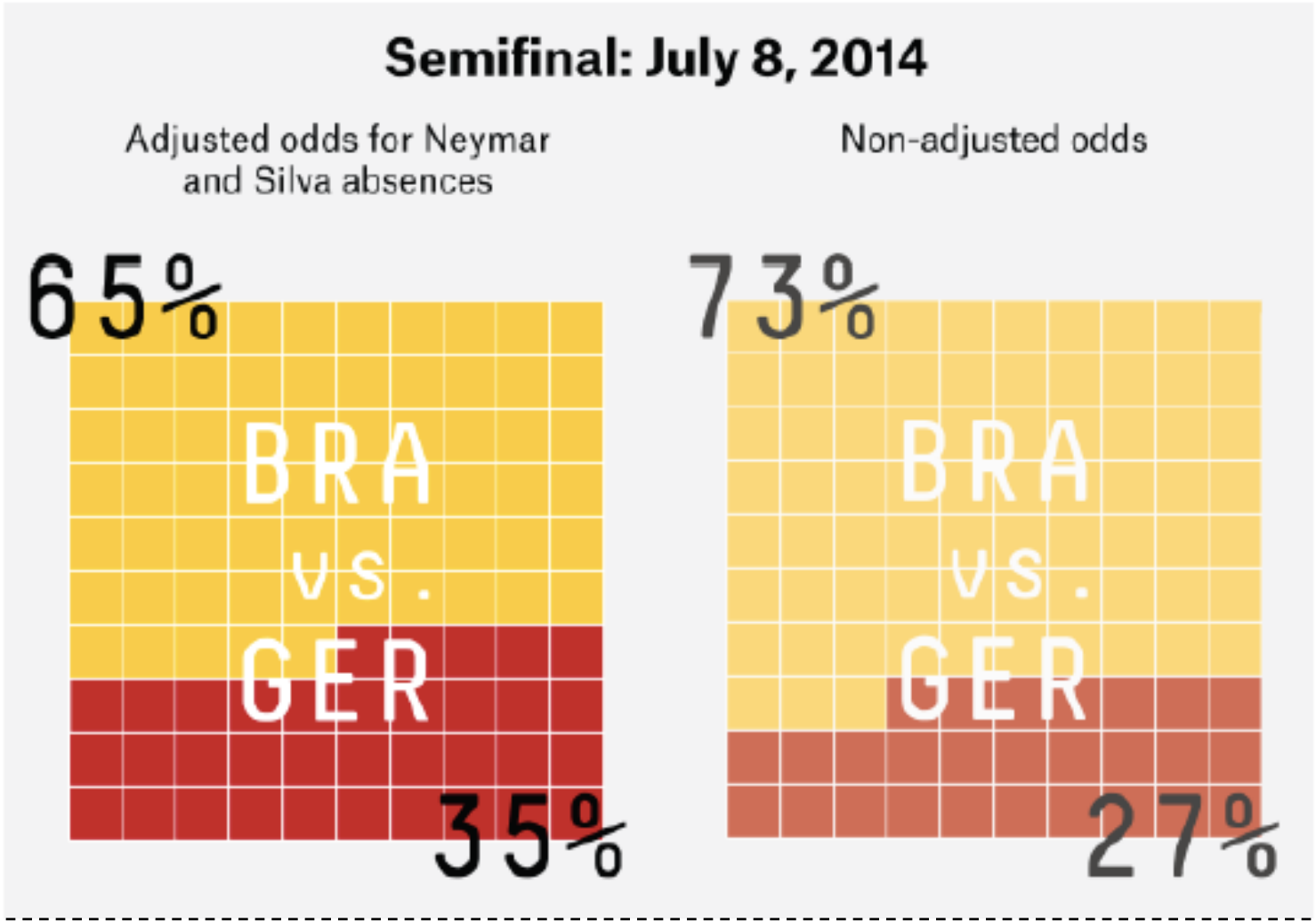
http://www.telegraph.co.uk/news/worldnews/us-election/9662363/Nate-Silver-politics-geek-hailed-for-Barack-Obama-wins-US-election-forecast.html


Semifinal: July 8, 2014
Adjusted odds for Neymar and Silva absences
65%
BRA
vs.
GER
35%
Non-adjusted odds
73%
BRA
vs.
GER
27%

Brazil crushed by Germany in the most humiliating defeat in World Cup history

1-7

Floored: the Brazil defence look shocked as Thomas Muller puts Germany ahead AP

MARTIN SAMUEL
Chief Sports Writer
reports from Belo Horizonte

THERE must have been a moment when even those watching in their white Mannschaft shirts inside Estadio Mineirao wished it would end. Germans are only human, after all.

Admittedly, the 11 on the pitch seemed to be transcending that state at times, but those looking on, the mortals — they must have felt it like the rest of us.

It was simply too much. Too brutal. Too excruciating. Too

« TURN TO PAGE 78, COL 1

IMPORTANT INFORMATION

NEGLIGENCE AT HOSPITAL OR DOCTORS?

Compensation could be available

b. A focus on identifying *individual causes*

Estrogen Hormone Replacement Therapy associated with lower incidence of cardiovascular disease in observational data

Table 3. Relative Risks of Coronary Heart Disease, According to Postmenopausal Hormone Use, after Simultaneous Adjustment for Potential Risk Factors in Proportional-Hazards Model.*

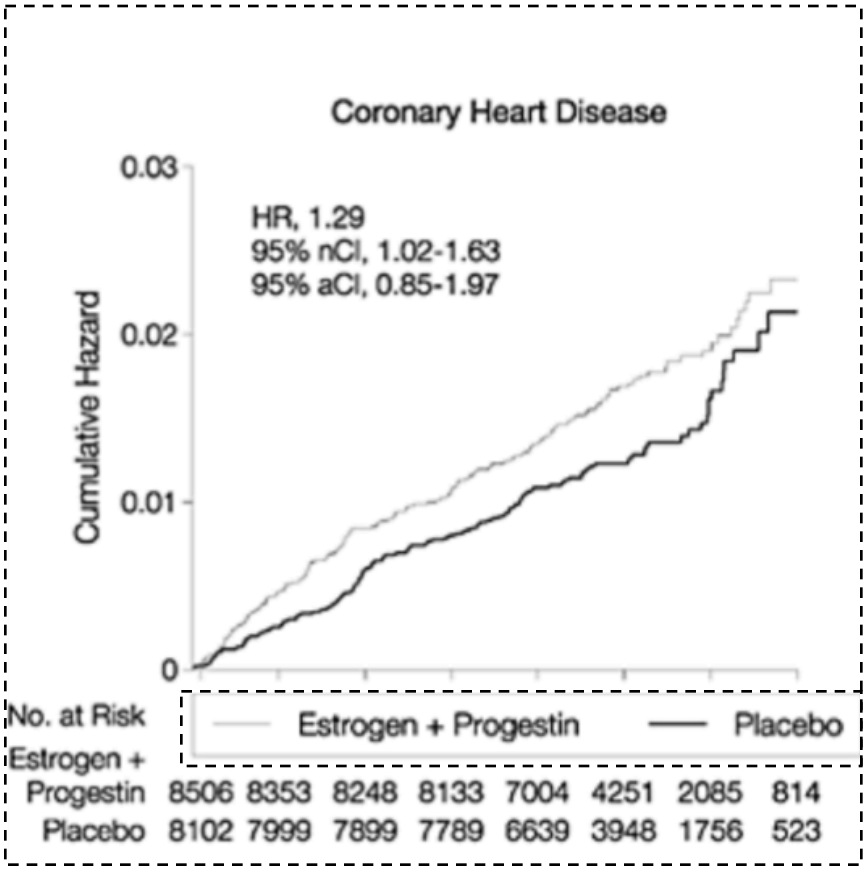
Disease and Hormone Use	Coefficient	Relative Risk†	P Value
Total coronary disease			
Current vs. never	−1.22	0.30 (0.14, 0.64)	0.002
Past vs. never	−0.52	0.59 (0.33, 1.06)	0.08
Nonfatal infarction only			
Current vs. never	−1.08	0.34 (0.14, 0.82)	0.02
Past vs. never	−0.43	0.65 (0.33, 1.28)	0.11

*The potential risk factors were a paternal history of infarction (none, at ≤60 yr, at >61 yr), a maternal history of infarction (none, at ≤60 yr, at >61 yr), type of menopause (natural or surgical), time period (1976-1978, 1978-1980), smoking status (current [at three levels of intensity], past, or never), hypertension (yes, no), diabetes (yes, no), past use of oral contraceptives (yes, no), high serum cholesterol level (yes, no), age (five categories), obesity (three categories), current hormone use (yes, no), and past hormone use only (yes, no).

†Figures in parentheses are 95% confidence limits.

Stampfer, M. J., Willett, W. C., Colditz, G. A., Rosner, B., Speizer, F. E., & Hennekens, C. H. (1985). A prospective study of postmenopausal estrogen therapy and coronary heart disease. *New England Journal of Medicine*, *313*(17), 1044-1049.

Estrogen Hormone Replacement Therapy associated with higher incidence of cardiovascular disease in RCT data



Writing Group for the Women's Health Initiative Investigators. (2002). Risks and benefits of estrogen plus progestin in healthy postmenopausal women: principal results from the Women's Health Initiative randomized controlled trial. *Jama*, *288*(3), 321-333.

Ginkgo Biloba associated with lower incidence of dementia in observational data

Table 5. Multivariate Analysis (Logistic Regression)

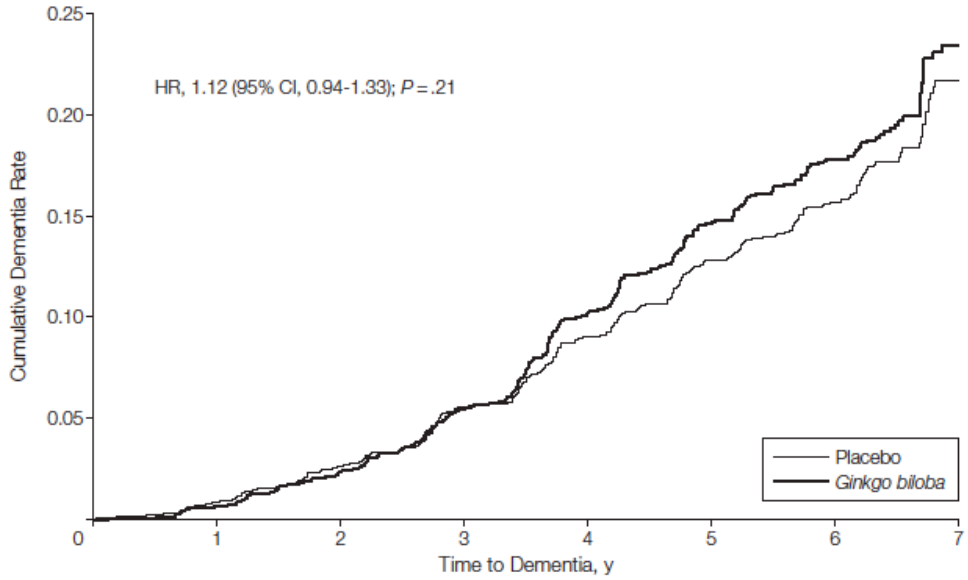
	Model		
Variable to be Explained	*p*	OR	95% CI
Pfeiffer test in 1992	.0082	0.60	0.41–0.87
Age (y)	.0004	1.16	1.07–1.26
Income (ref: >915 euros)	.0063		
457–915	.0033	2.91	1.43–5.94
<457	.0168	5.56	1.36–22.70
Unknown	.0106	2.62	1.25–5.47
Perceived health (poor vs good)	.0333	2.02	1.06–3.86
Hearing problem	.0765	0.58	0.32–1.06
C4A treatment (ref: not exposed)	.0698		
Nonconsecutive exposure(s)	.7261	0.87	0.41–1.86
2 consecutive exposures	.4915	1.34	0.59–3.04
⩾3 consecutive exposures	.0180	0.31	0.12–0.82
Adequacy of the model (Hosmer–Lemeshow test)	.7175		

Notes: For variable to be explained, dementia of the Alzheimer's type ($n = 69$) is versus dementia not of the Alzheimer's type ($n = 332$). OR = odds ratio; CI = confidence interval.

Andrieu, S., Gillette, S., Amouyal, K., Nourhashemi, F., Reynish, E., Ousset, P. J., ... & Grandjean, H. (2003). Association of Alzheimer's disease onset with ginkgo biloba and other symptomatic cognitive treatments in a population of women aged 75 years and older from the EPIDOS study. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 58(4), M372-M377.

Ginkgo Biloba not associated with lower incidence of dementia in RCT data

Figure 3. Cumulative Dementia Rates by Treatment



No. at risk								
Placebo	1524	1485	1423	1342	1243	1148	792	81
G biloba	1545	1521	1458	1369	1254	1129	775	97

No. with incident dementia							
Placebo	13	26	40	50	51	36	30
G biloba	10	26	47	66	60	40	27

CI indicates confidence interval; HR, hazard ratio.

DeKosky, S. T., Williamson, J. D., Fitzpatrick, A. L., Kronmal, R. A., Ives, D. G., Saxton, J. A., ... & Ginkgo Evaluation of Memory (GEM) Study Investigators. (2008). Ginkgo biloba for prevention of dementia: a randomized controlled trial. *Jama*, *300*(19), 2253-2262.

Beta-carotene associated with reduced risk of lung cancer in observational data

Table 4. Serum Levels of Nutrients in Relation to the Risk of Lung Cancer, According to Cell Type.

Lung Cancer Cell Type	No. of Sets*	Nutrient			
		Retinol	β-Carotene	Vitamin E	Selenium
		relative odds (95% confidence limits)†			
Squamous cell	26	1.15 (0.47, 2.84)	4.30 (1.38, 13.41)	2.33 (0.78, 6.98)	0.24 (0.08, 0.69)
Small cell	25	1.36 (0.53, 3.49)	1.09 (0.41, 2.91)	1.84 (0.67, 5.08)	0.77 (0.28, 2.08)
Adenocarcinoma	27	0.80 (0.31, 2.05)	1.33 (0.53, 3.33)	1.76 (0.66, 4.71)	0.72 (0.30, 1.75)
Large cell and unspecified	21	0.10 (0.01, 0.77)	1.54 (0.46, 5.17)	2.00 (0.62, 6.45)	0.27 (0.07, 1.04)

*Sets included a case and one or two controls.

†The comparison was between low and high levels of nutrients, with use of the high level as the reference category.

Menkes, M. S., Comstock, G. W., Vuilleumier, J. P., Helsing, K. J., Rider, A. A., & Brookmeyer, R. (1986). Serum beta-carotene, vitamins A and E, selenium, and the risk of lung cancer. *New England Journal of Medicine*, *315*(20), 1250-1254.

Beta-carotene associated with slightly higher risk of lung cancer in RCT data

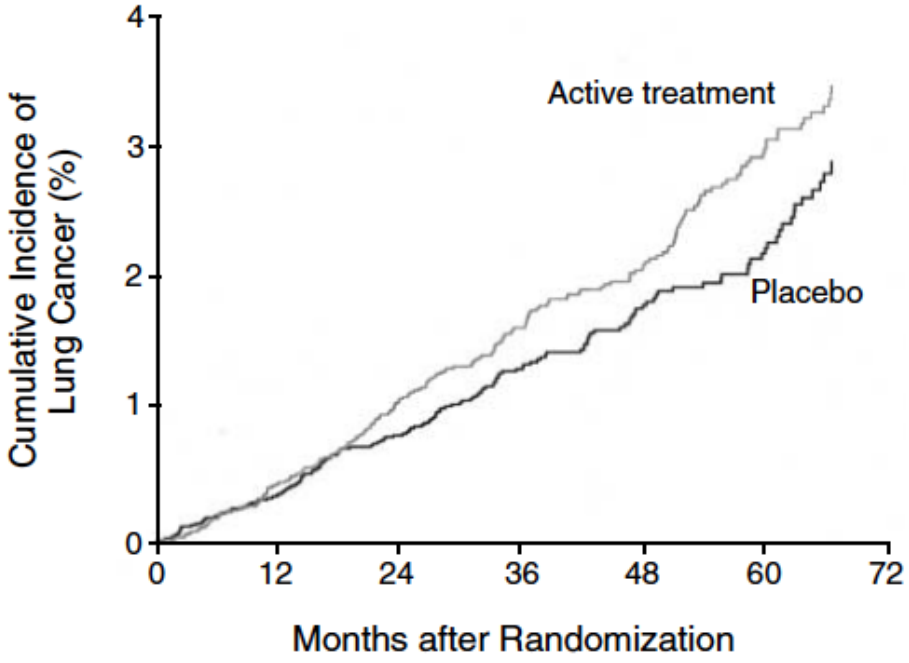
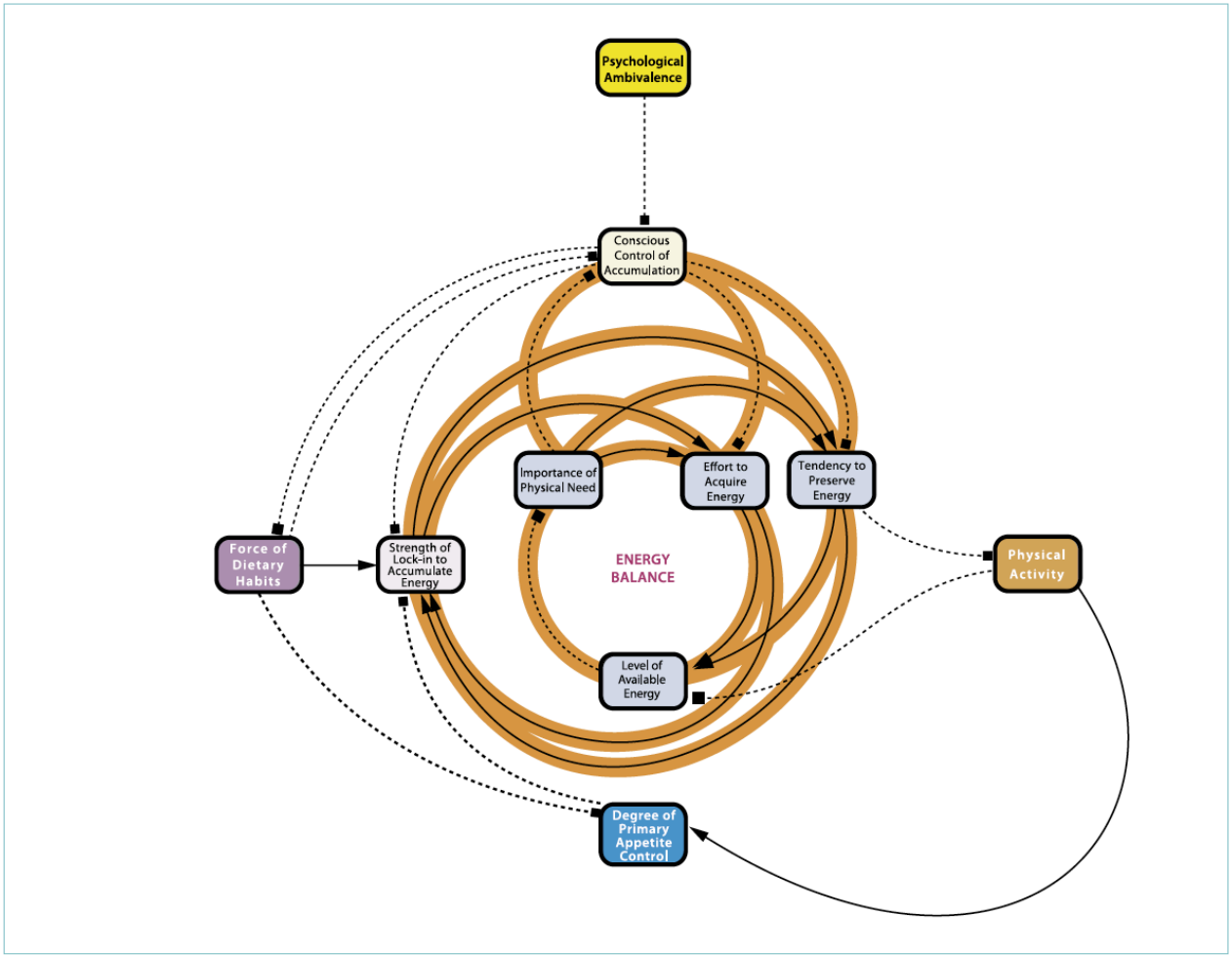


Figure 1. Kaplan–Meier Curves of the Cumulative Incidence of Lung Cancer among Participants Receiving Active Treatment and Those Receiving Placebo.

Data are shown only through 5½ years of follow-up because of the small numbers of participants beyond that time.

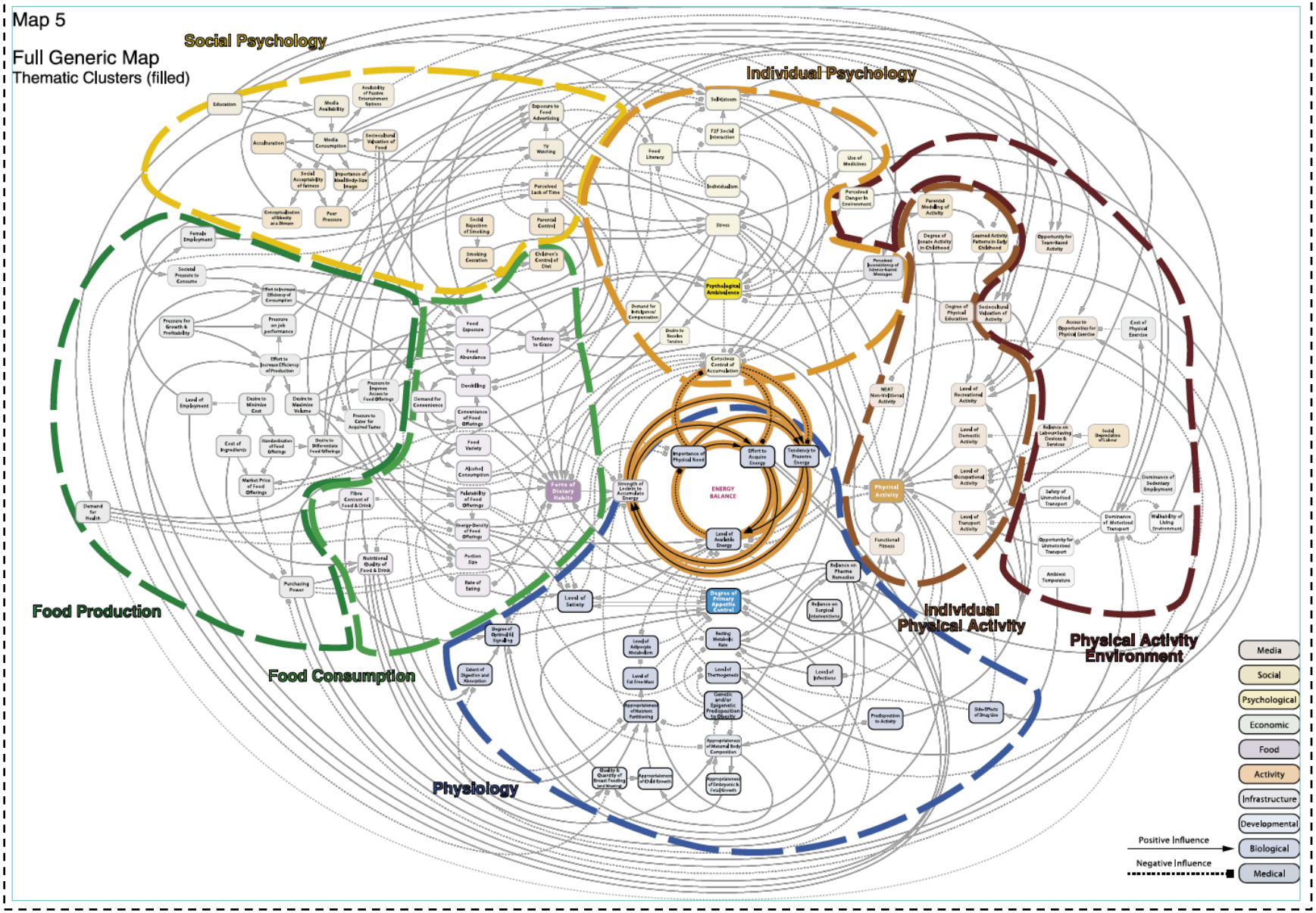
Omenn, G. S., Goodman, G. E., Thornquist, M. D., Balmes, J., Cullen, M. R., Glass, A., ... & Hammar, S. (1996). Effects of a combination of beta carotene and vitamin A on lung cancer and cardiovascular disease. New England journal of medicine, 334(18), 1150-1155.

Figure 5.3: The four key variables in the obesity system map and their relationships to the central engine.[17,18] The key variables are 'level of primary appetite control', 'force of dietary habits', 'level of physical activity' and 'level of psychological ambivalence'. Variables are represented by boxes, positive causal relationships are represented by solid arrows and negative relationships by dotted lines. The central engine is highlighted in orange at the centre of the map.



Foresight - Tackling Obesities: Future Choices
<http://www.foresight.gov.uk/OurWork/ActiveProjects/Obesity/KeyInfo/Index.asp>

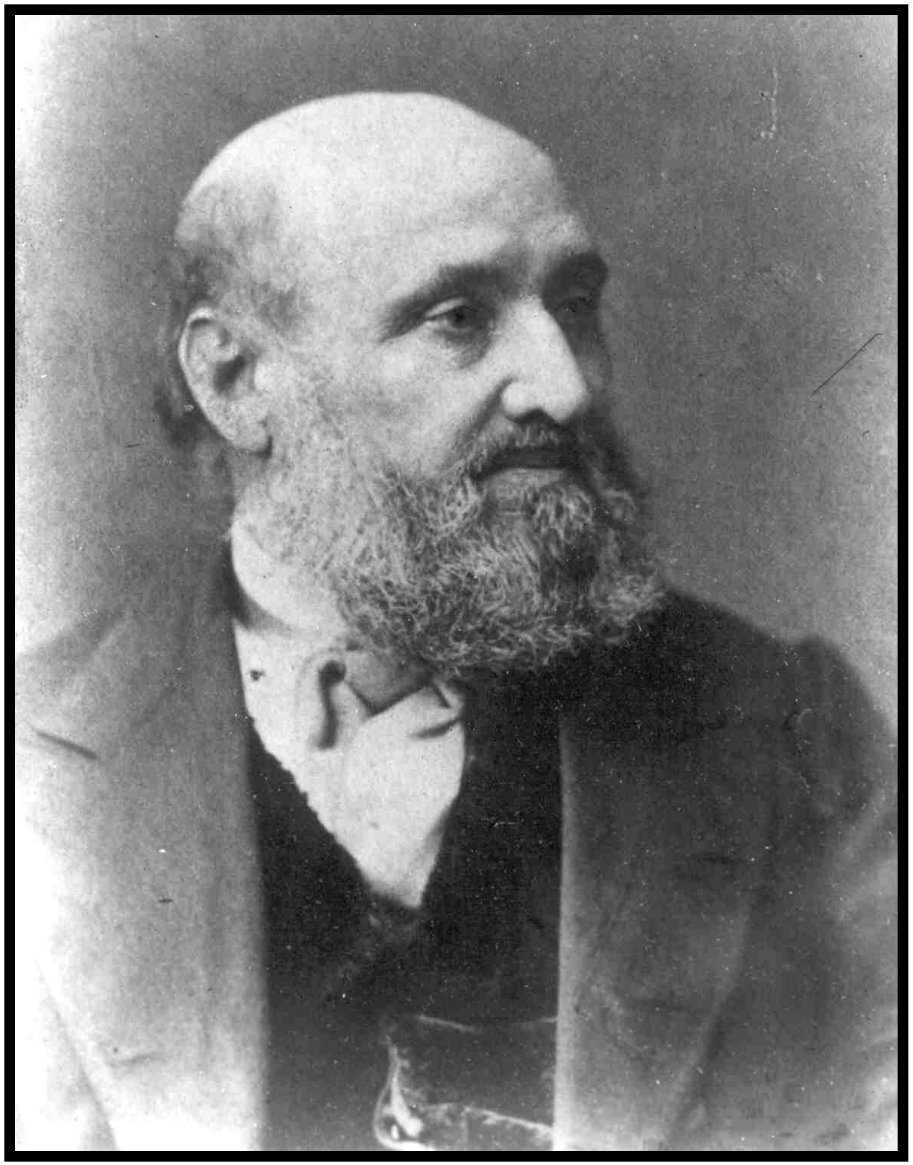
Figure 5.2: The full obesity system map with thematic clusters (see main text 5.1.2 for discussion)[17,18] Variables are represented by boxes, positive causal relationships are represented by solid arrows and negative relationships by dotted lines. The central engine is highlighted in orange at the centre of the map.



Foresight - Tackling Obesities: Future Choices: http://www.foresight.gov.uk/OurWork/ActiveProjects/Obesity/KeyInfo/Index.asp

c. Misplaced emphasis in thinking about causes

vs

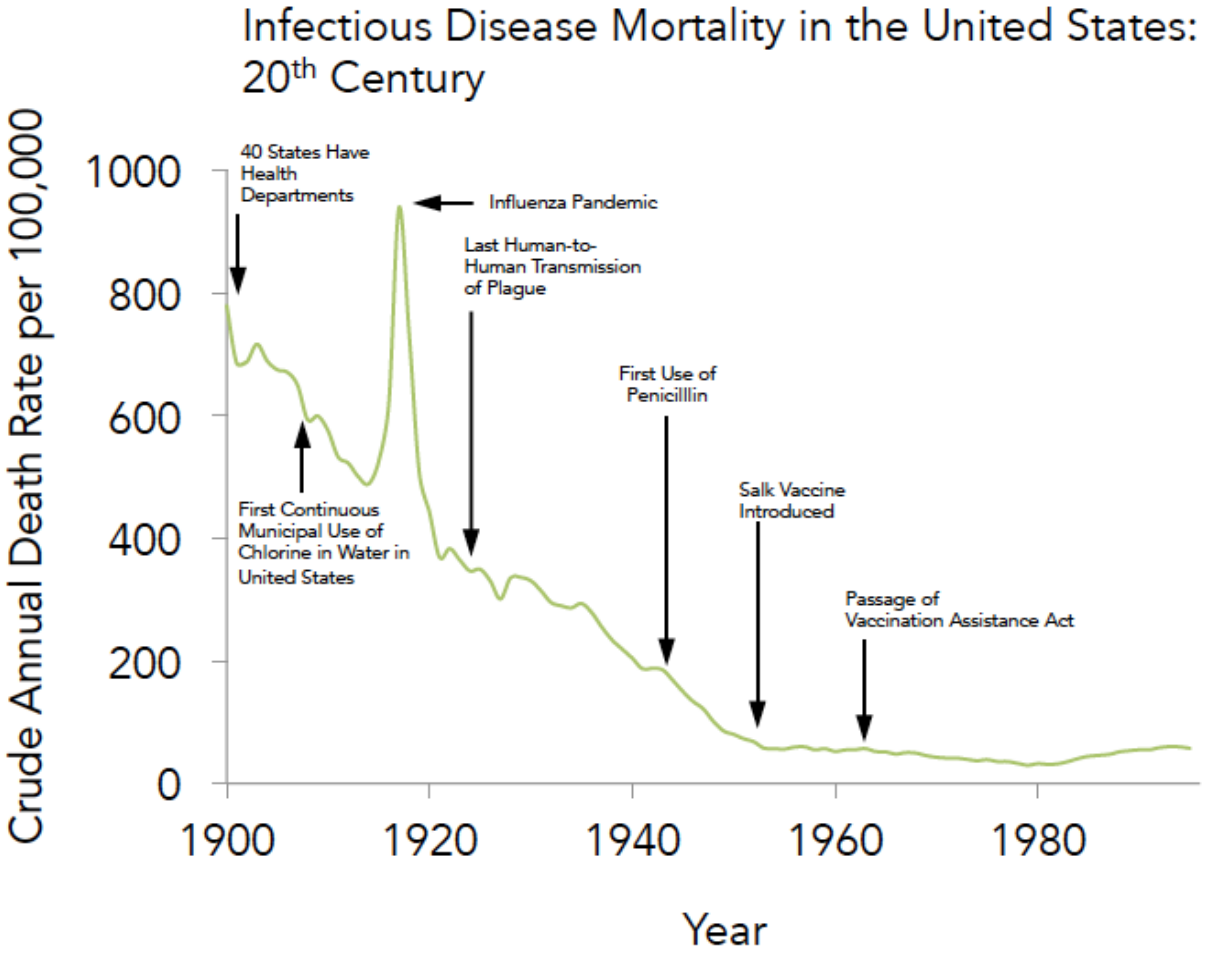


Hamlin C. Could you starve to death in England in 1839? The Chadwick-Farr controversy and the loss of the "social" in public health. American Journal of Public Health 1995; 85:856-66

Comparing deaths from social factors to other causes

Social Factor	No. (%)	Cause of Death	No. (%)
Low education	193 626 (8.3)	Acute MI	192 898 (8.0)
Low social support	179 937 (7.7)	Stroke	167 661 (7.0)
Racial segregation	153 796 (6.6)	Lung cancer	155 521 (6.5)
Income inequality	145 388 (6.2)	Chronic lower resp. dis.	122 009 (5.1)
Poverty	102 672 (4.4)	Unintentional injuries	97 900 (4.1)
Area-level poverty	39 553 (1.7)	Renal failure	36 471 (1.5)

Minino et al. Deaths: Final data for 2000. Natl Vital Stat Rep. 2002; 50: 1-120.
Galea S, Tracy M, Hoggatt KJ, DiMaggio C, Karpati A. Estimated deaths attributable to social factors in the United States. American Journal of Public Health. 2011;101(8):1456-65. PMID: 21680937. PMCID: PMC3134519. http://dx.doi.org/10.2105/AJPH.2010.300086


Infectious Disease Mortality in the United States: 20th Century
Crude Annual Death Rate per 100,000
1000
800
600
400
200
0
1900
1920
1940
1960
1980
Year
40 States Have Health Departments
Influenza Pandemic
Last Human-to-Human Transmission of Plague
First Use of Penicilllin
Salk Vaccine Introduced
Passage of Vaccination Assistance Act
First Continuous Municipal Use of Chlorine in Water in United States

d. Forgetting about context, what matters most

Crack Babies: The Worst Threat Is Mom Herself

By Douglas J. Besharov

LAST WEEK in this city, Greater Southeast Community Hospital released a 7-week-old baby to her homeless, drug-addicted mother even though the child was at severe risk of pulmonary arrest. The hospital's explanation: "Because [the mother] demanded that the baby be released."

The hospital provided the mother with an apnea monitor to warn her if the baby stopped breathing while asleep, and trained her in CPR. But on the very first night, the mother went out drinking and left the child at a friend's house—without the monitor. Within seven hours, the baby was dead. Like Dooney Waters, the 6-year-old living in his mother's drug den, whose shocking story was reported in The Washington Post last week, this child was all but abandoned by ities.

September 17, 1989

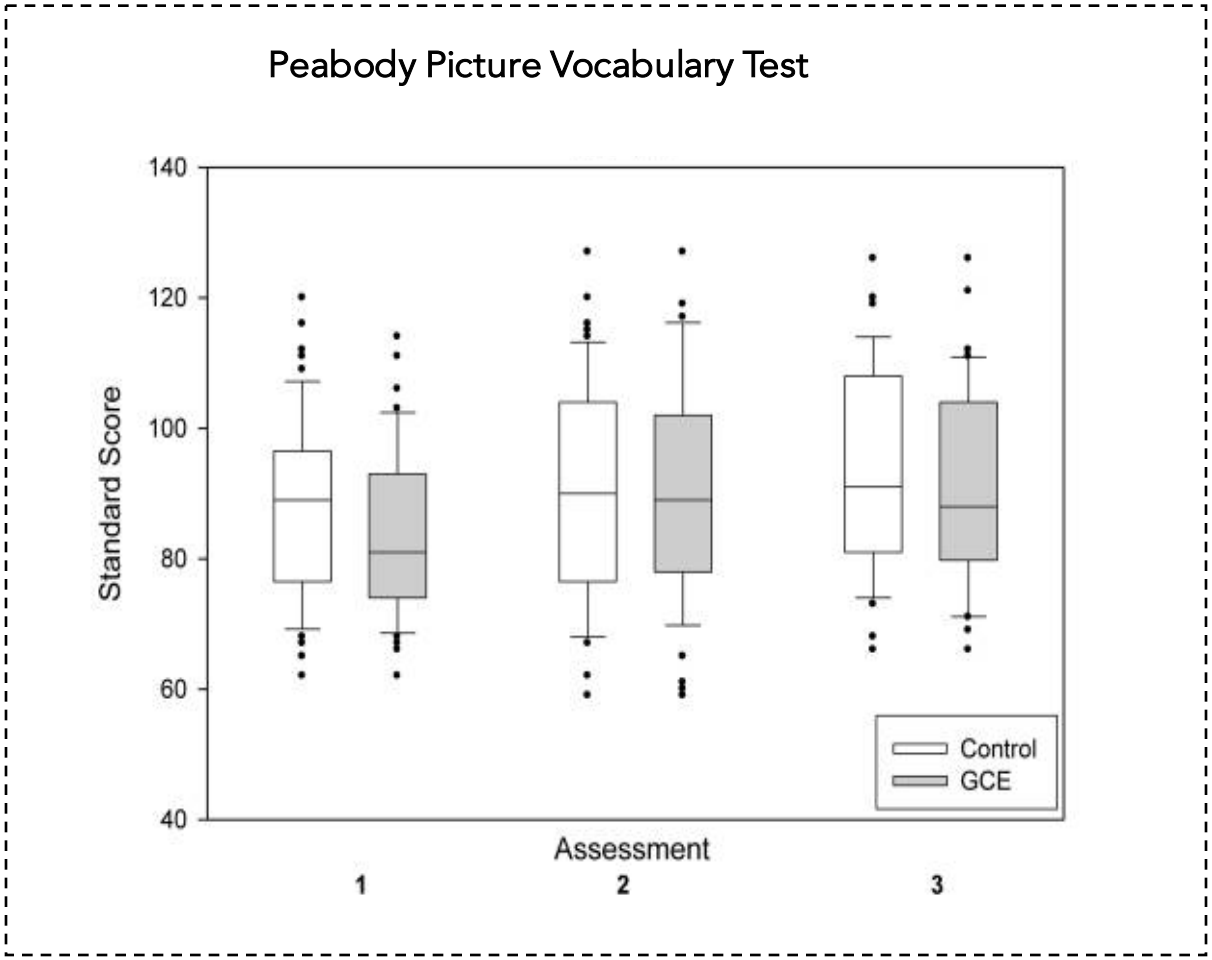
Crack's Toll Among Babies: A Joyless View

September 6, 1988

Cocaine: Litany of Fetal Risks Grows

CHILDREN OF COCAINE

(By Charles Krauthammer)



Betancourt LM et al. Adolescents with and without gestational cocaine exposure: Longitudinal analysis of inhibitory control, memory and receptive language. *Neurotoxicol Teratol* 2011; 33(1): 36-46.

Predictor for Peabody Picture Vocabulary Test score	Coefficient	P-value
Gestational cocaine exposure	-2.89	0.26
Assessment no.	2.72	<0.001
Gestational cocaine exposure x assessment no.	0.58	0.51
Age at 1st assessment	-0.36	0.76
Female gender	-4.93	0.058
Parental nurturance	-0.31	0.89
Environmental stimulation	5.91	0.039
Caregiver BDI-II depression score	0.03	0.84

Betancourt LM et al. Adolescents with and without gestational cocaine exposure: Longitudinal analysis of inhibitory control, memory and receptive language. *Neurotoxicol Teratol* 2011; 33(1): 36-46.

e. Misinvestment of money, time, and energy

EDITORIAL | Annals of Internal Medicine

We Can Reduce Dietary Sodium, Save Money, and Save Lives

Most Americans consume far more salt than is healthy; the average sodium intake has increased over the past 30 years from already high levels to more than double the recommended amount (1, 2). Excess sodium consumption increases blood pressure (3); each 20–mm Hg increase in systolic blood pressure above 115 mm Hg doubles the

After tobacco control the most cost effective intervention to control chronic disease might be reduction of sodium intake.

and heart attacks are attributable to high blood pressure (7). In the United States, approximately 100 000 deaths each year have been attributed to excess sodium intake (8). Because about one third of U.S. adults have hypertension and another 28% have levels above the desirable range (9), and because sodium consumption contributes to the increase in blood pressure observed with increasing age (9), reductions in salt intake will lead to substantial population-wide improvements in health.

Clinical care and health education require considerable individual attention and effort to help one person at a time through medical treatment or to adopt healthy behaviors. Policy interventions that change the environment to make

savings of $18 billion in direct health care costs (15). Still-larger decreases in sodium intake than were examined in this study would probably result in even larger health improvements and cost savings and would be more cost-effective than using medications to lower blood pressure in people with hypertension (13).

try in these countries have been successful. In 2003, the United Kingdom introduced a voluntary strategy to decrease the sodium content of processed and packaged food, which has resulted in reductions of 20% to 30% in most processed food sold in stores (14). New sodium reduction targets in the United Kingdom are being established and are expected to lead to a total 40% reduction in population sodium intake by 2012 (14). Japan and Finland have also implemented effective salt reduction programs; Ireland, Australia, and Canada have recently begun similar initiatives; and many other countries have committed to reducing sodium intake at the population level (14).

Although substantial changes in food production will

Bayer R, Johns D, Galea S. Salt, Science, And Public Health: The Challenge Of Evidence-Based Decision Making. Health Affairs. 2012; 31(12): 2738-2746

REDUCING POPULATION SALT INTAKE

The sodium phantom

Niels Graudal *senior consultant*[1], Gesche Jürgens *MD*[2]

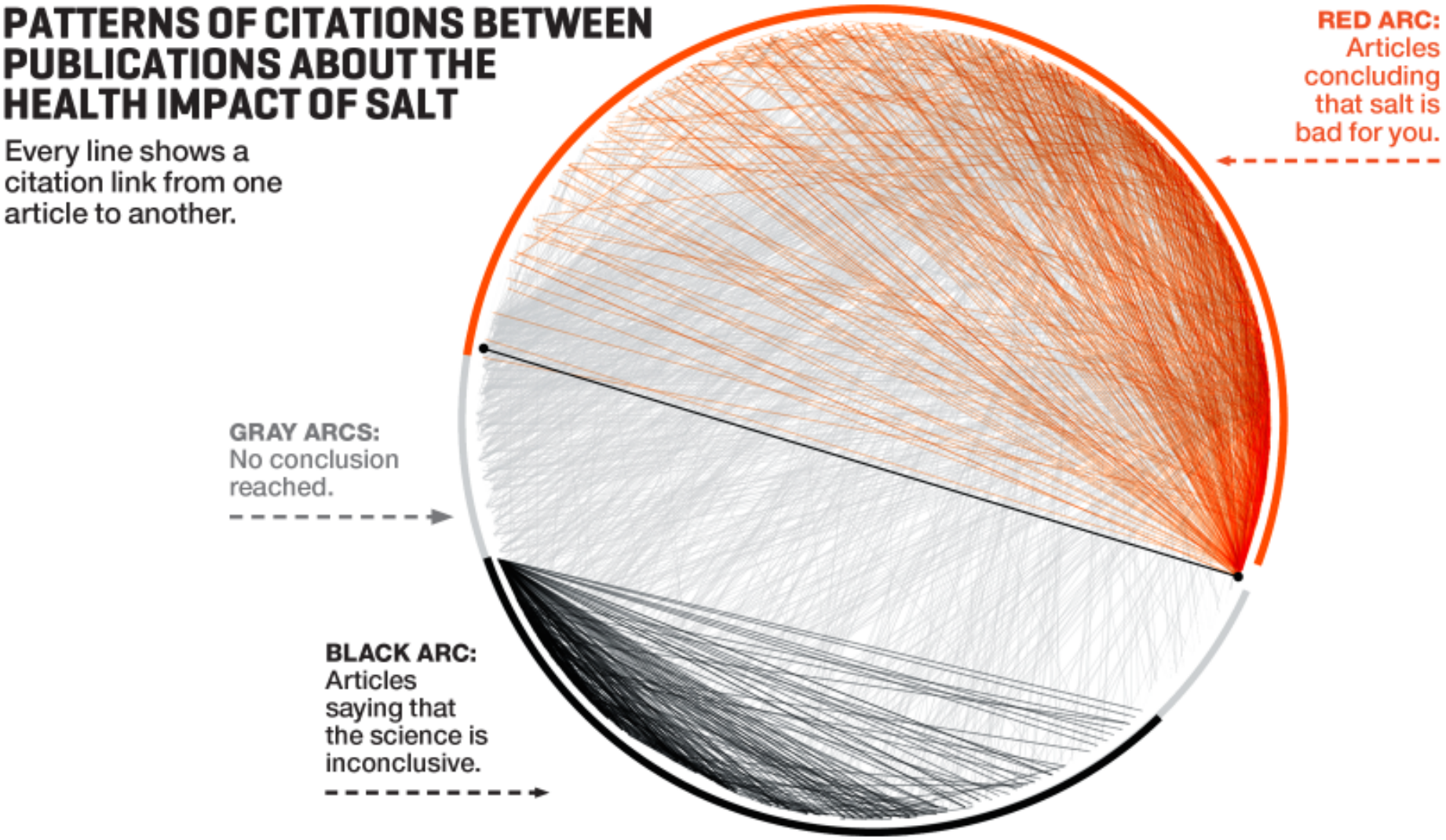
[1]Department
Pharmacolog

BMJ

of Clinical

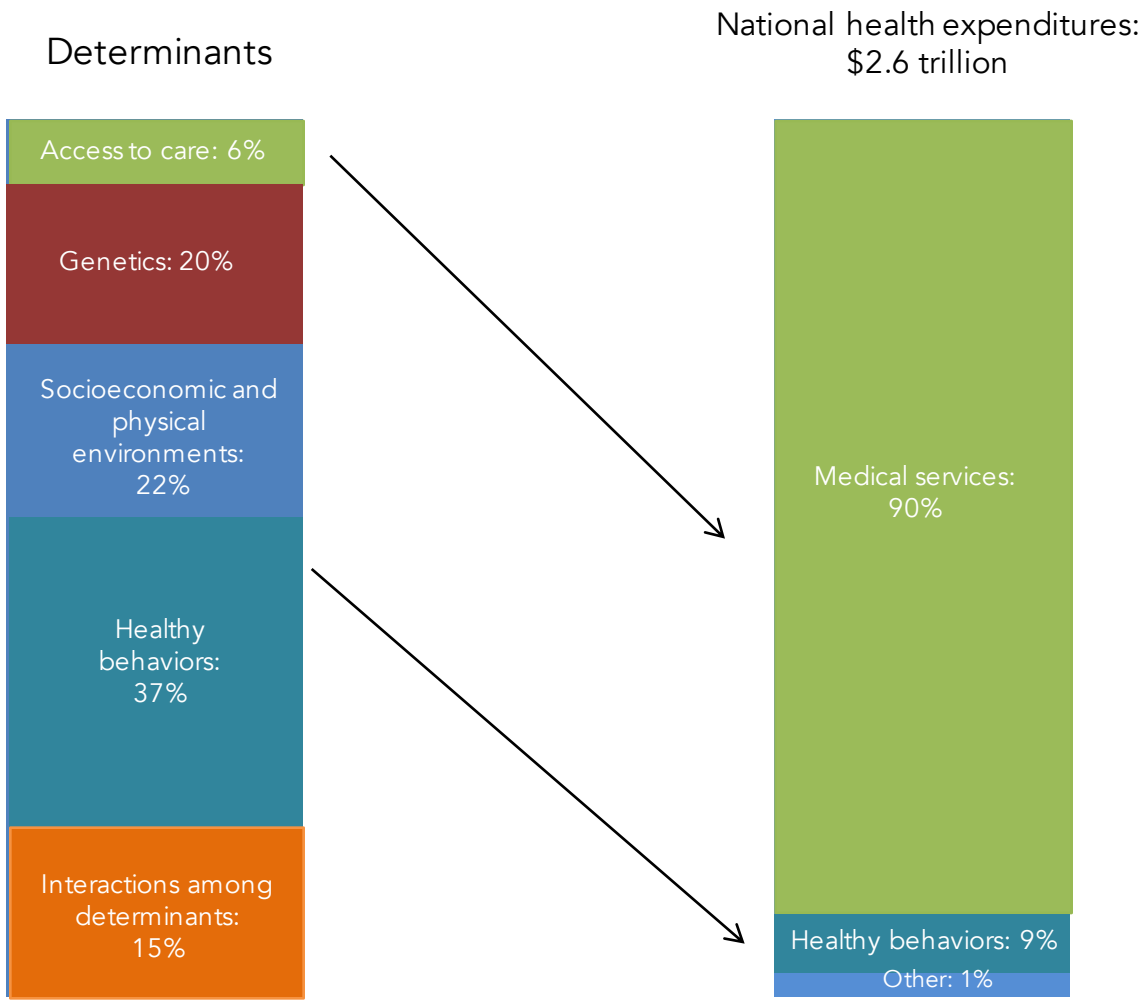
It is surprising that many countries have uncritically adopted sodium reduction, which probably is the largest delusion in the history of preventive medicine.

Niels Graudal and G. Jurgens. "The sodium phantom," BMJ 2011;343:d6119



Galea S. This is why you can't always trust data. http://fortune.com/2015/12/21/research-bias-data/

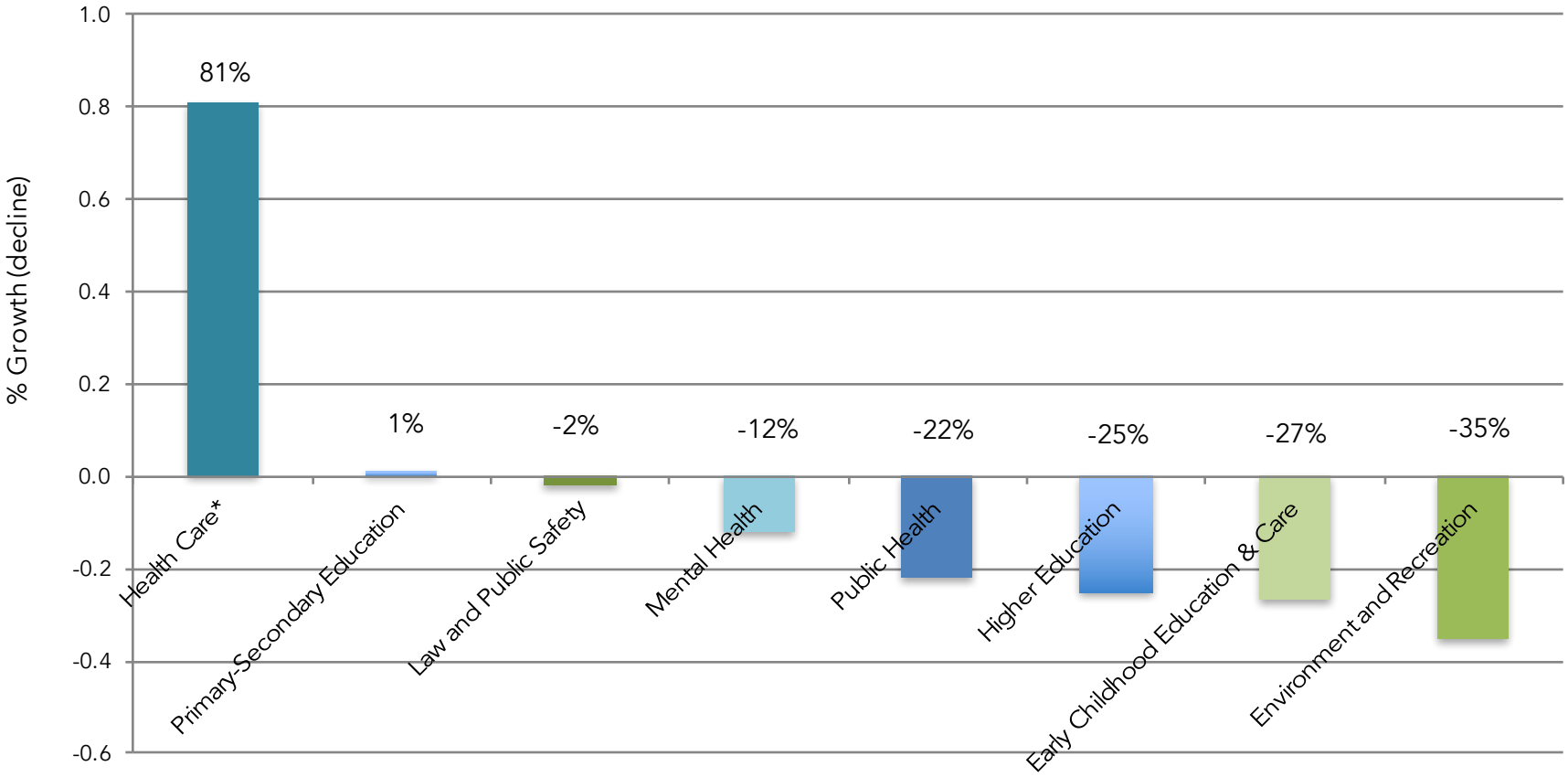
Health determinants vs. health expenditures



"Healthy People/Healthy Economy: An Initiative to Make Massachusetts the National Leader in Health and Wellness." 2015. Data from NEHI 2013. <http://www.tbf.org/tbf/56/hphe/Health-Crisis>

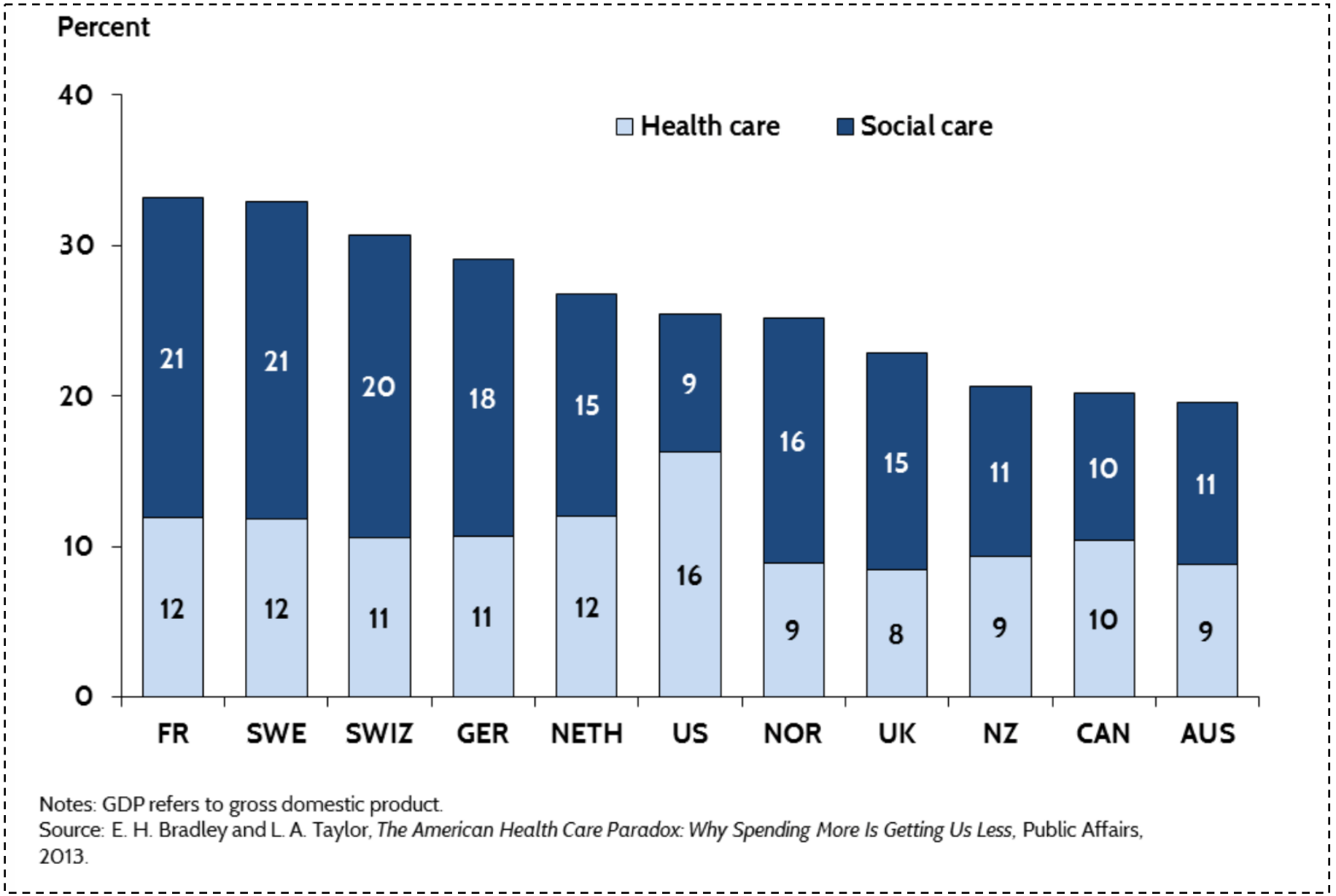
Tarlov A. Social determinants of health: the sociobiological translation. In: Blane D, Brunner E, Wilkinson R, editors. Health and social organization: towards a health policy for the 21st century. London: Routledge; 1996 pp. 71-93.

Change in Massachusetts State Government spending: 2001-14



* Health care expenditure is Group Insurance Commission spending plus MassHealth (Medicaid)

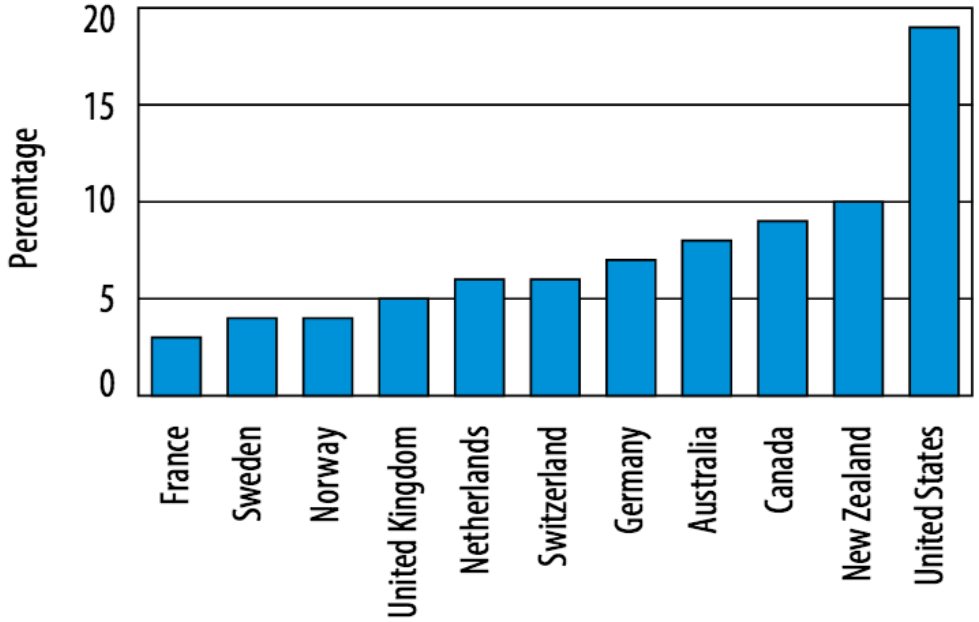
"Healthy People/Healthy Economy: An Initiative to Make Massachusetts the National Leader in Health and Wellness." 2015. Data from Massachusetts Budget and Policy Center Budget Browser. <http://www.tbf.org/tbf/56/hphe/Health-Crisis>



Notes: GDP refers to gross domestic product.
Source: E. H. Bradley and L. A. Taylor, *The American Health Care Paradox: Why Spending More Is Getting Us Less*, Public Affairs, 2013.

http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective

Fig. 4.3. **Percentage of adults aged 65 years or older who had problems accessing health-care services during the past year due to their cost, 11 countries, 2014**



Note: Because of the cost, respondents with a medical problem did not visit a doctor, missed a medical test or treatment recommended by a doctor, did not fill out a prescription or missed a dose of medicine, or a combination of these.
Source: (*6*).

World Health Organization, "World Report on Ageing and Health."
<http://apps.who.int/iris/bitstream/10665/186463/1/9789240694811_eng.pdf?ua=1> Accessed March 25, 2016

4. Fixing this state of affairs?

a. Focus on the ineluctable role of context

Failure of State Soda Tax Plan Reflects Power of an Antitax Message

Earl Wilson/The New York Times

An ad against the soda tax on the back of a Pepsi delivery truck in Brooklyn.

"…The beverage industry has outspent the pro-tax side and has succeeded in painting the soda tax as a naked money grab cleverly disguised as a health policy." –New York Times, July 2010


SUPER
BIG
GULP
7
ELEVEN

New soda wars: infringement on freedoms?

June 06, 2012 | Daily News Editorial

Premier Rewards Gold Card from American Express
Earn 25,000 points
Plus, Enjoy a $0 Introductory Annual Fee for the First Year
Learn More
Terms and Limitations apply.

Newsgram

Breaking news from the U.S. and around the world.

New York Appellate Court Strikes Down Bloomberg's Soda Ban

The law would have banned certain businesses from selling sodas and sugary drinks larger than 16 ounces.

New York City Mayor Michael Bloomberg's plans to appeal Tuesday's appellate court ruling, which

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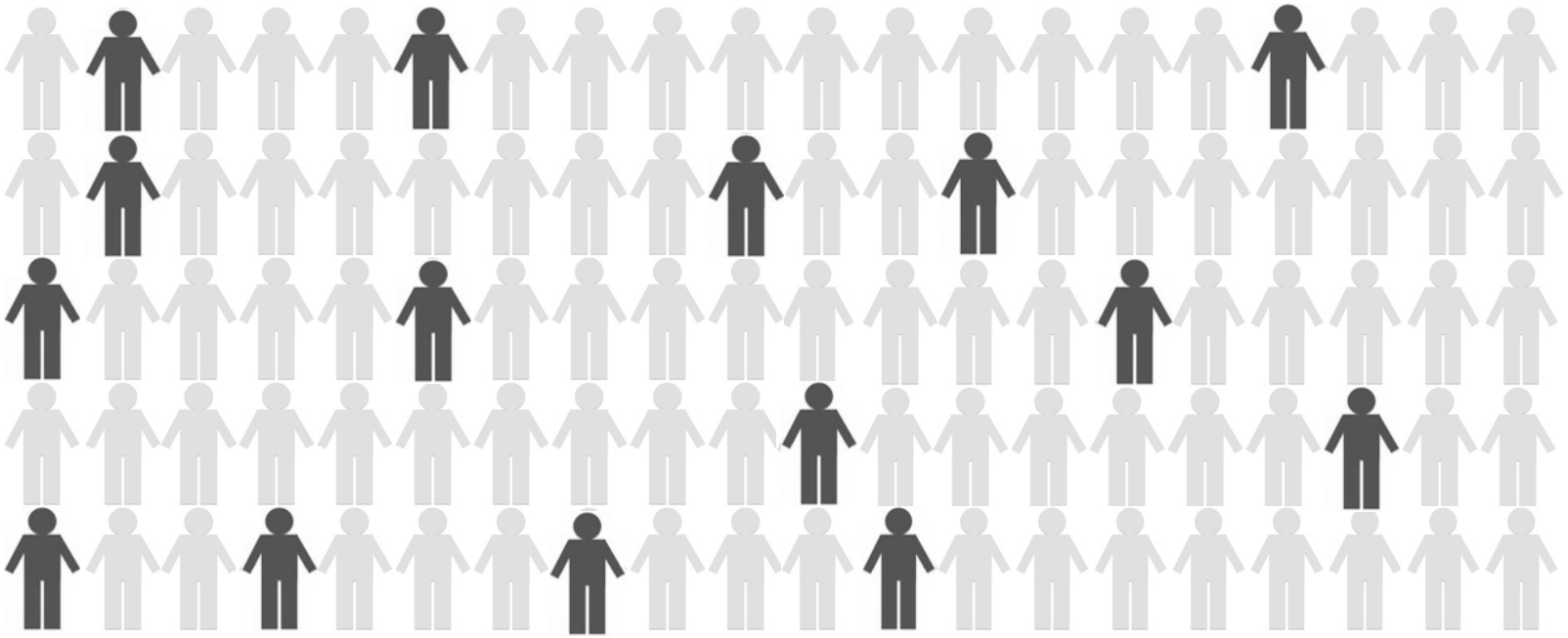
How much of our cognitive ability is determined by our genes?



= GE+

= ENV+

= CA+

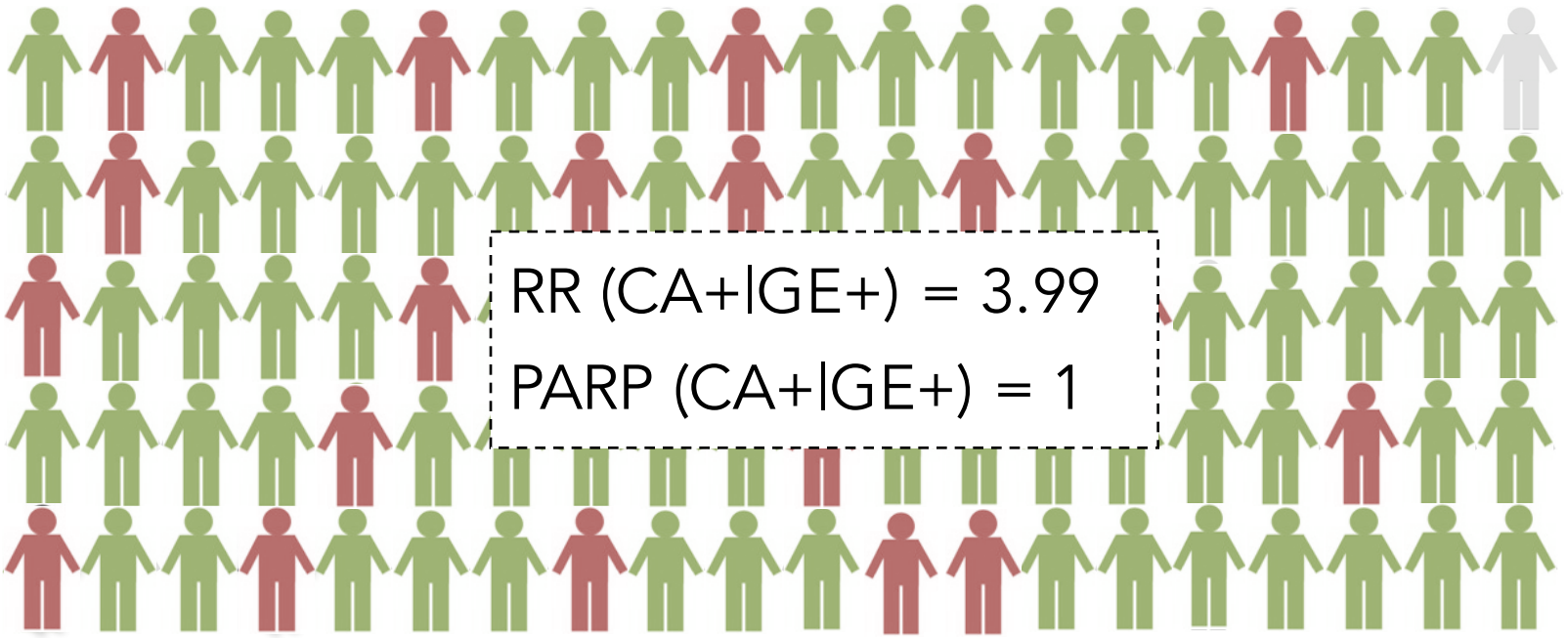
Scenario 1

= GE+ = CA+ = ENV+

Scenario 1

= GE+ = CA+ = ENV+

Scenario 1



= GE+ = CA+ = ENV+

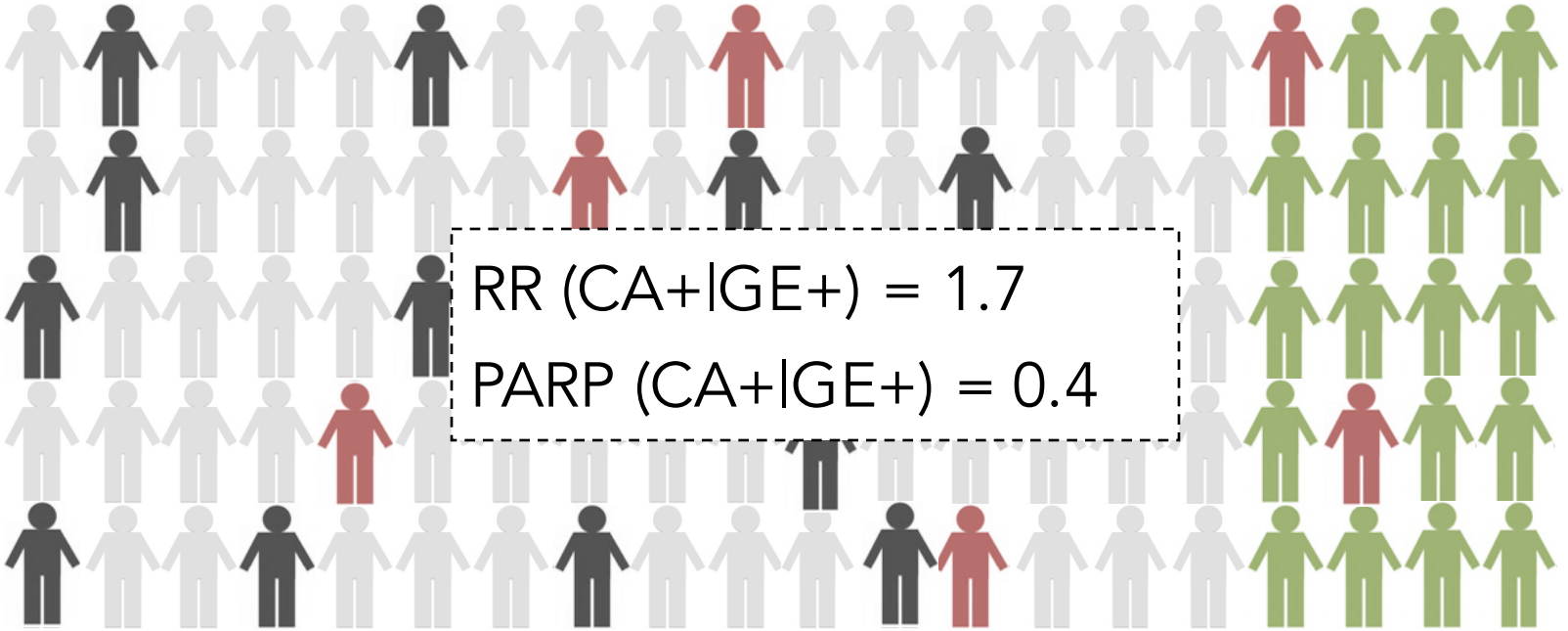
Scenario 2

= GE+ = CA+ = ENV+

Scenario 2

= GE+ = CA+ = ENV+

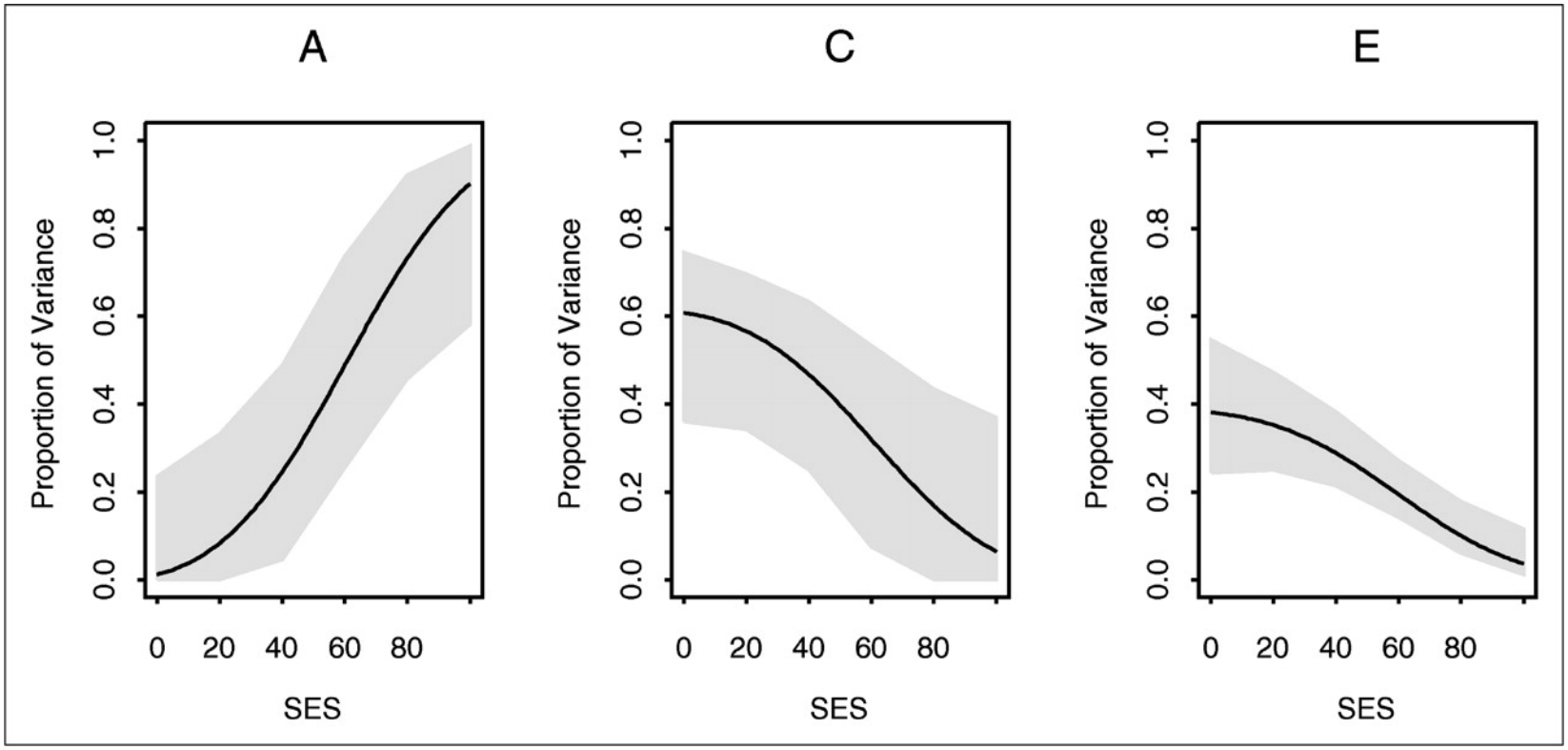
Scenario 2



= GE+ = CA+ = ENV+

Is this all theoretical?

Proportion of total Full-Scale IQ variance accounted for by A, C, and E plotted as a function of observed socioeconomic status (SES).

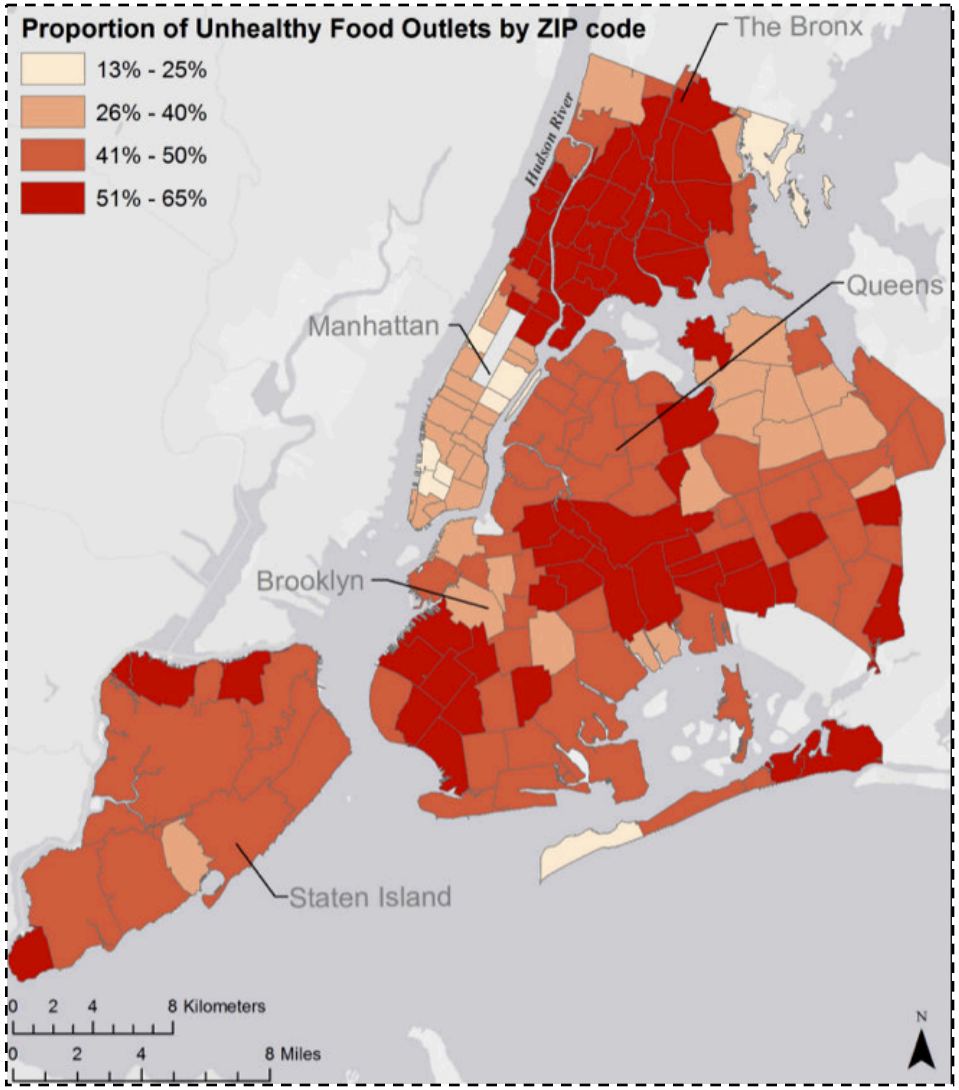


Turkheimer E et al. Psychological Science 2003;14:623-628

b. By any methods necessary

Divertente campagna per la prevenzione dell'obesità

Poor food environment in New York City



Stark J et al. Neighbourhood food environments and body mass index among New York City adults. *J Epidemiol Community Health* 2013; 67: 736-742.

Research report

Neighbourhood food environments and body mass index among New York City adults

Research

Neighborhood Food Environment and Walkability Predict Obesity in New York City

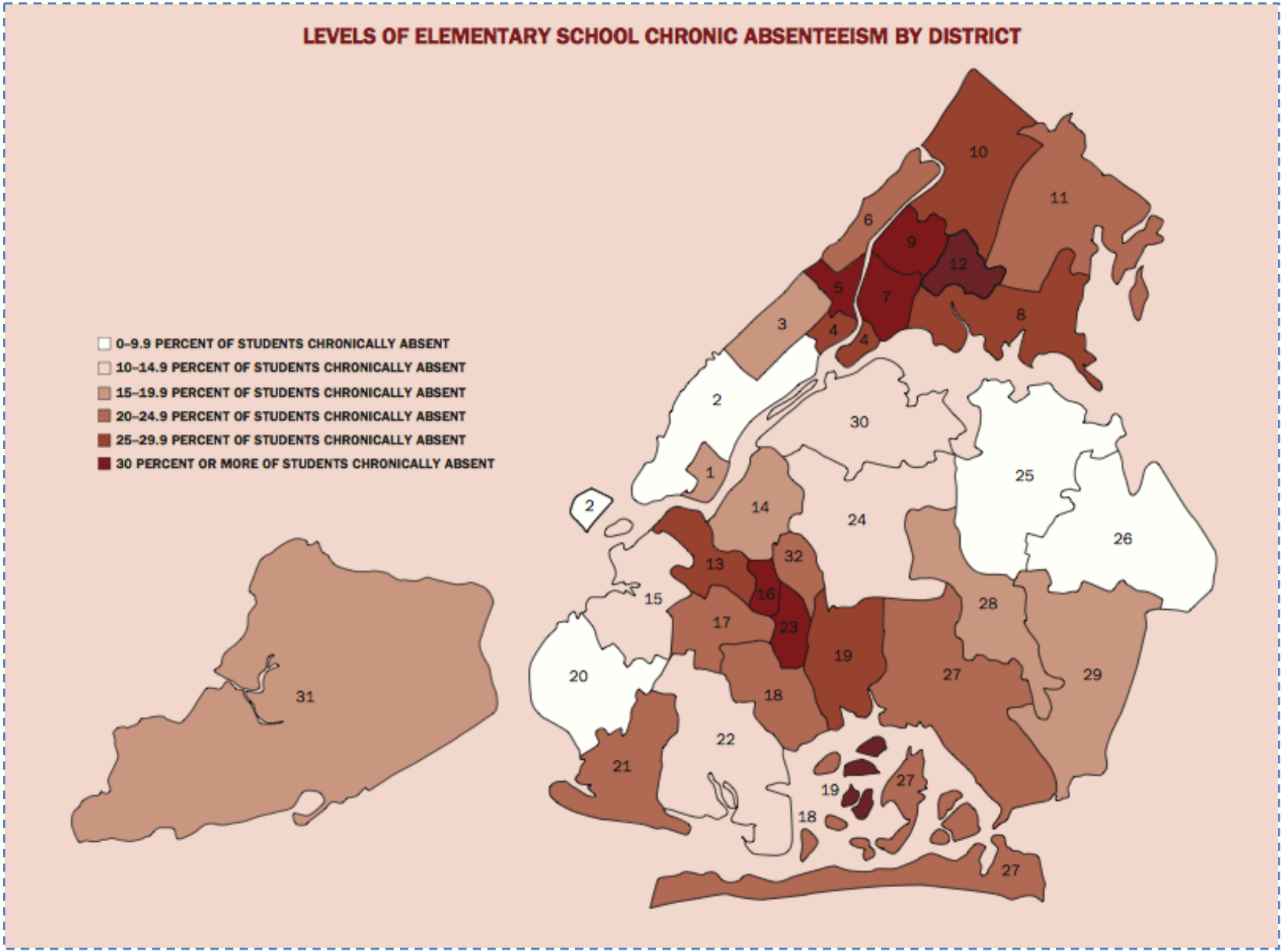
Education Modifies Genetic and Environmental Influences on BMI

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

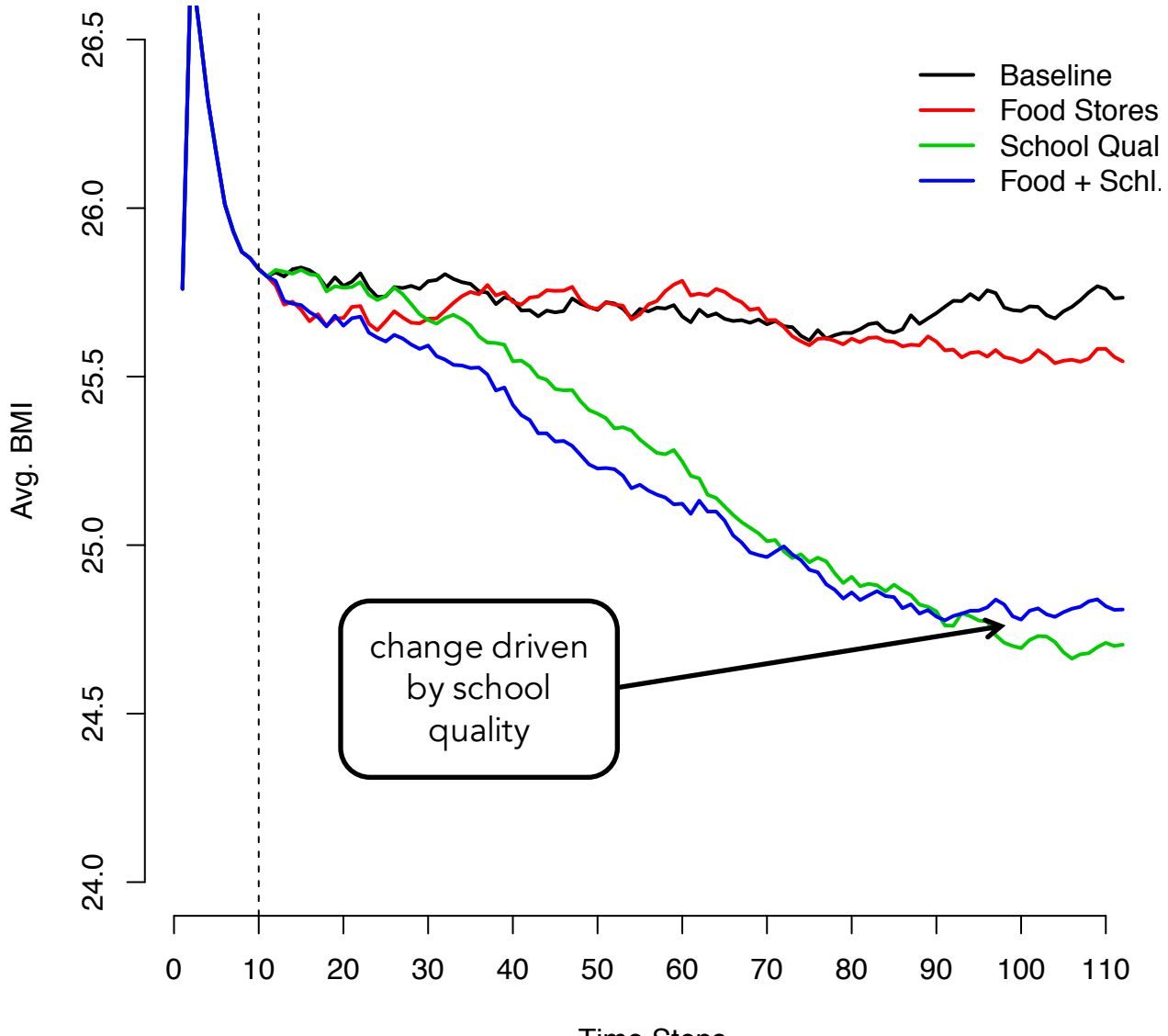
Are neighborhood education levels associated with BMI among adults in Cairo, Egypt?



http://www.usnews.com/cmsmedia/13/cf/75a042c94c0fb078efa0790b2e73/141110-hechingerabsenteeism-graphic.absenteeism.png

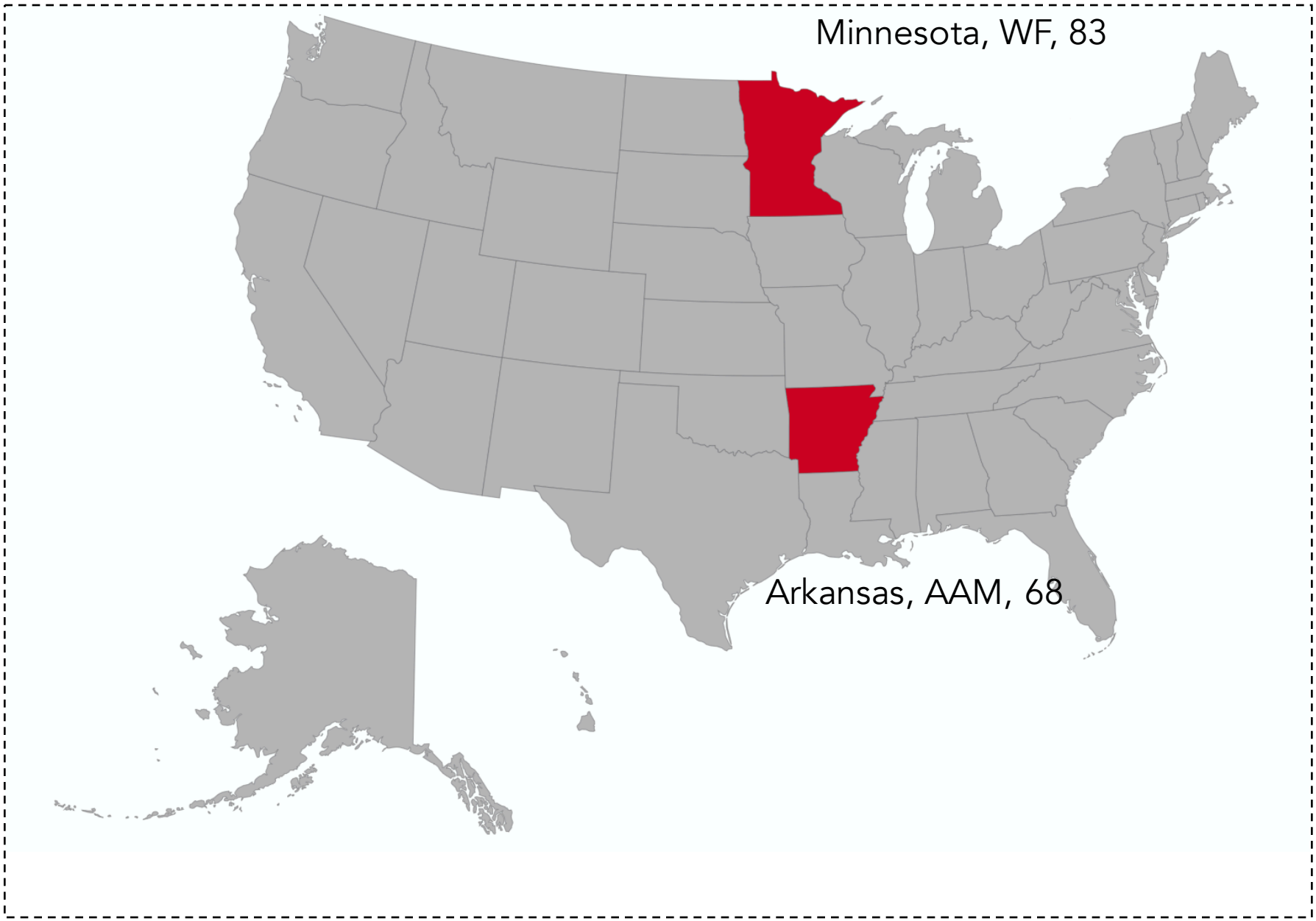
Where is our greatest return on investment to lower obesity: improving food store availability, or improving school quality?

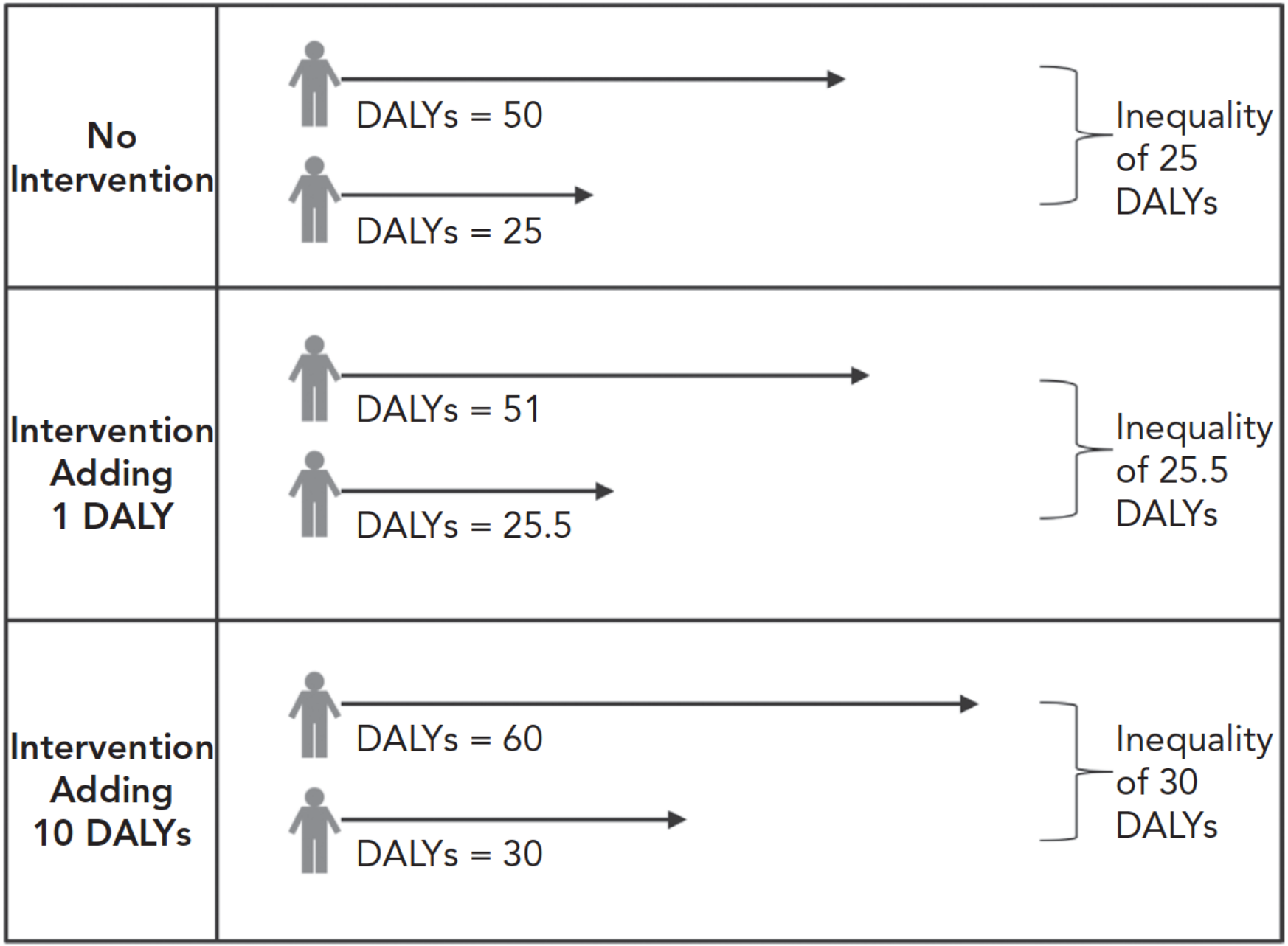
Black Body Mass Index change by policy



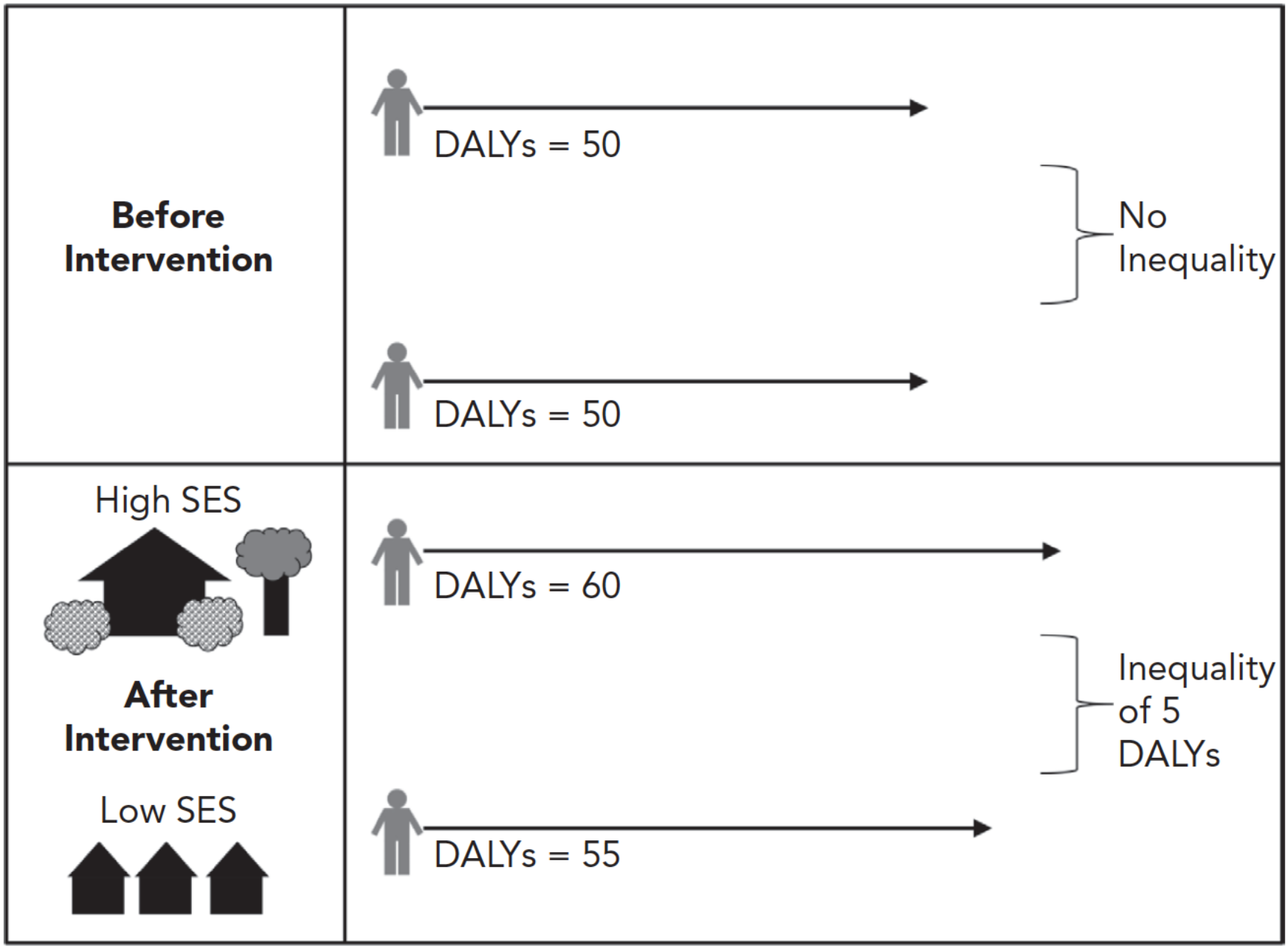
Orr MG, Galea S, Kaplan GA. Neighborhood food, physical activity, and educational environments and black/white disparities in obesity: A complex systems simulation analysis. Under review.

c. Embrace concern with health equity and efficiency tradeoffs


Minnesota, WF, 83
Arkansas, AAM, 68

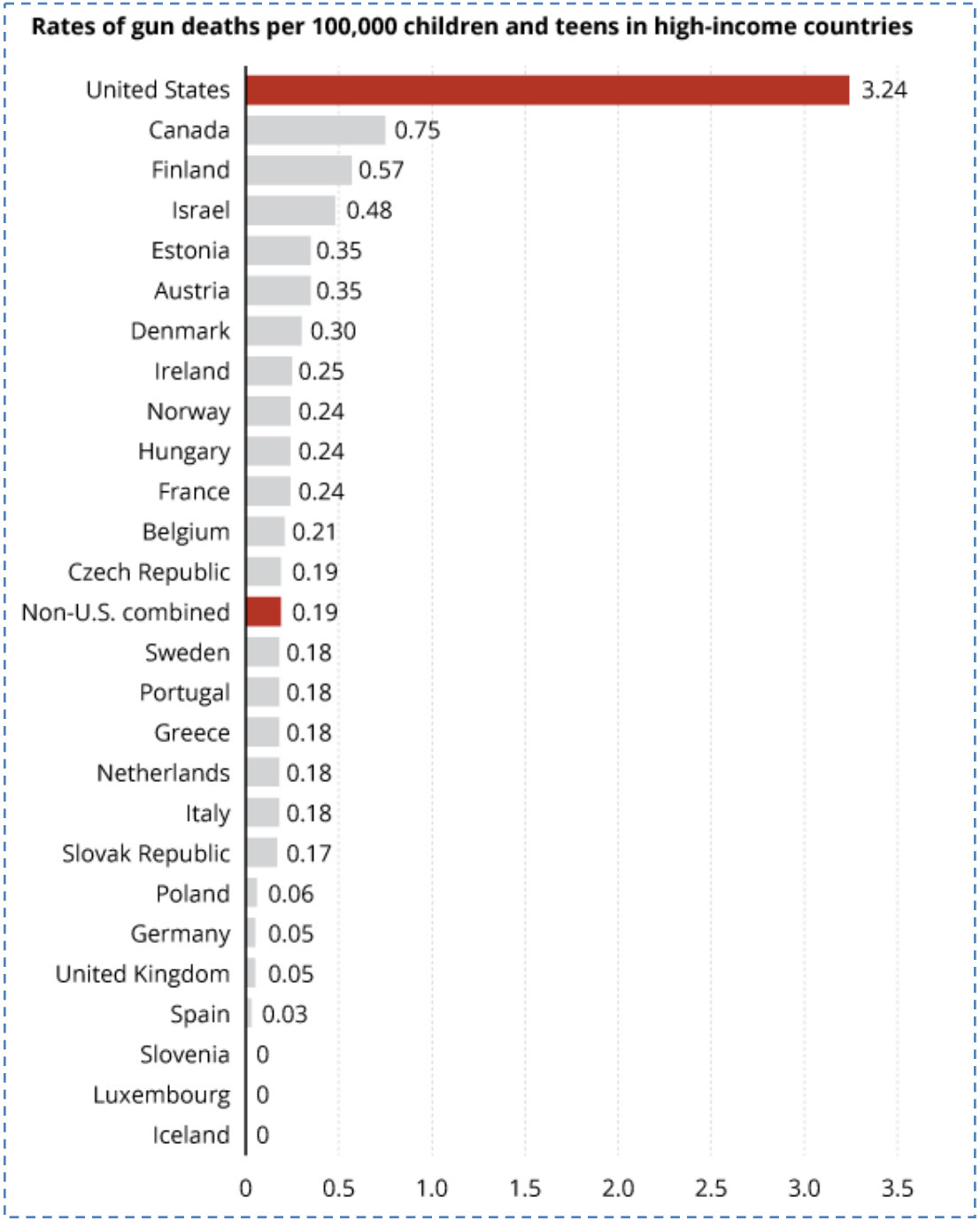


Keyes KM, Galea S. Population health science. Oxford University Press; 2016.



Keyes KM, Galea S. Population health science. Oxford University Press; 2016.

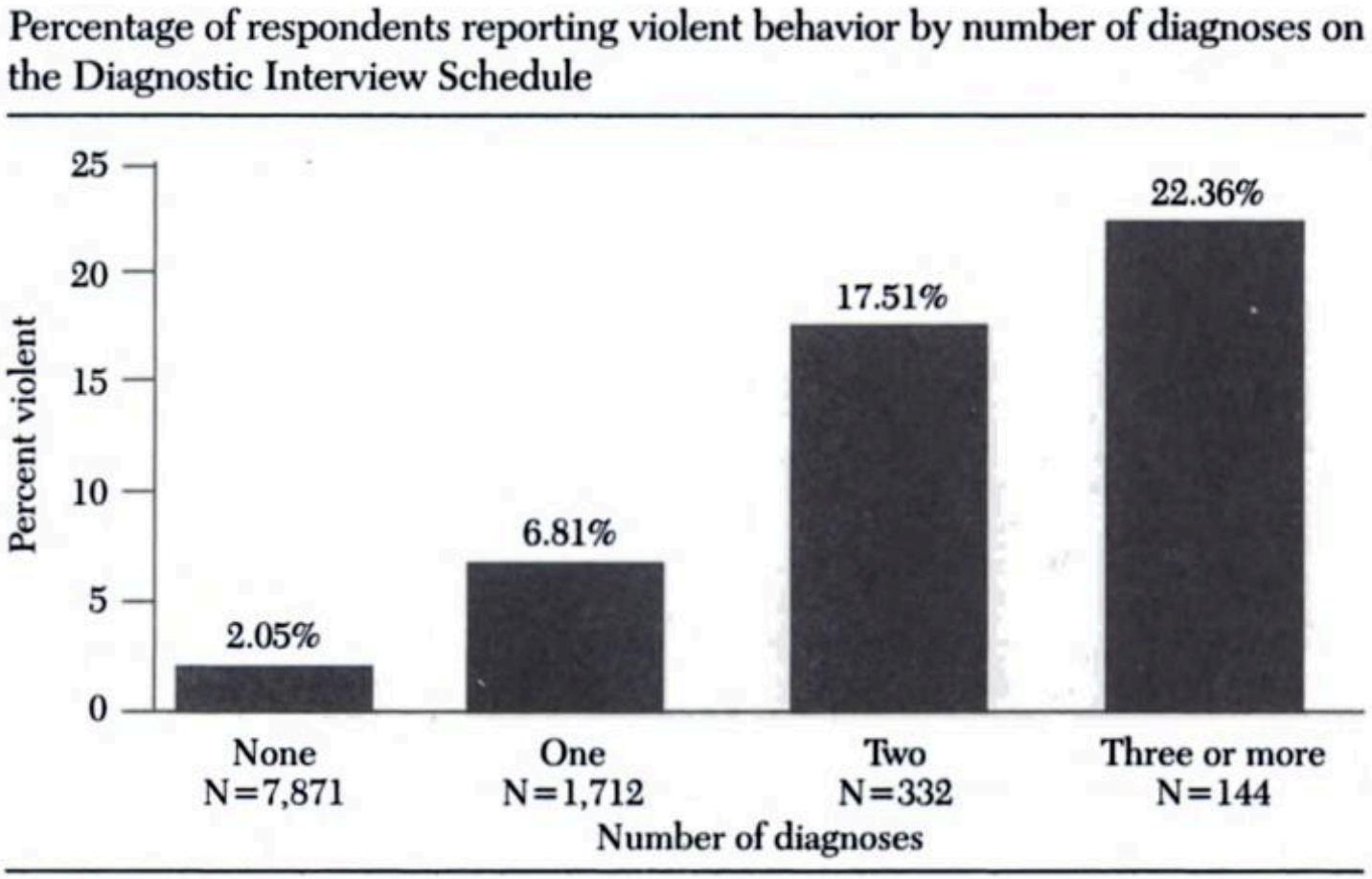
d. Focus on *what matters most*



https://www.rit.edu/cla/criminaljustice/sites/rit.edu.cla.criminaljustice/files/docs/WorkingPapers/2014/Firearm%20Injuries%20to%20Children%20Dec%202013.pdf

Maybe the answer is to make sure that guns are not in the hands of those with mental illness?

Psychiatric disorders increase the risk of violent behavior in the United States



Swanson JW, Holzer CE, Ganju VK, Jono RT. Violence and psychiatric disorder in the community: Evidence from the Epidemiologic Catchment Area Surveys. In: Violent Behavior and Mental Illness: A Compendium of Articles from Psychiatric Services and Community Psychiatry. 1997; American Psychiatric Association.

House Approves Modest Funding Boost For Gun Background Checks

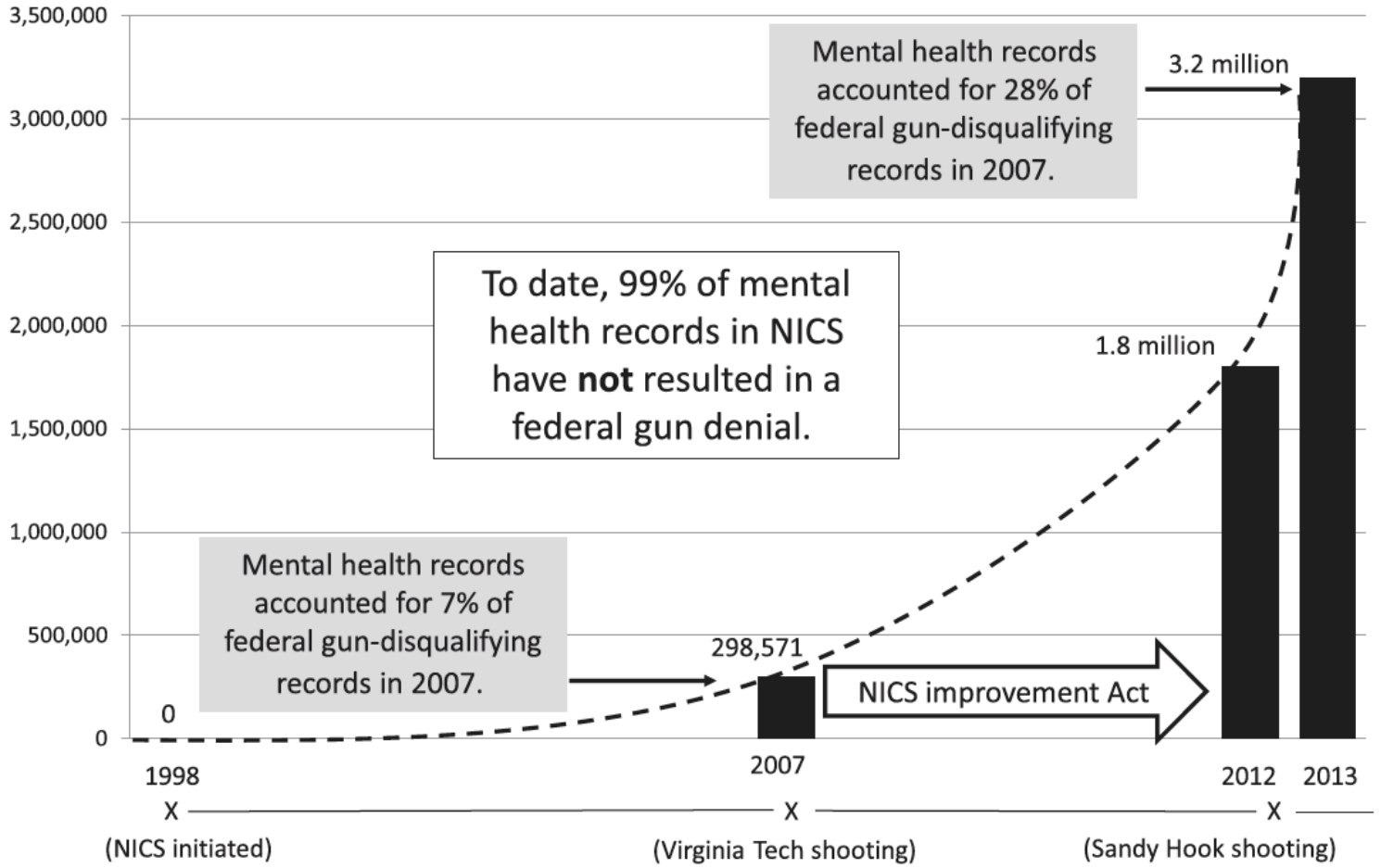
Posted: 05/29/2014 6:48 pm EDT | Updated: 05/29/2014 9:59 pm EDT

Sandy Hook Panel Focusing On Guns, School Safety, Mental Health

Mental Illness and New Gun Law Reforms
The Promise and Peril of Crisis-Driven Policy

FEDERAL FIREARMS PROHIBITION UNDER 18 U.S.C. § 922(g)(4)
PERSONS ADJUDICATED AS A MENTAL DEFECTIVE OR COMMITTED TO A MENTAL INSTITUTION

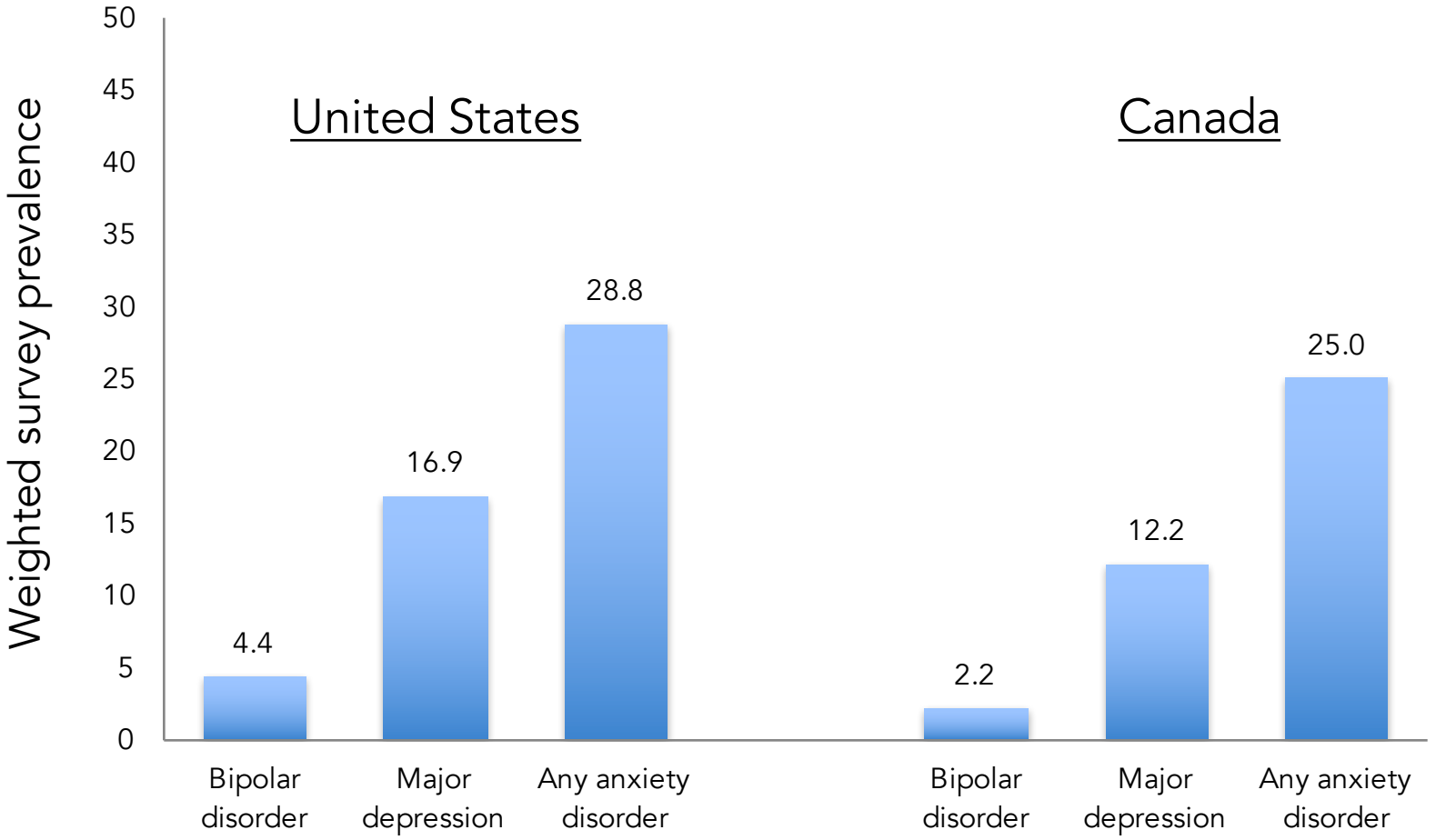
High-profile mass shootings and the accumulation of mental health records in National Instant Check System



Swanson JW, McGinty EE, Fazel S, Mays VM. Mental illness and reduction of gun violence and suicide: bringing epidemiologic research to policy. *Annals of Epidemiology* 2014.

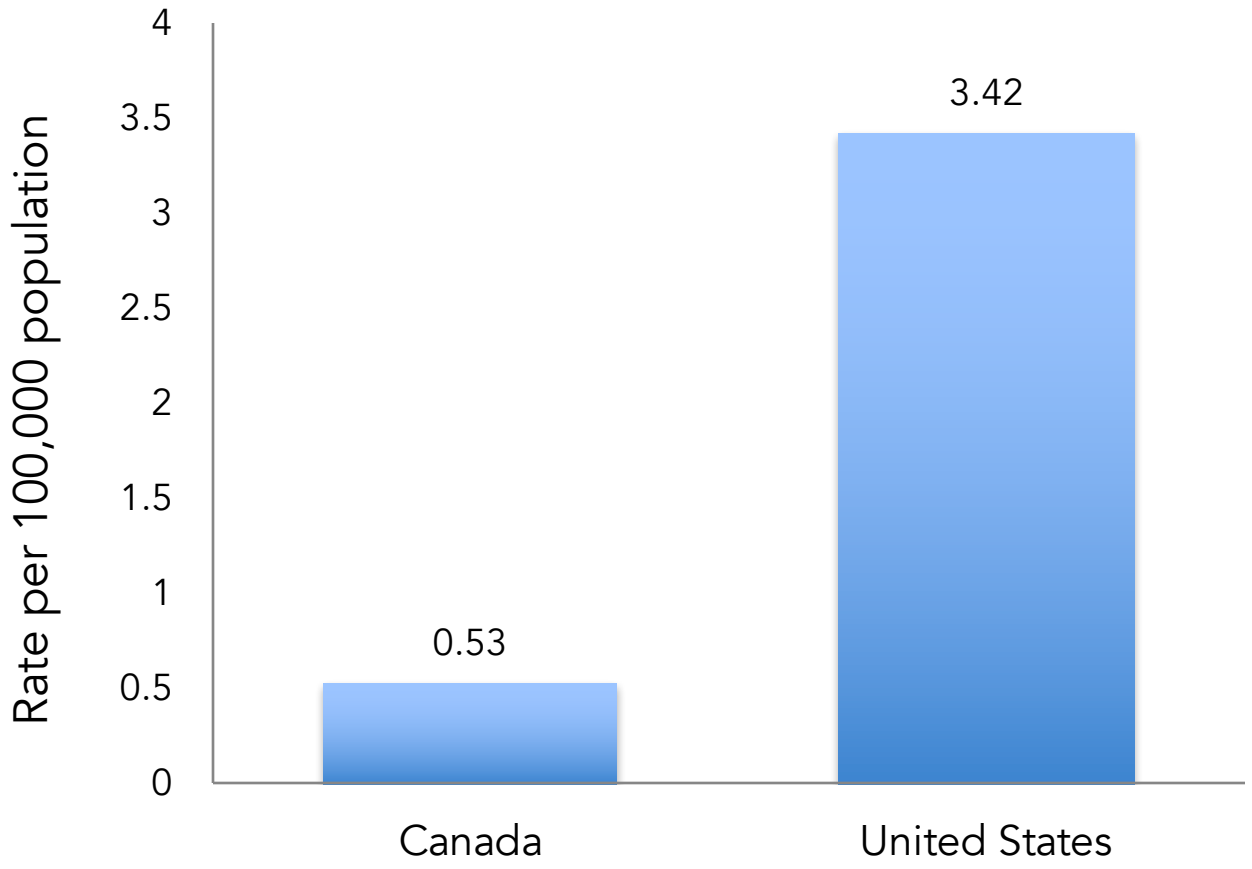
Is this likely to matter much to firearm-related violence in the U.S? Let us consider the case of Canada.

Lifetime prevalence of psychiatric disorders are comparable in Canada and the U.S.



Schaffer A et al. Community survey of bipolar disorder in Canada: lifetime prevalence and illness characteristics. *Can J Psychiatry* 2006; 51(1): 9-16.
Patten SB et al. Descriptive Epidemiology of Major Depression in Canada. *The Canadian Journal of Psychiatry* February 2006.
Kessler RC et al. Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *JAMA* 2005; 62 (6).
"Mental Health and Mental Illness". Anxiety Disorders Association of Canada. <http://anxietycanada.ca/english/pdf/kirby.pdf> Accessed November 21, 2014.

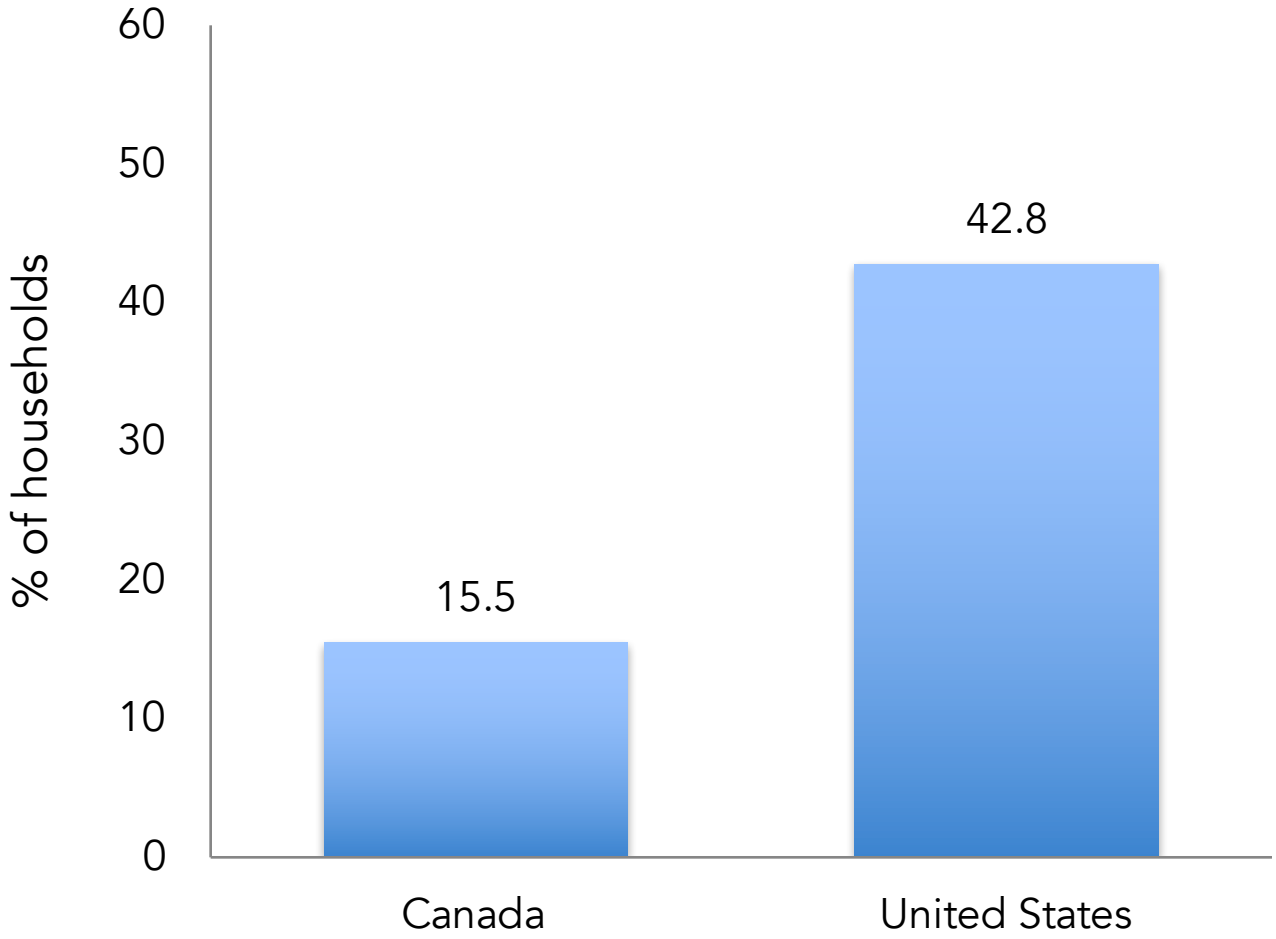
Firearm homicide rate per 100,000 in 2009



Beatty, Sarah, Cotter, Adam. (2010) "Homicide in Canada, 2009," *Juristat* 30 via "An Overview of Gun Control in US, Canada and Globally." Coalition for Gun Control. <http://guncontrol.ca/overview-gun-control-us-canada-global/> Accessed November 14, 2014.

What is causing this difference?

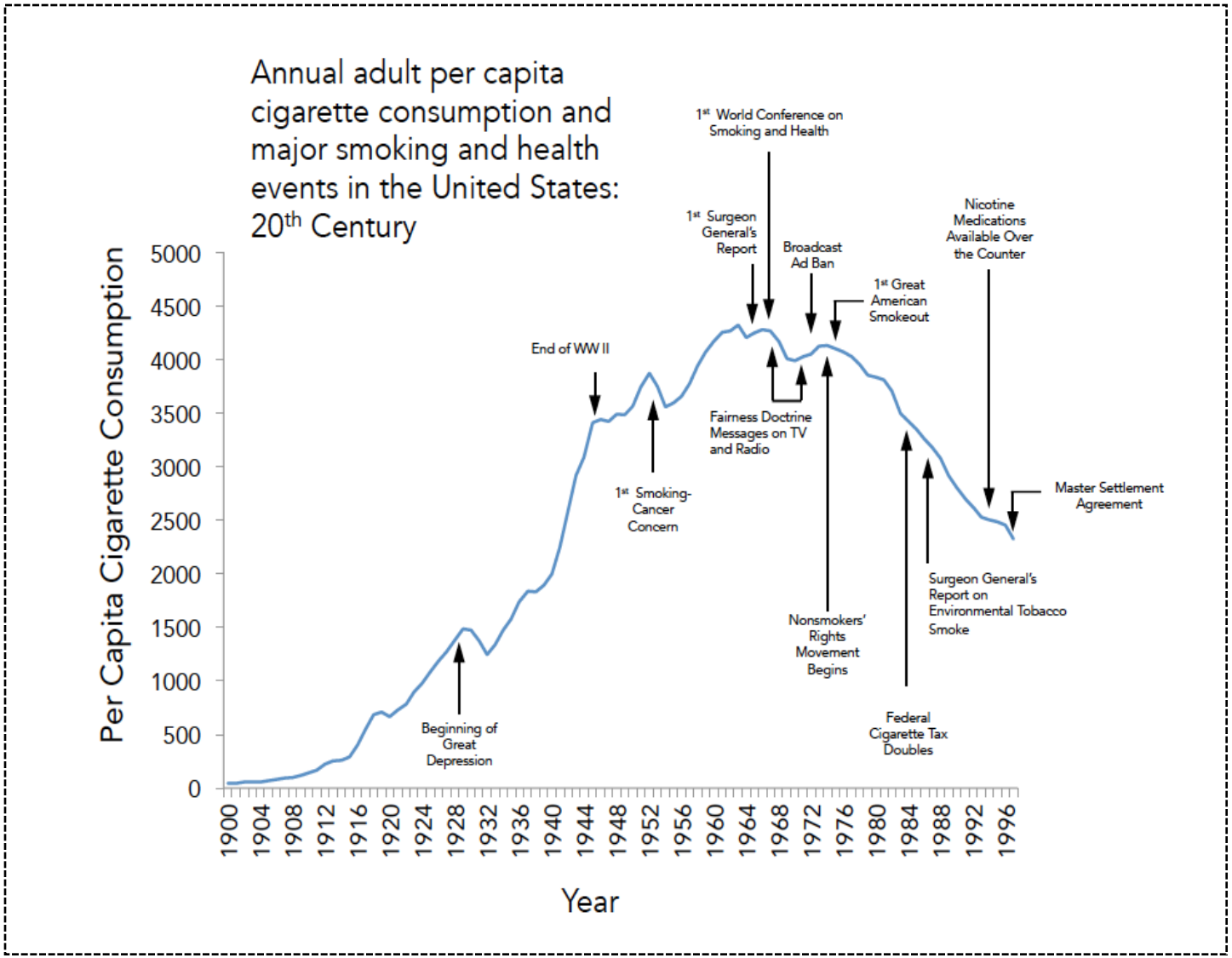
Proportion of households owning firearms

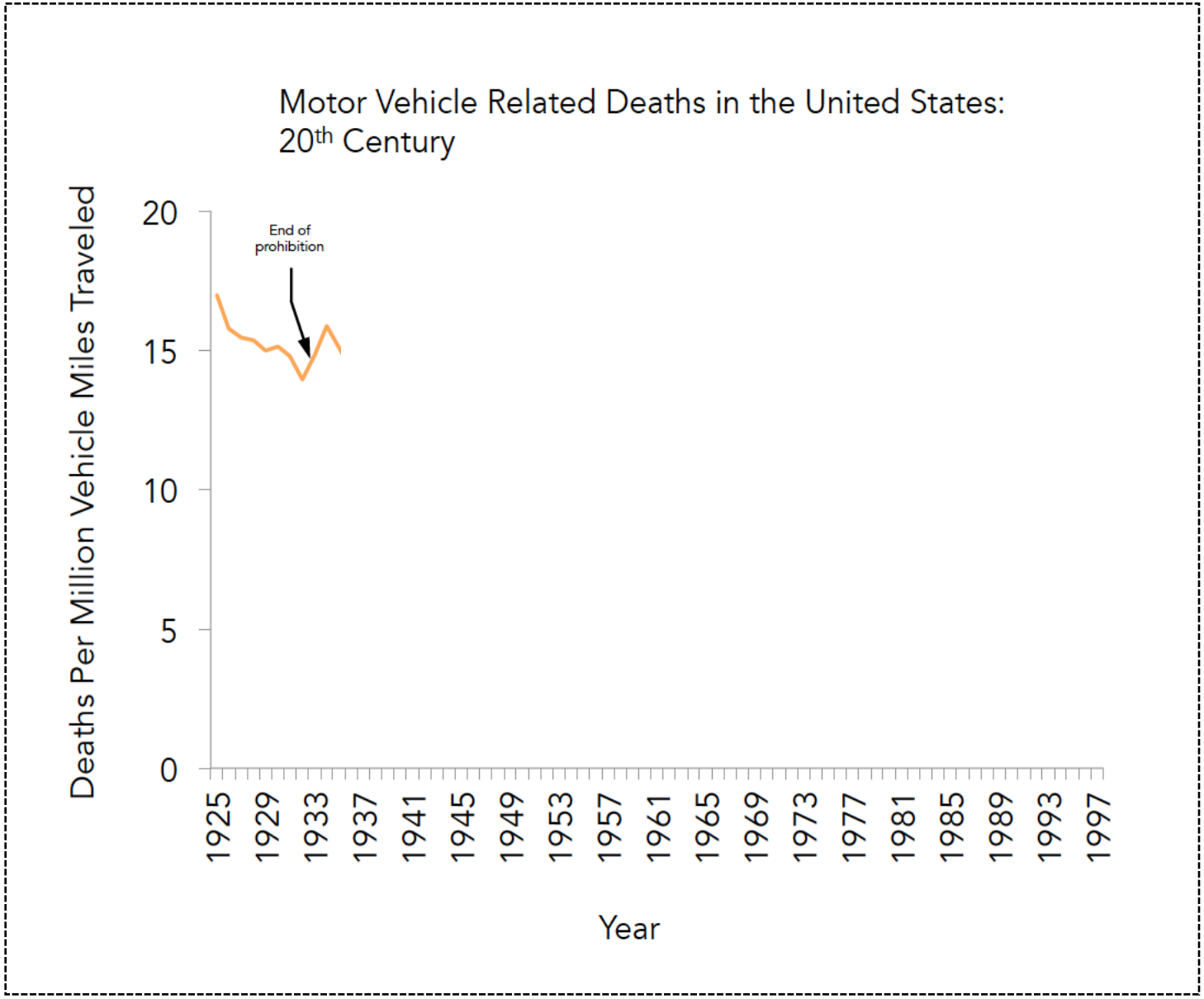


"An Overview of Gun Control in US, Canada and Globally." Coalition for Gun Control. <http://guncontrol.ca/overview-gun-control-us-canada-global/> Accessed November 14, 2014.

Differences in firearm availability underlie the differences in the measure of association that we observe in the relation between mental illness and firearm violence across these two geographic contexts.

e. Embrace the intellectual and moral challenges of our time

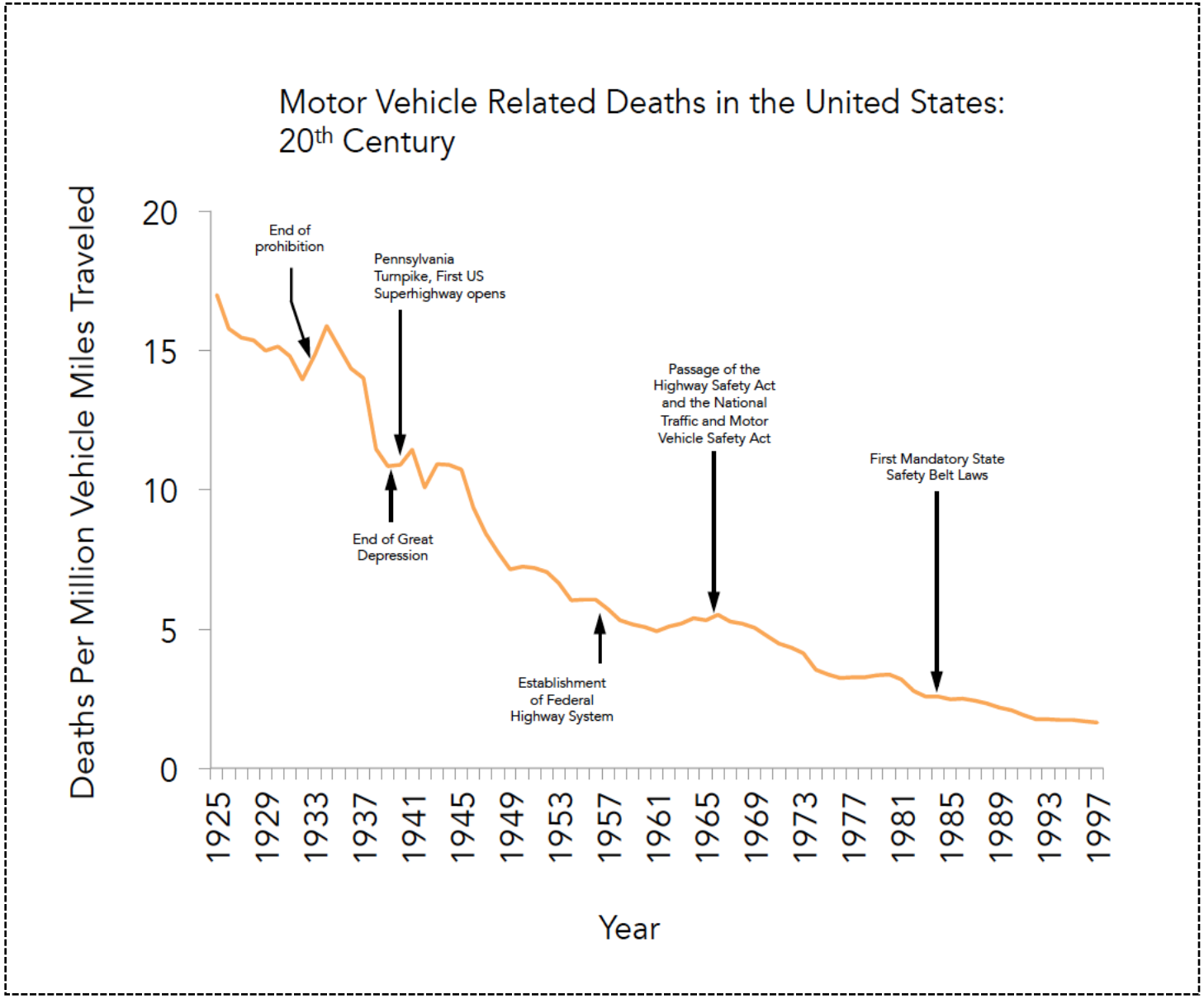

Annual adult per capita cigarette consumption and major smoking and health events in the United States: 20th Century
Per Capita Cigarette Consumption
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1900
1904
1908
1912
1916
1920
1924
1928
1932
1936
1940
1944
1948
1952
1956
1960
1964
1968
1972
1976
1980
1984
1988
1992
1996
Year
1st World Conference on Smoking and Health
1st Surgeon General's Report
Broadcast Ad Ban
1st Great American Smokeout
Nicotine Medications Available Over the Counter
End of WW II
Fairness Doctrine Messages on TV and Radio
1st Smoking-Cancer Concern
Master Settlement Agreement
Nonsmokers' Rights Movement Begins
Surgeon General's Report on Environmental Tobacco Smoke
Federal Cigarette Tax Doubles
Beginning of Great Depression


Motor Vehicle Related Deaths in the United States:
20th Century
Deaths Per Million Vehicle Miles Traveled
20
15
10
5
0
End of
prohibition
1925
1929
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
Year

Do we choose to invest in

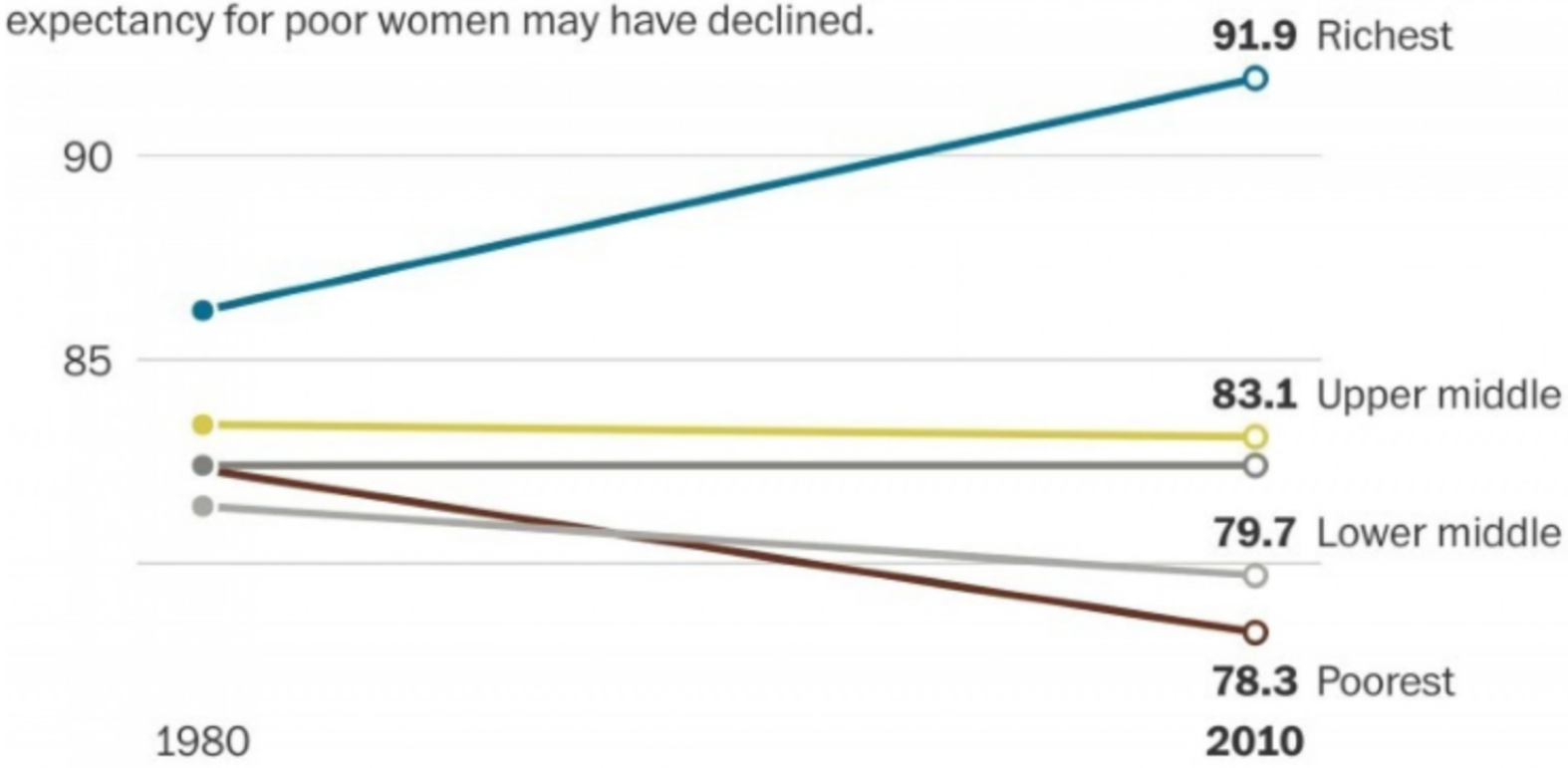
a. More driving lessons for every driver?

b. Better roads, better cars?


Motor Vehicle Related Deaths in the United States: 20th Century
Deaths Per Million Vehicle Miles Traveled
20
15
10
5
0
End of prohibition
Pennsylvania Turnpike, First US Superhighway opens
End of Great Depression
Establishment of Federal Highway System
Passage of the Highway Safety Act and the National Traffic and Motor Vehicle Safety Act
First Mandatory State Safety Belt Laws
1925
1929
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
Year

Inequality in life expectancy widens for women

Wealthier women can expect to live longer than their parents did, while life expectancy for poor women may have declined.



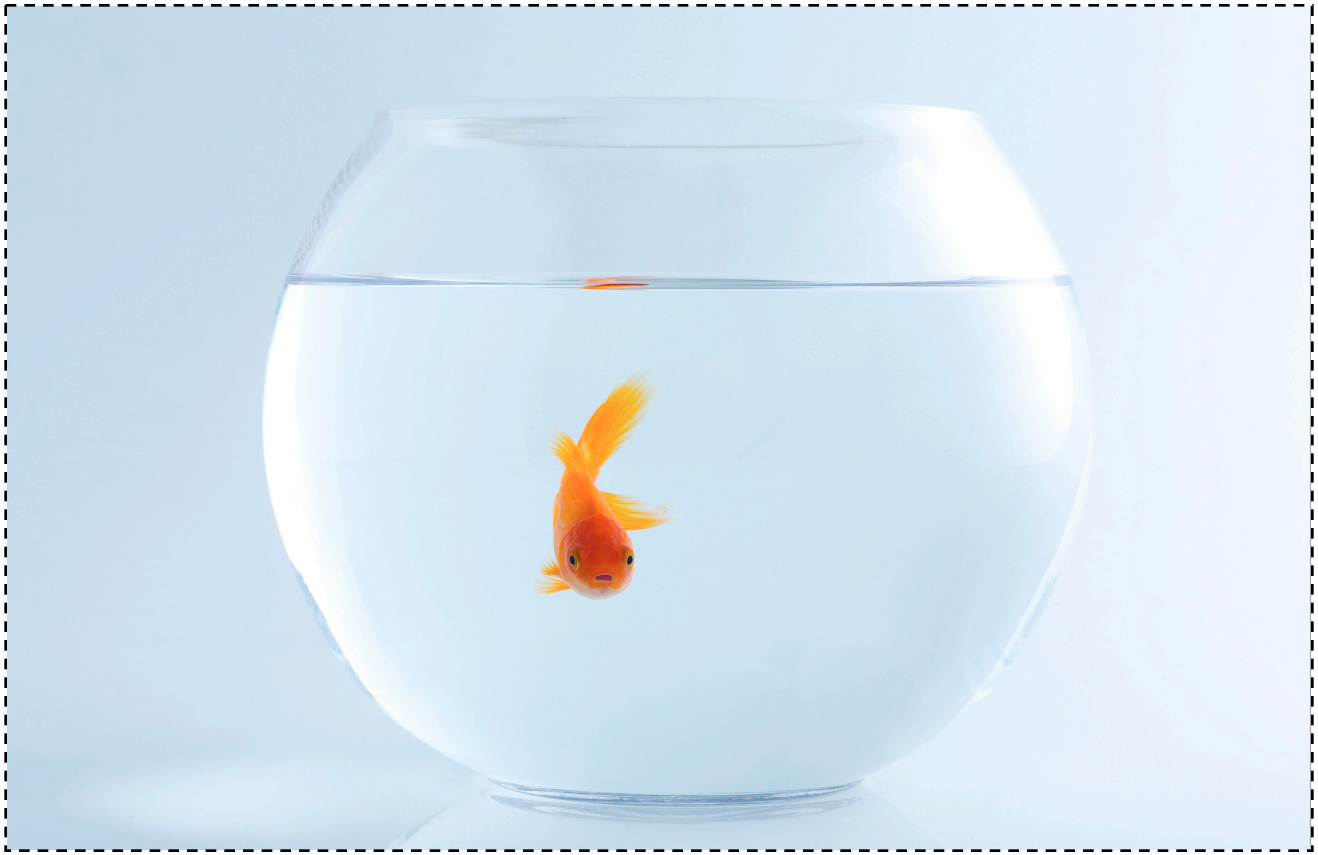
Life expectancy for 50-year-olds in a given year, by quintile of income over the previous 10 years

Source: National Academies of Science, Engineering and Medicine

National Academy of Medicine. The growing gap in life expectancy by income: Implications for federal programs and policy responses. 2015. http://www.nap.edu/download.php?record_id=19015#

5. Ending on metaphors


11
4
1
12
2
15
23
19
10
14
22
15



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