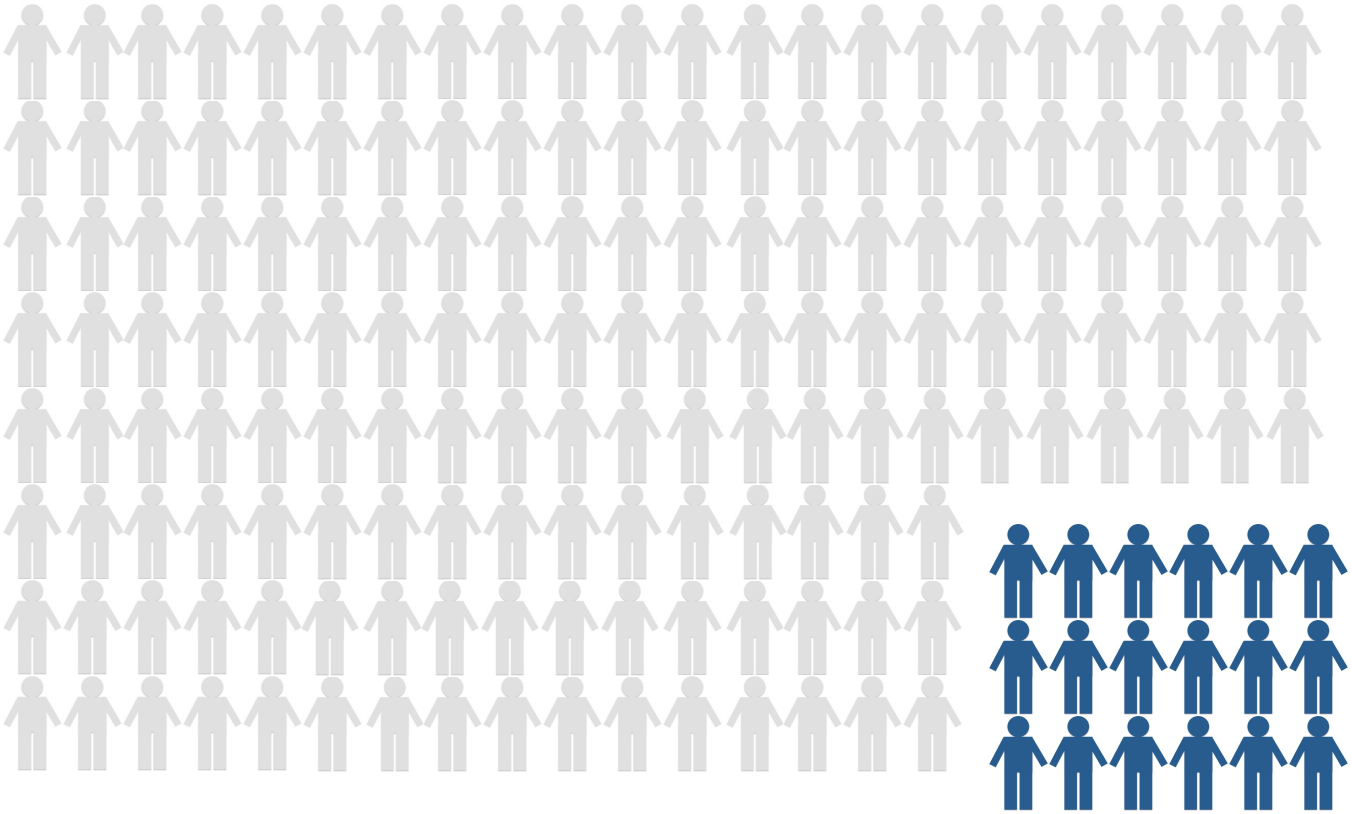
What matters most to improve the mental health of populations

Sandro Galea

Boston University School of Public Health

1. We are centrally motivated to improve the health of populations



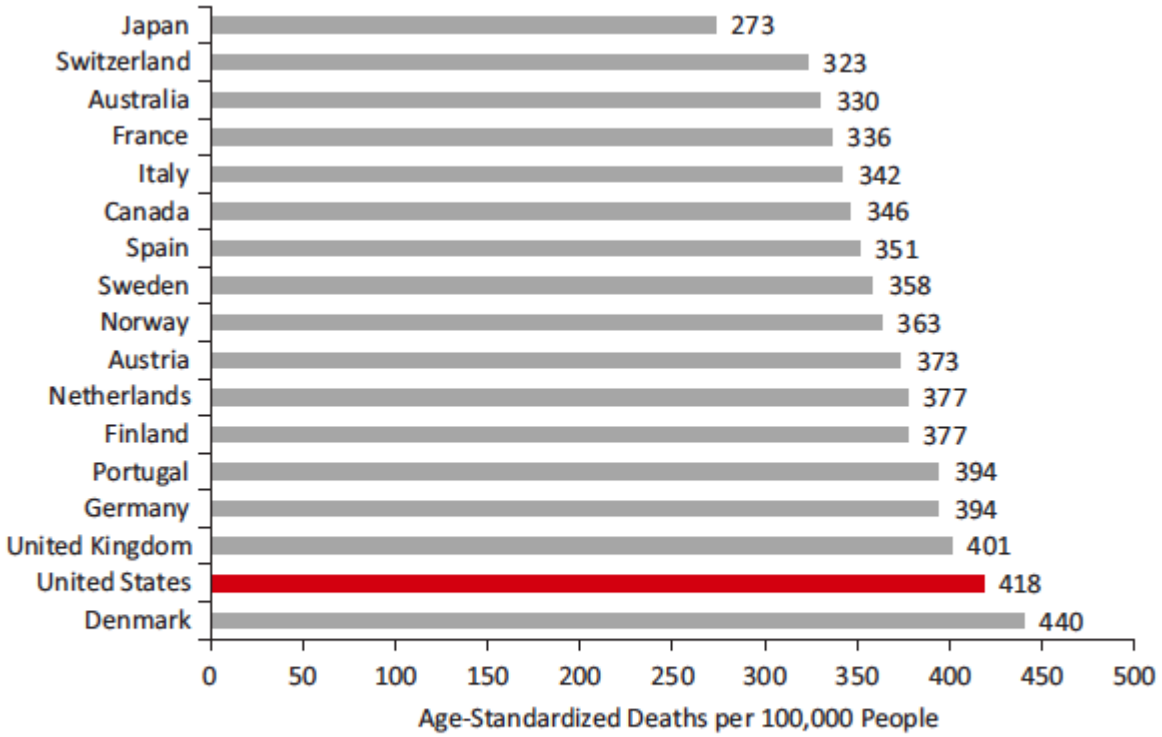


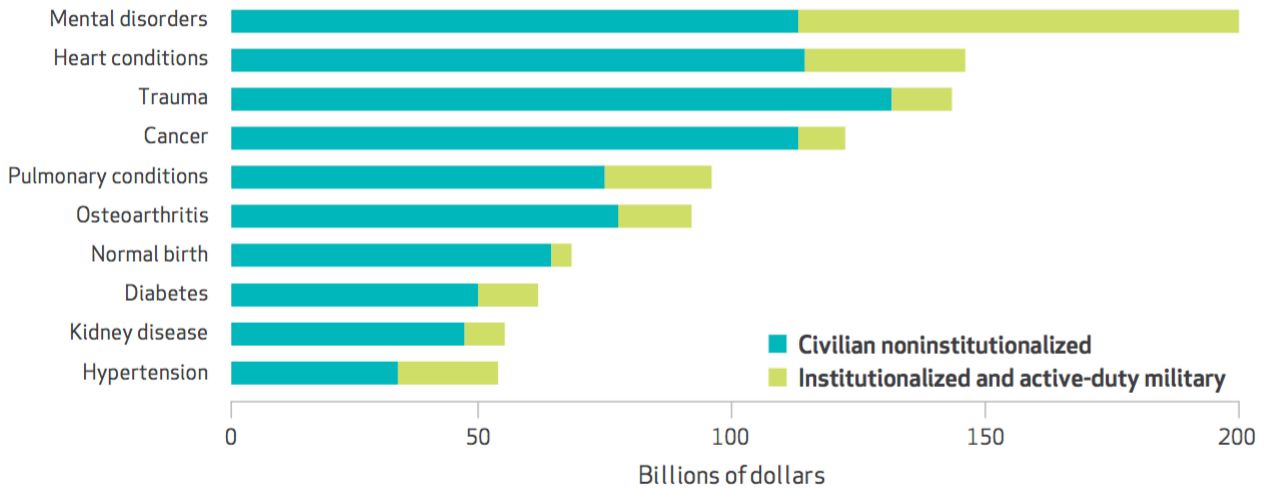
FIGURE 1-1 Mortality from noncommunicable diseases in 17 peer countries, 2008.
SOURCE: Data from World Health Organization (2011a, Table 3).

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

2. What are we doing to improve (population) mental health?

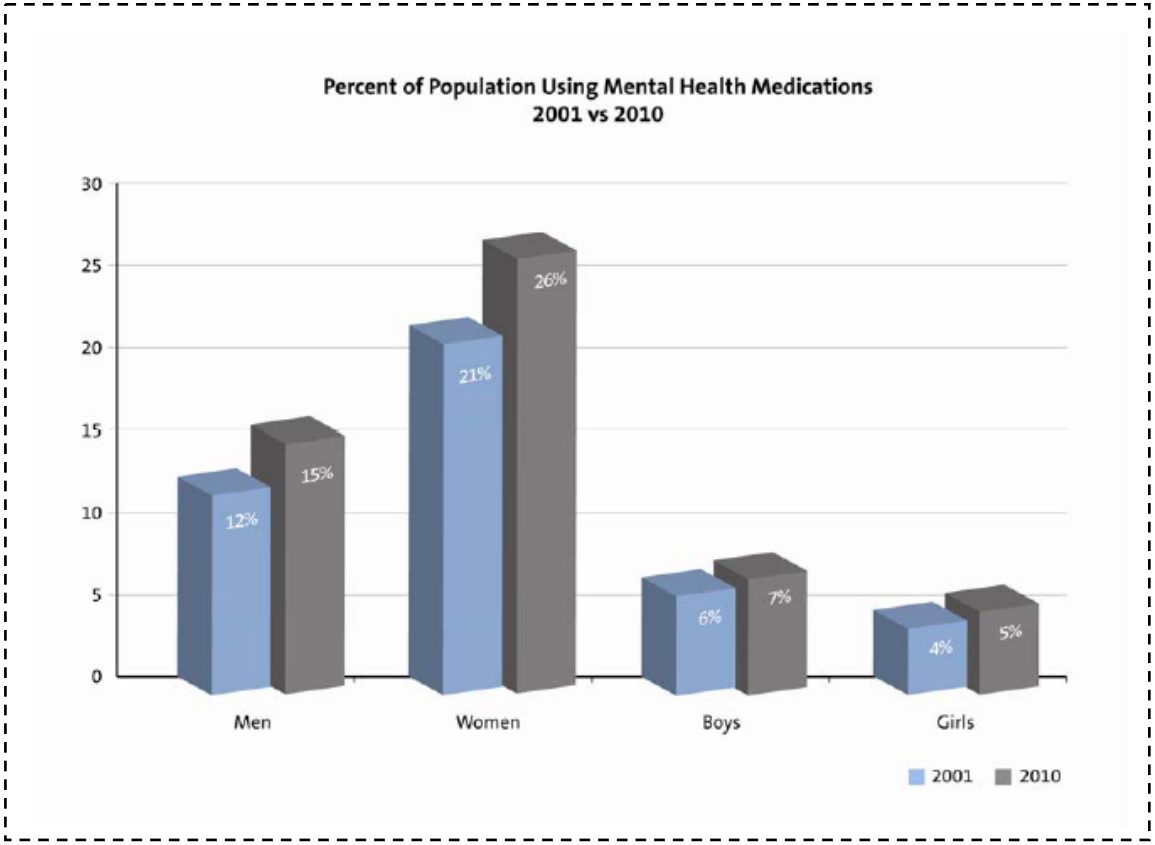
EXHIBIT 1

Ten medical conditions with the highest estimated spending in 2013

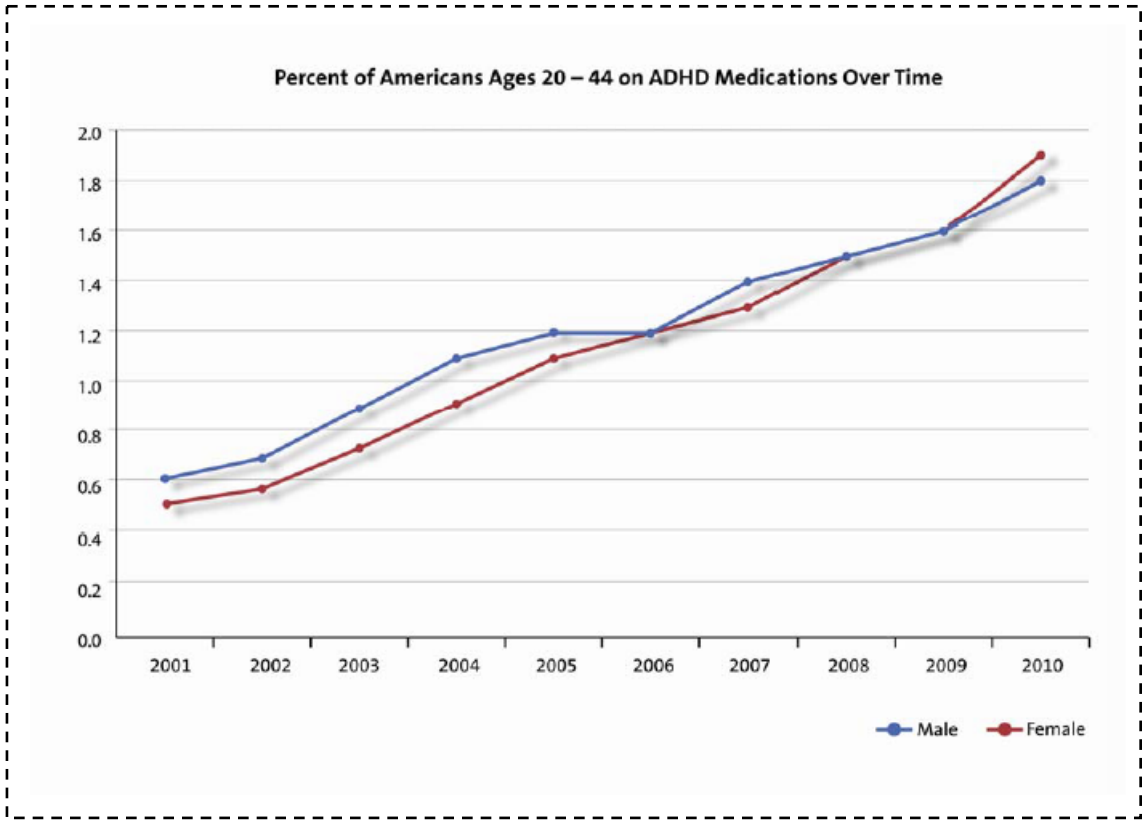


SOURCE Author's analysis of study data. **NOTES** Institutionalized populations include nursing home residents, long-term patients in psychiatric hospitals, and prisoners. Trauma is fractures and wounds. Pulmonary conditions include chronic obstructive pulmonary disease, asthma, and other pulmonary diseases.

Roehrig, Charles. *Mental Disorders Top The List Of The Most Costly Conditions In The United States: $201 Billion* Health Affairs. May 18, 2016.



http://apps.who.int/medicinedocs/documents/s19032en/s19032en.pdf



http://apps.who.int/medicinedocs/documents/s19032en/s19032en.pdf

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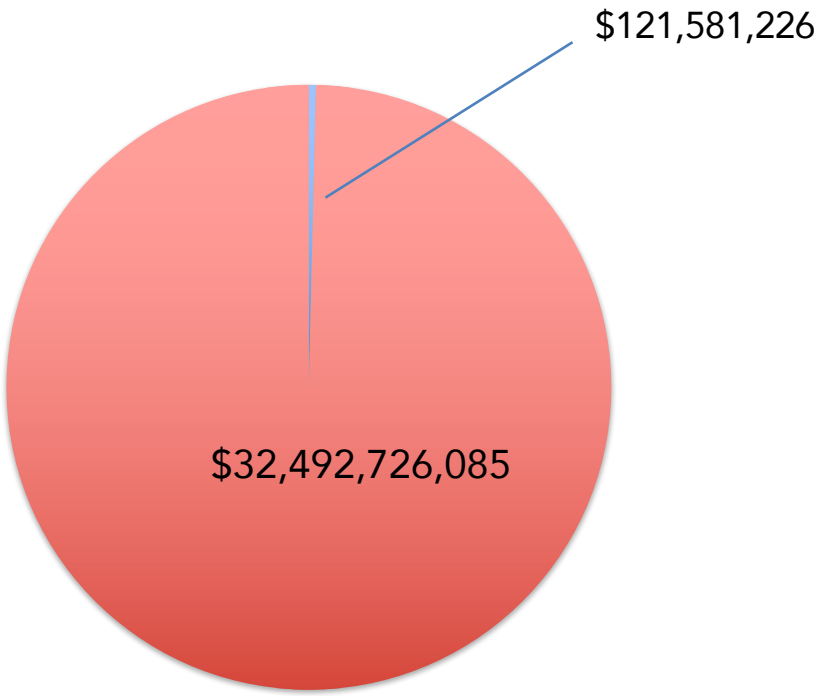
Tuesday, September 30th, 2014

BRAIN Initiative

President Obama is making new investments in the "BRAIN" Initiative — a bold new research effort to revolutionize our understanding of the human mind and uncover new ways to treat, prevent, and cure brain disorders like Alzheimer's, schizophrenia, autism, epilepsy, and traumatic brain injury.

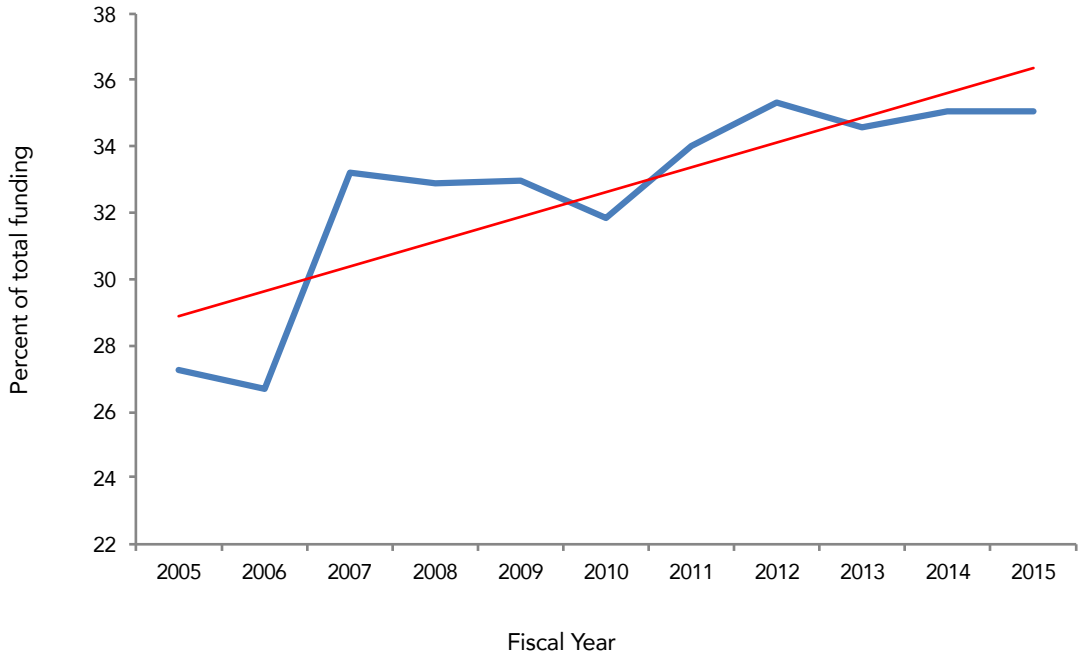
SHARE ON FACEBOOK SHARE ON TWITTER

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



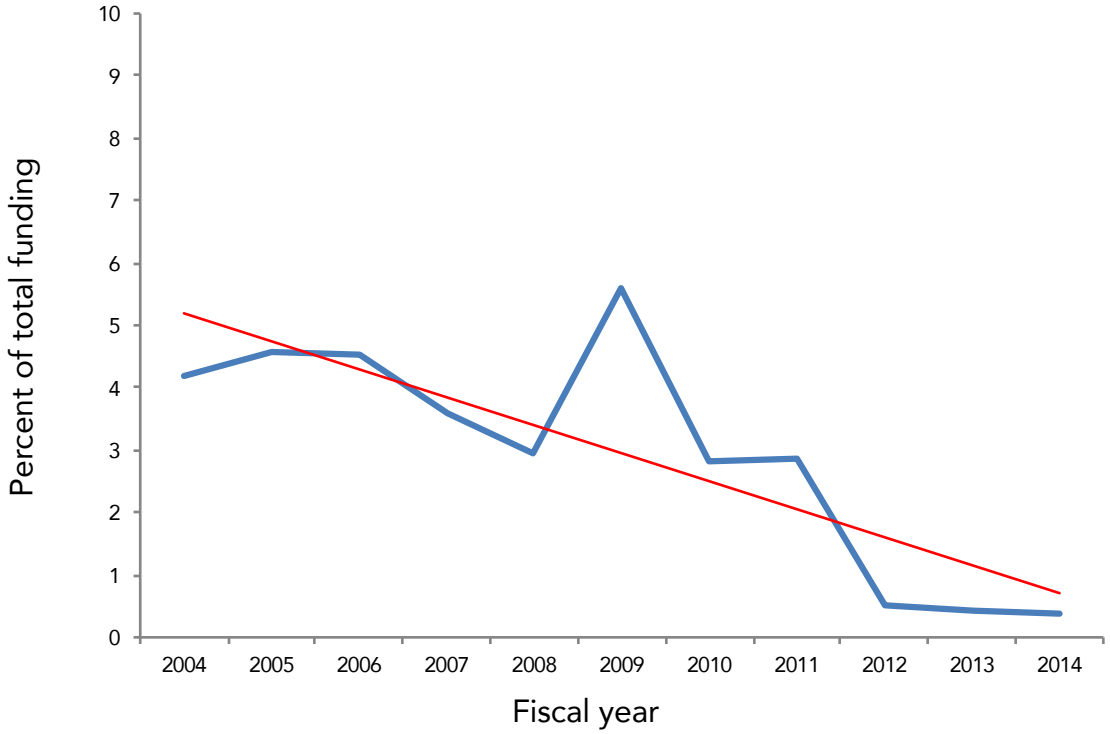
NIH RePORTER. Current projects from FY 2014-2015 for which funding data is available. <http://projectreporter.nih.gov/> Accessed on June 22, 2015.

Proportion of NIH funding awarded to projects with the terms “genetic” or “genetics” in the title, abstract or terms



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

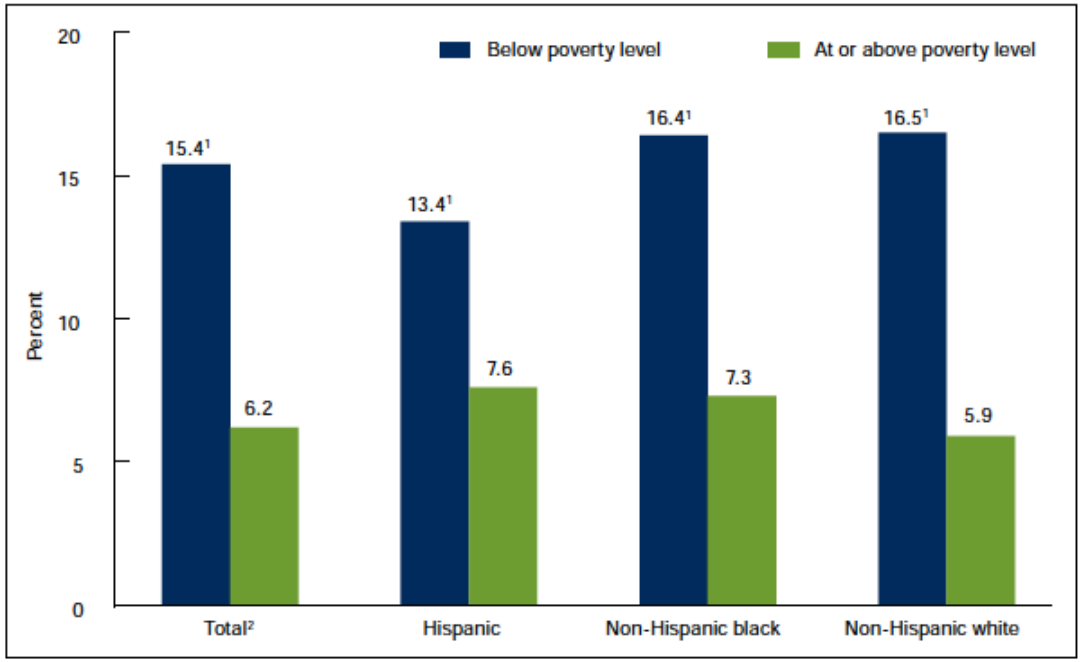
Proportion of NIH funding awarded to projects with the terms "population" or "public" in the title, abstract, or terms



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

3. Is this getting us where we want to get to?

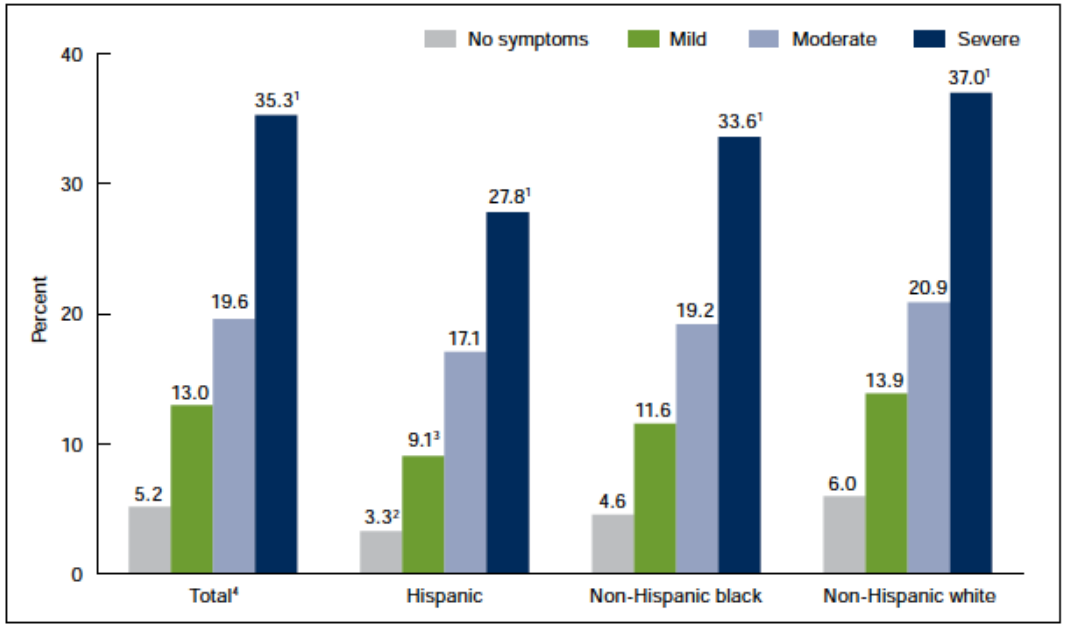
Figure 3. Percentage of persons aged 12 and over with depression, by poverty status and race and Hispanic origin: United States, 2009–2012



[1]Significantly higher than "at or above poverty level."
[2]Includes race and ethnicity groups not shown separately.
NOTES: Depression is defined as moderate to severe depressive symptoms. The poverty level is set by the U.S. Department of Health and Human Services and is based on family income and family size. Access data table for Figure 3 at: http://www.cdc.gov/nchs/data/databriefs/db172_table.pdf#3.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

http://www.cdc.gov/nchs/data/databriefs/db172.pdf

Figure 5. Percentage of those aged 12 and over who contacted a mental health professional in past 12 months, by depressive symptom severity and race and Hispanic origin: United States, 2009–2012



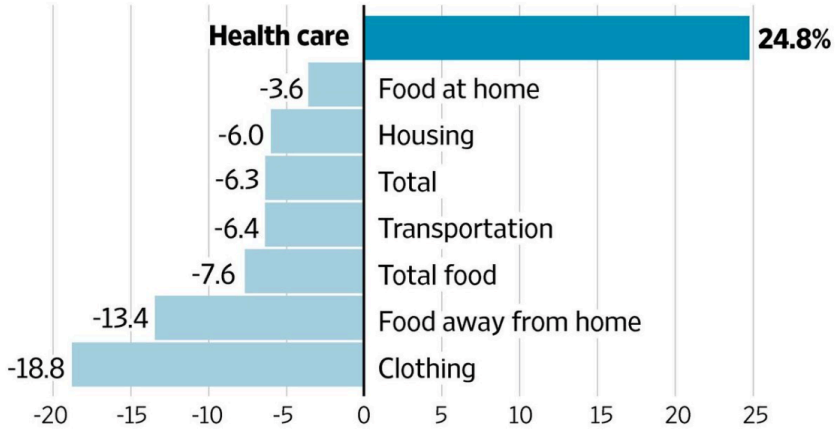
[1]Significant linear trend.
[2]Significantly less than non-Hispanic black and non-Hispanic white.
[3]Significantly less than non-Hispanic white.
[4]Includes race and ethnicity groups not shown separately.
NOTE: Access data table for Figure 5 at: http://www.cdc.gov/nchs/data/databriefs/db172_table.pdf#5.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

http://www.cdc.gov/nchs/data/databriefs/db172.pdf

A Bigger Bite

Middle-class families' spending on health care has increased 25% since 2007. Other basic needs, such as clothing and food, have decreased.

Percent change in middle-income households' spending on basic needs (2007 to 2014)



Sources: Brookings Institution analysis of Consumer Expenditure Survey, Labor Department

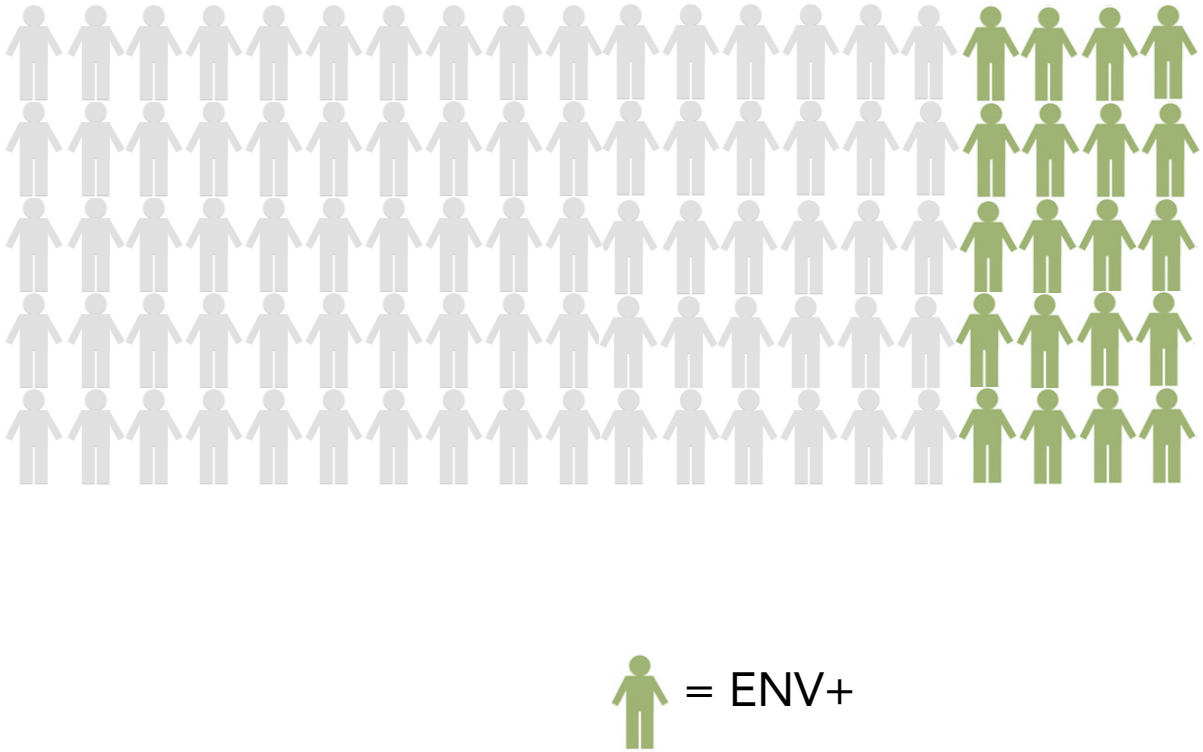
THE WALL STREET JOURNAL.

The Wall Street Journal. "Burden of Health-Care Costs Moves to the Middle Class."
<http://www.wsj.com/articles/burden-of-health-care-costs-moves-to-the-middle-class-1472166246> Accessed September 7, 2016

4. What *should* we be doing? A what matters most illustration

How much is risk of depression determined by our genes?

= GE+


= ENV+

= DEP+

Scenario 1

= GE+ = DEP+ = ENV+

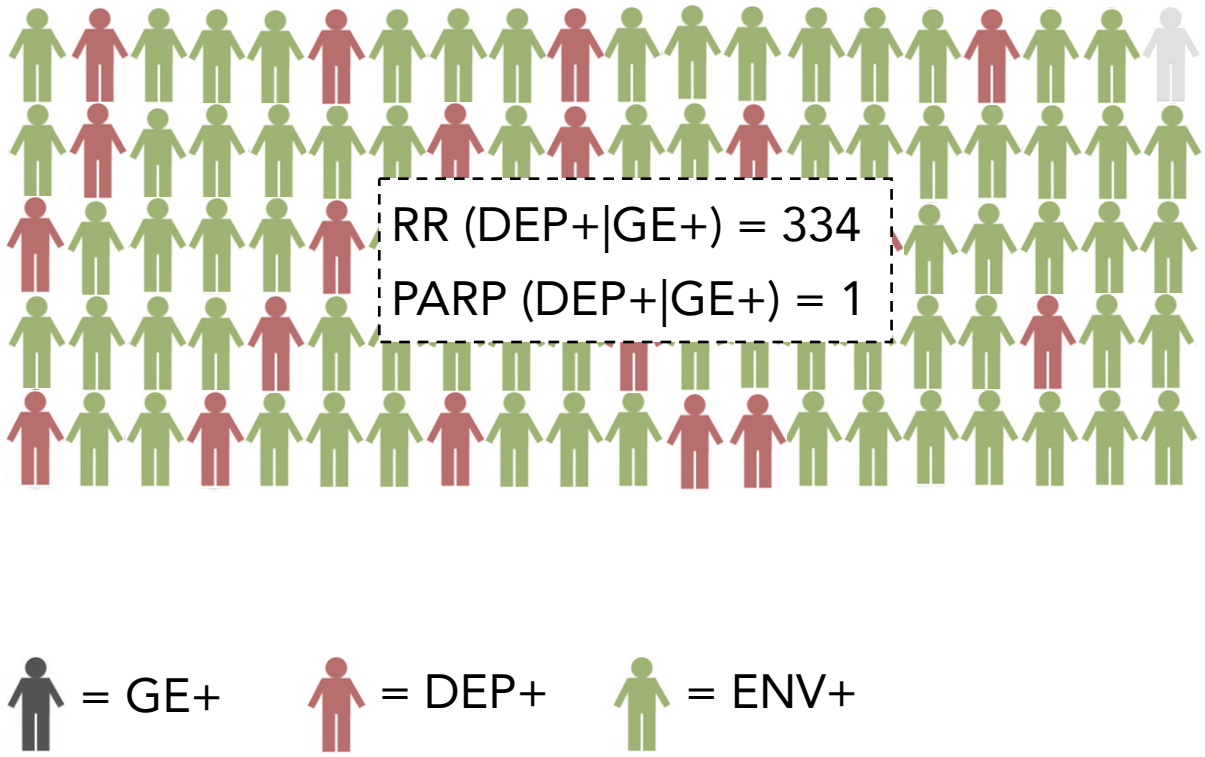
Scenario 1

= GE+ = DEP+ = ENV+

Scenario 1

= GE+ = DEP+ = ENV+

Scenario 1



Scenario 1

= GE+ = DEP+ = ENV+

Molecular Psychiatry (2012), 1–15
© 2012 Macmillan Publishers Limited All rights reserved 1359-4184/12
www.nature.com/mp

ORIGINAL ARTICLE

A mega-analysis of genome-wide association studies for major depressive disorder

Major Depressive Disorder Working Group of the Psychiatric GWAS Consortium[1]

Prior genome-wide association studies (GWAS) of major depressive disorder (MDD) have met with limited success. We sought to increase statistical power to detect disease loci by conducting a GWAS mega-analysis for MDD. In the MDD discovery phase, we analyzed more than 1.2 million autosomal and X chromosome single-nucleotide polymorphisms (SNPs) in 18 759 independent and unrelated subjects of recent European ancestry (9240 MDD cases and 9519 controls). In the MDD replication phase, we evaluated 554 SNPs in independent samples (6783 MDD cases and 50 695 controls). We also conducted a cross-disorder meta-analysis using 819 autosomal SNPs with $P < 0.0001$ for either MDD or the Psychiatric GWAS Consortium

> Although this is the largest genome-wide analysis of MDD yet conducted…we were unable to identify robust and replicable findings

Major Depressive Disorder Working Group of the Psychiatric GWAS Consortium. A mega-analysis of genome-wide association studies for major depressive disorder Molecular Psychiatry (2012), 1–15

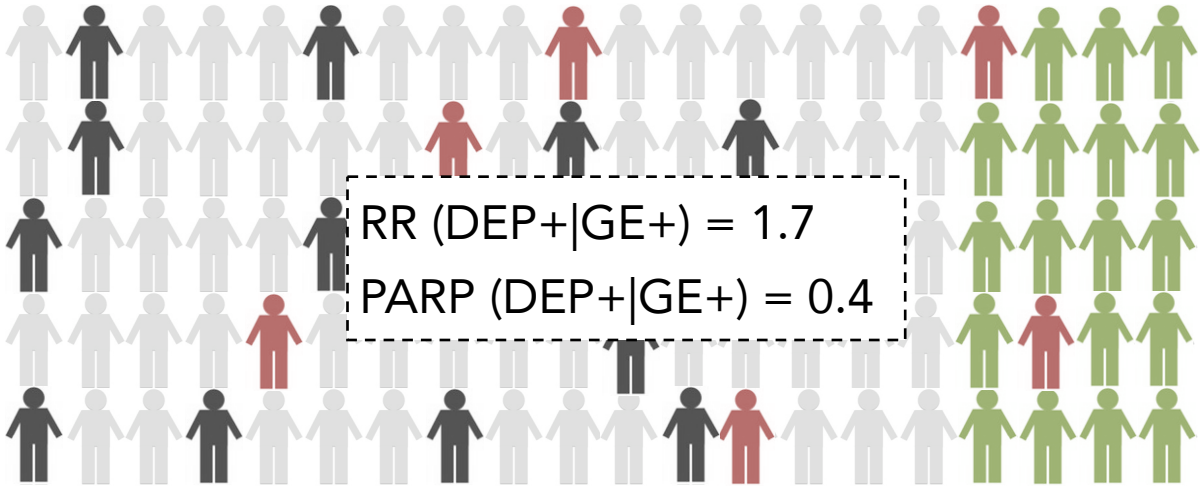
Scenario 2

= GE+ = DEP+ = ENV+

Scenario 2

= GE+ = DEP+ = ENV+

Scenario 2



= GE+ = DEP+ = ENV+

Scenario 2

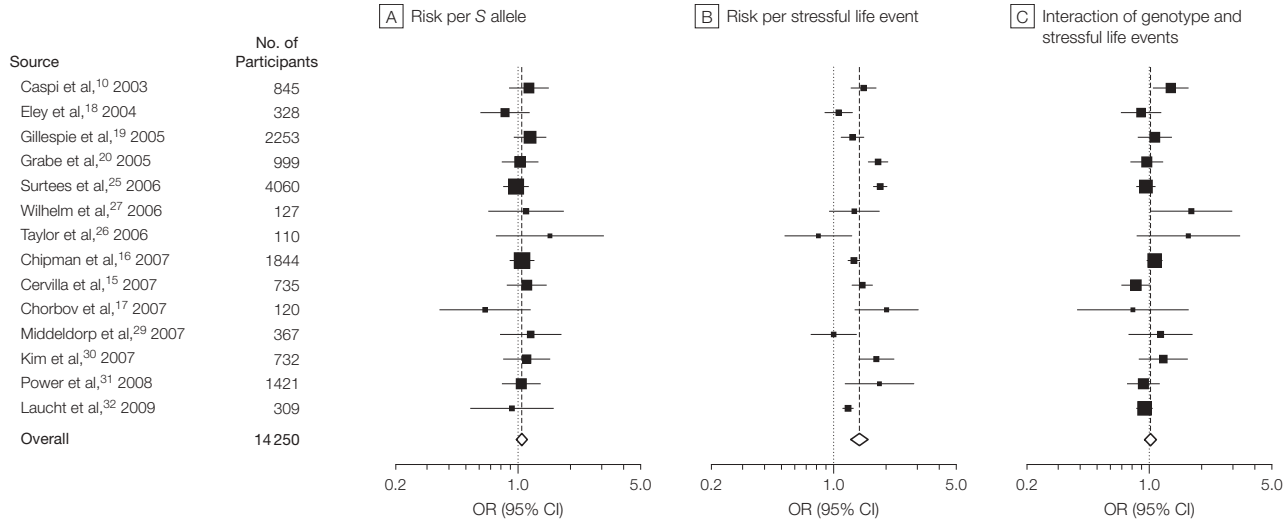
Therefore only about 40% of our risk of depression is determined by our genes
= GE+
= DEP+
= ENV+

What is going on?

Interaction Between the Serotonin Transporter Gene (*5-HTTLPR*), Stressful Life Events, and Risk of Depression

A Meta-analysis

Figure 2. Logistic Regression Analyses of Risk of Depression for 14 Studies



The boxes and lines indicate the odds ratios (ORs) and their 95% confidence intervals (CIs) on a log scale for each study. The size of the box indicates the relative weight of each estimate.

Risch et al., *JAMA* (2009) 301: 2462-71

5. So what *should* we be doing?

1. Investment in early childhood education
2. Increase Earned Income Tax Credits
3. Expand safe affordable public transportation
4. Financial support for low-income homeowners
5. School-based obesity prevention
6. …

But isn’t this outside our remit?

6. We cannot afford *not* to.

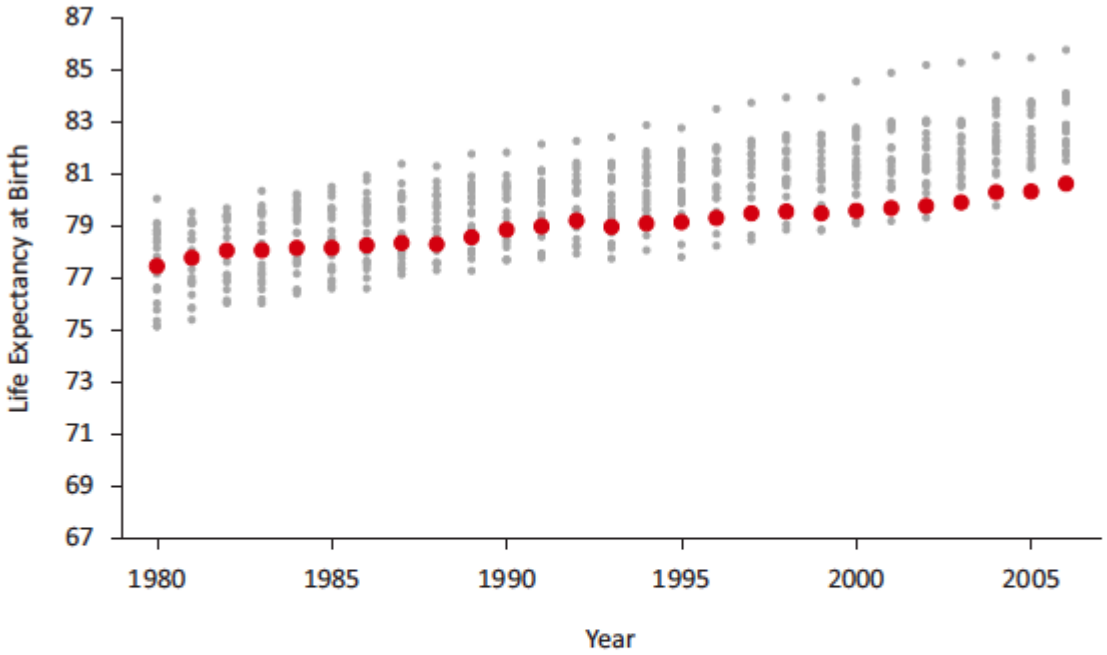


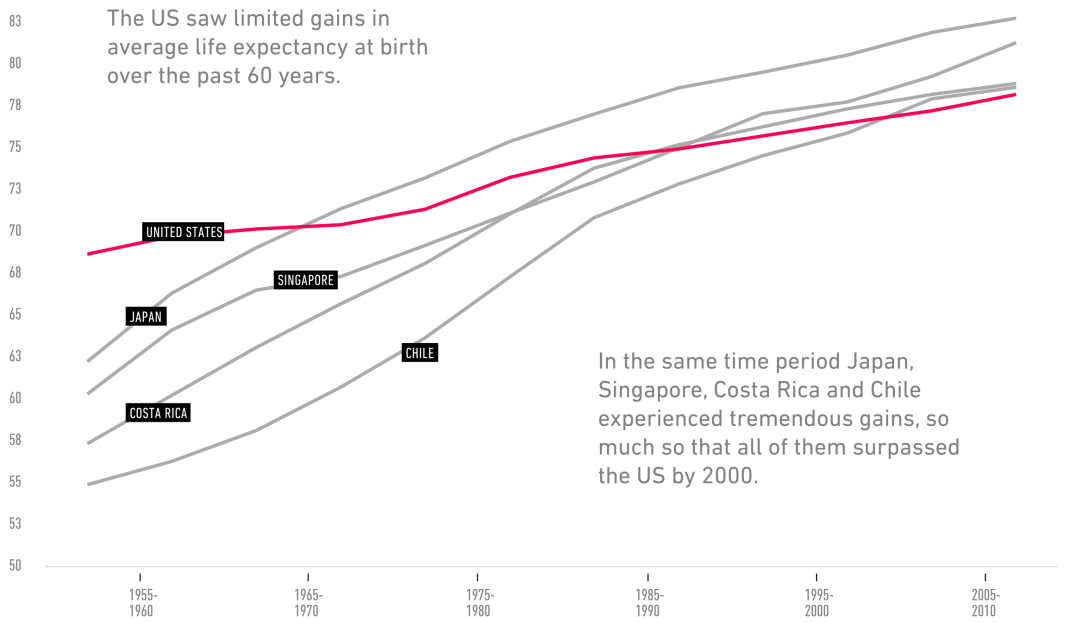
FIGURE 1-6 U.S. female life expectancy at birth relative to 21 other high-income countries, 1980-2006.

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.

SURPASSING THE US IN LIFE EXPECTANCY



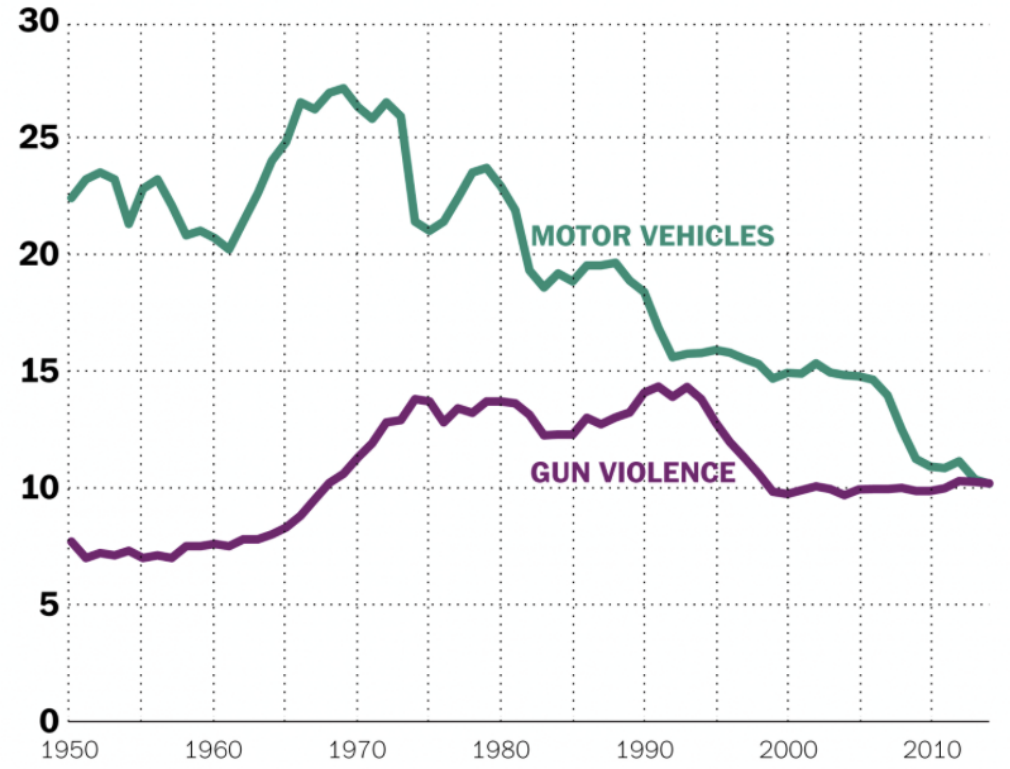
Author: GRAPH Team **Published:** December 11th, 2013

Tagged: life expectancy, high-income countries, oecd

DATA SOURCE: UNITED NATIONS, DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, POPULATION DIVISION (2013). WORLD POPULATION PROSPECTS: THE 2012 REVISION, DVD EDITION.

Gun deaths and motor vehicle deaths converge

Deaths per 100,000 population for gun violence and motor vehicle traffic events, 1950 – 2014

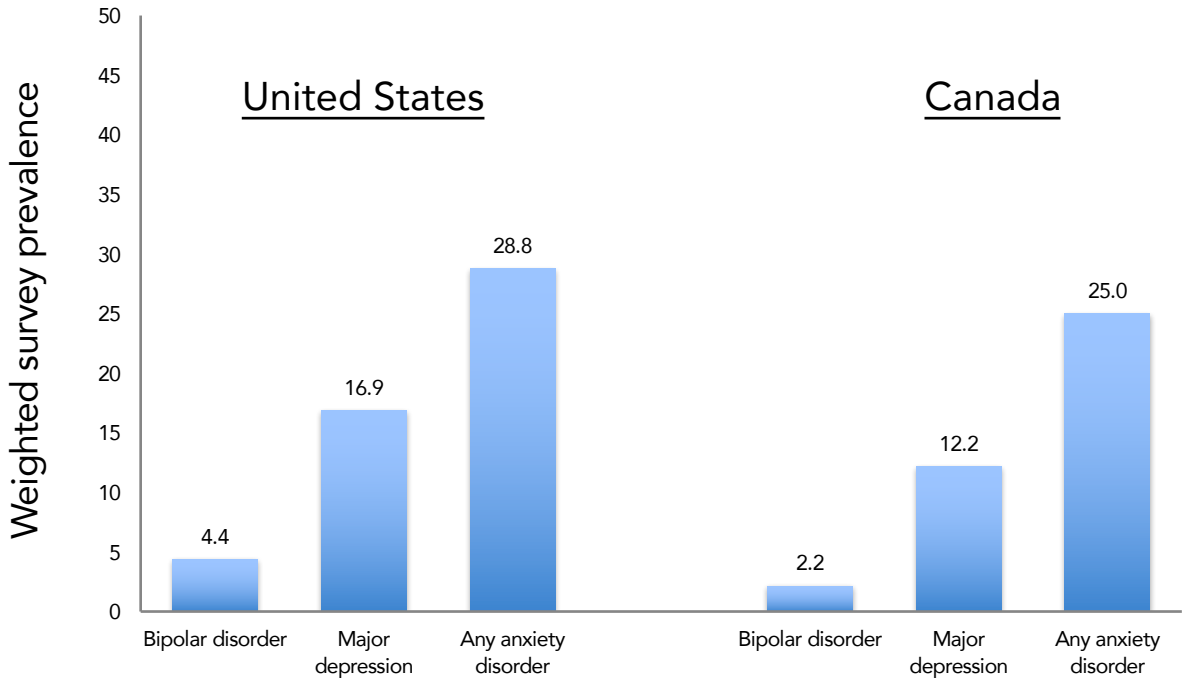


WAPO.ST/**WONKBLOG**

Source: CDC/Garen Wintemute

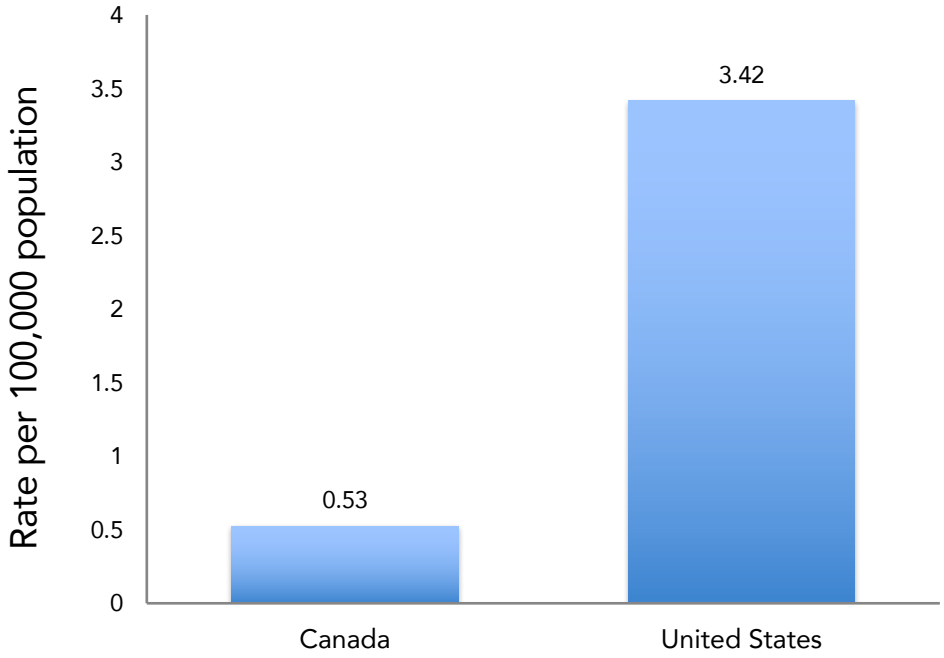
https://www.washingtonpost.com/news/wonk/wp/2015/12/17/guns-are-now-killing-as-many-people-as-cars-in-the-u-s/

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



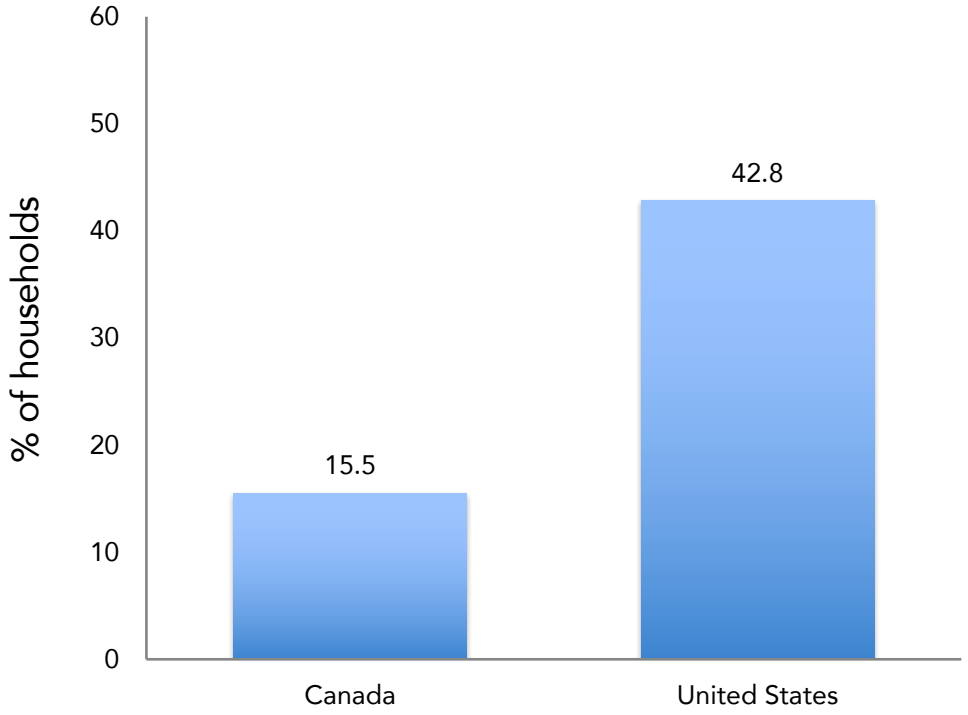
Schaffer A et al. Community survey of bipolar disorder in Canada: lifetime prevalence and illness characteristics. *Can J Psychiatry* 2006; 51(1): 9-16.
Patten SB et al. Descriptive Epidemiology of Major Depression in Canada. *The Canadian Journal of Psychiatry* February 2006.
Kessler RC et al. Lifetime 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.

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.

2

America has 4.4 percent of the world's population, but almost half of the civilian-owned guns around the world

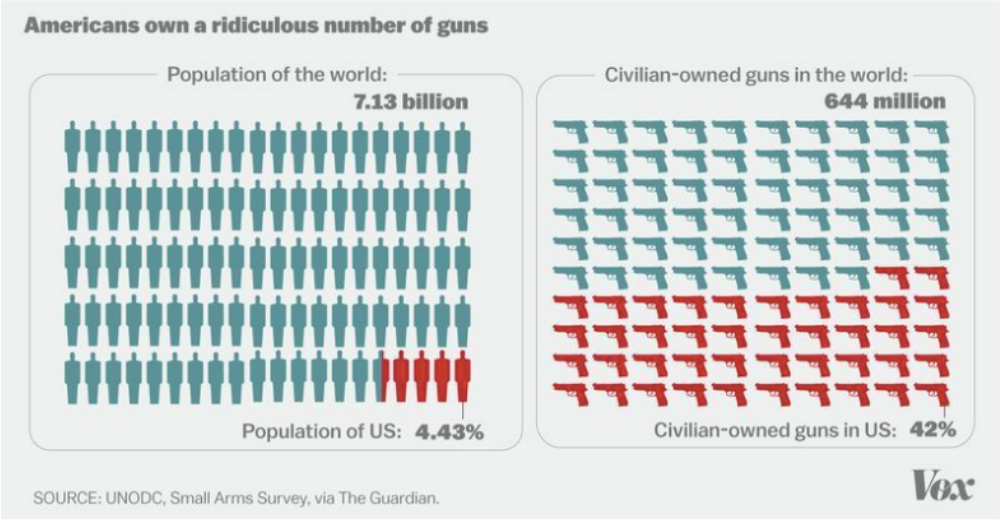


Image credit: Javier Zarracina/Vox

http://www.vox.com/2015/8/24/9183525/gun-violence-statistics

House Approves Modest Funding Boost For Gun Background Checks

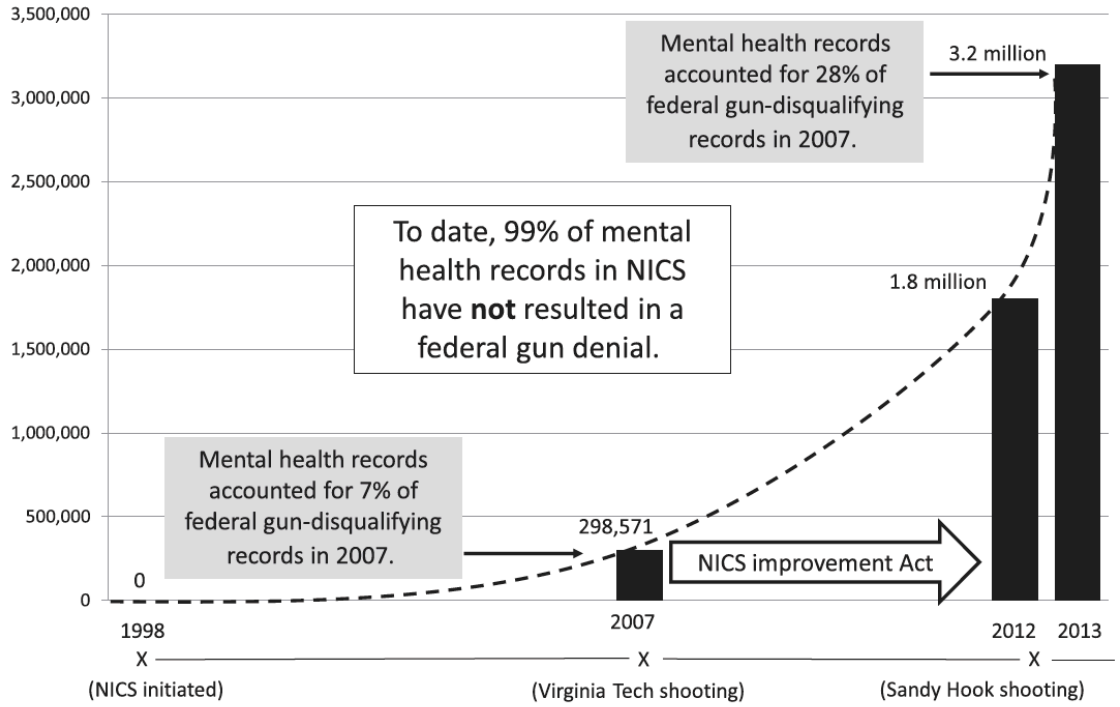
Posted: 05/29/2014 6:48 pm EDT | Updated: 05/29/2014 9:59 pm EDT

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

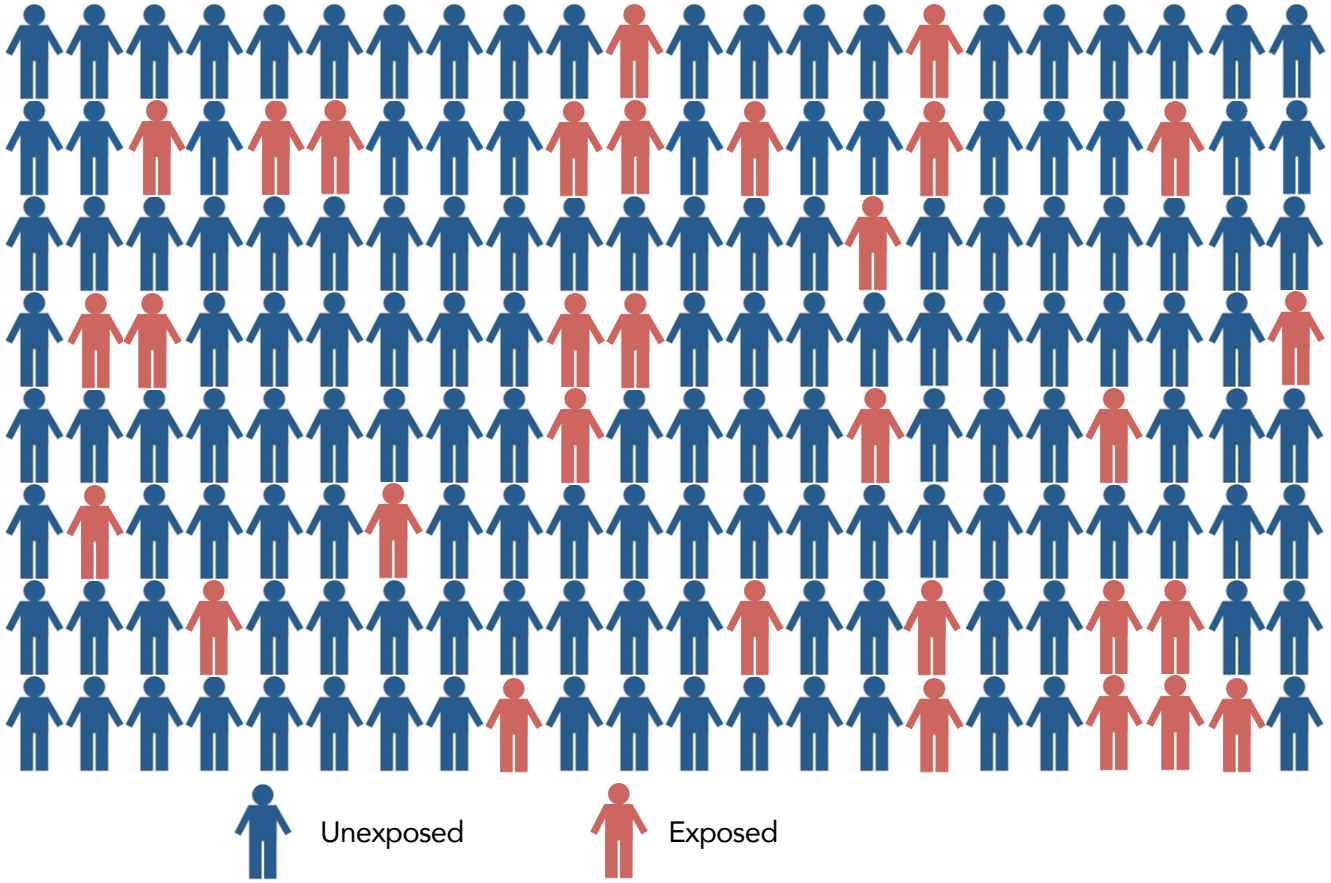
High-profile mass shootings and the accumulation of mental health records in National Instant Check System



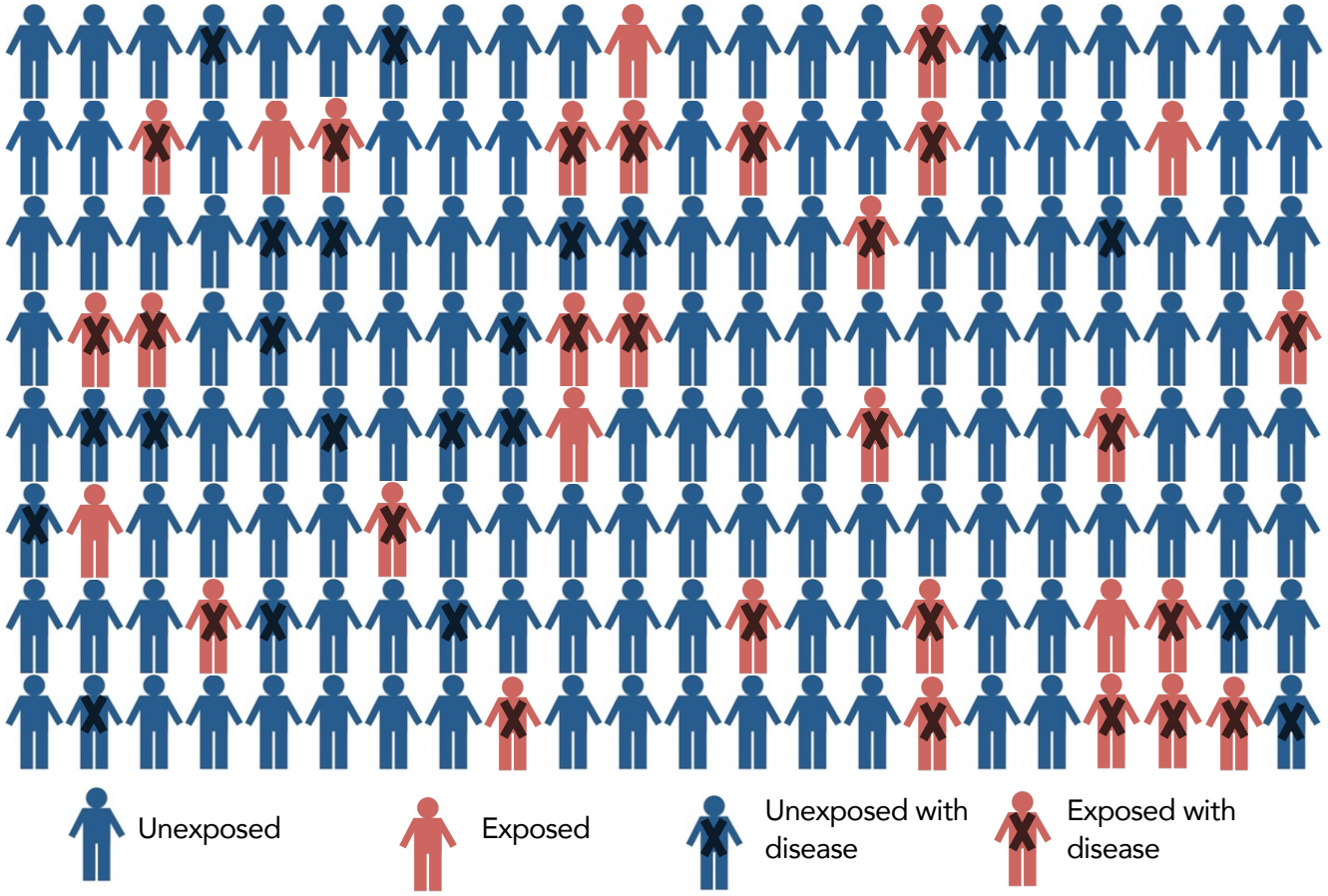
Swanson JW, McGinty EE, Fazel S, Mays VM. Mental illness and reduction of gun violence and suicide: bringing epidemiologic research to policy. *Annals of Epidemiology* 2014.

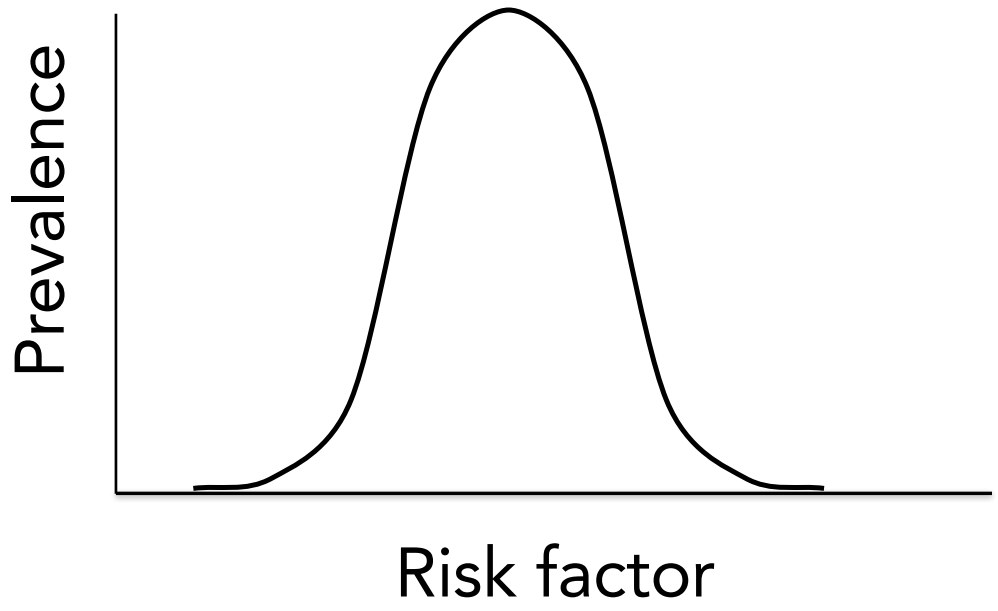
7. Rethinking our overall approach

Some people are ‘exposed’



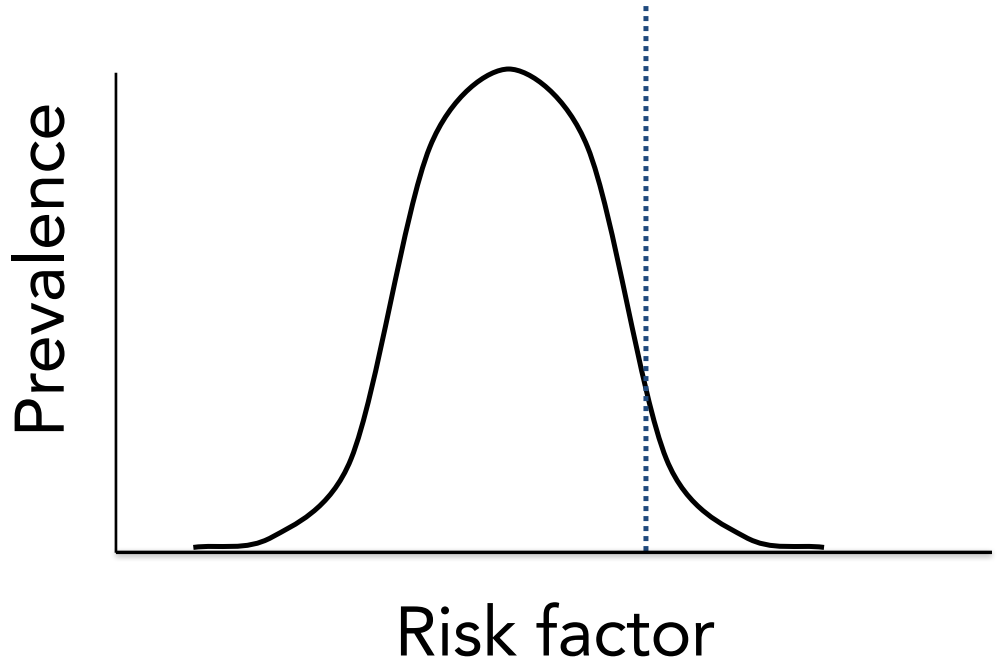
Both exposed and unexposed have disease





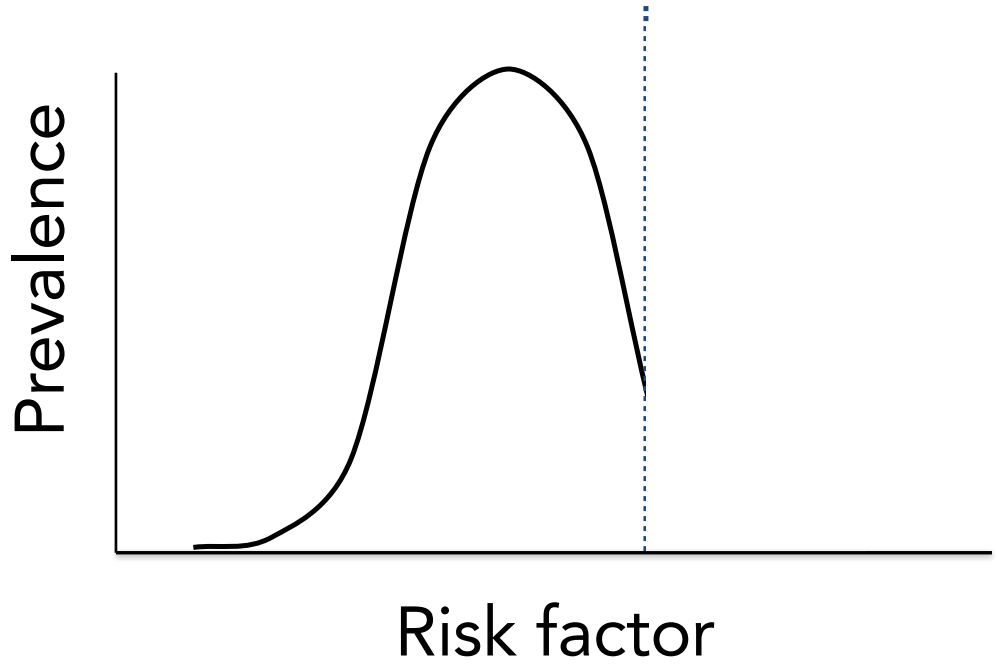
Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

Identify those who are high risk



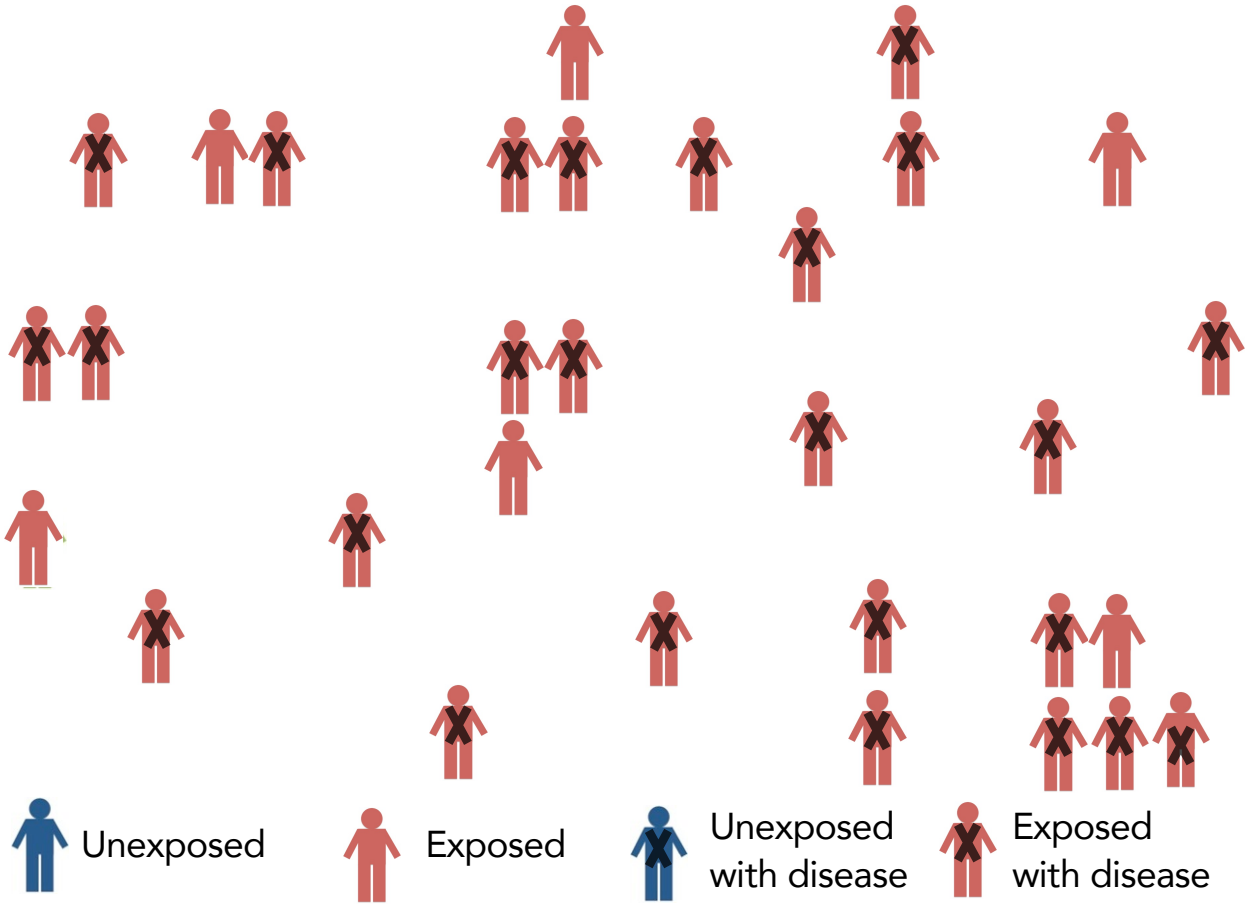
Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

Then decrease their risk

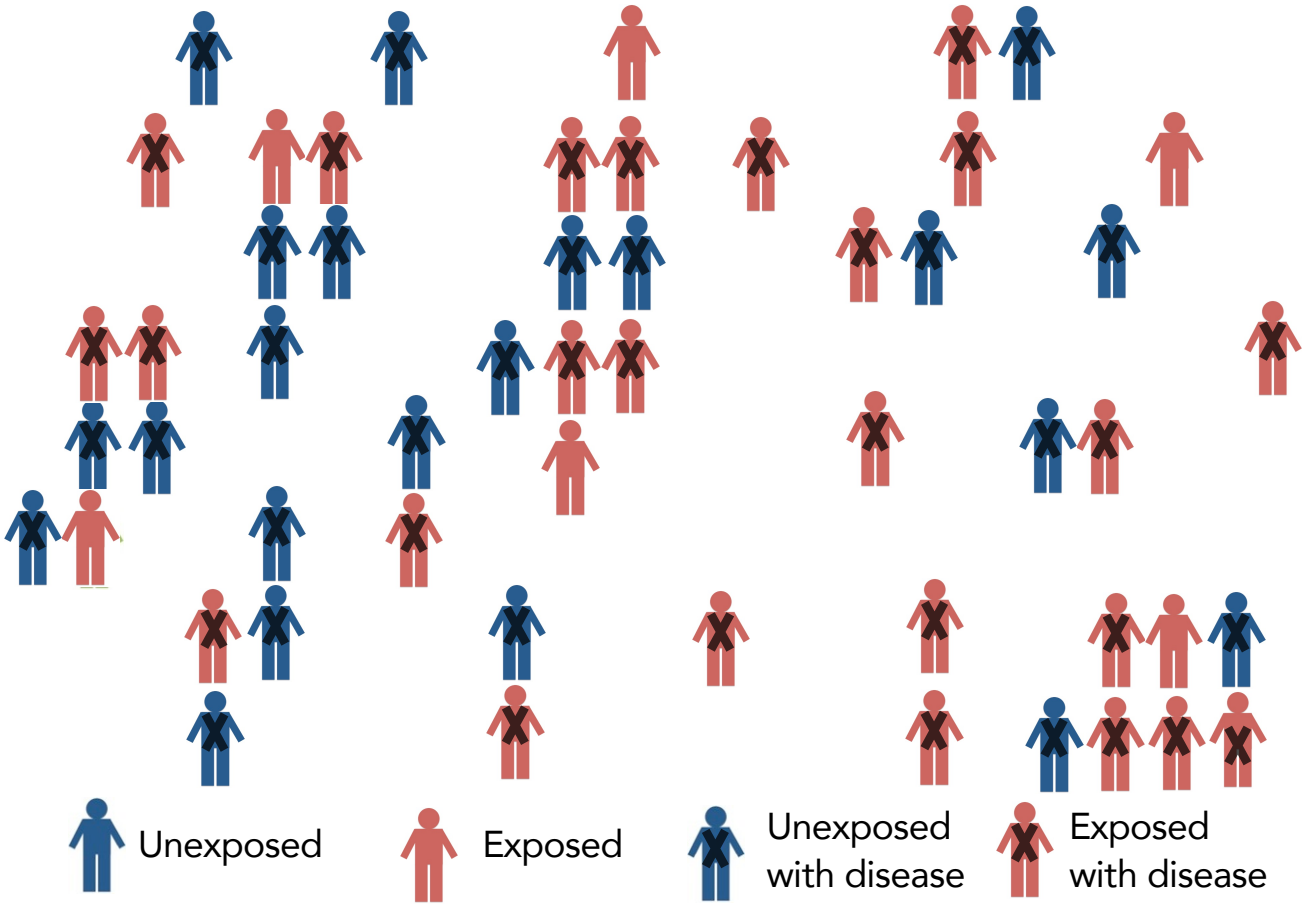


Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

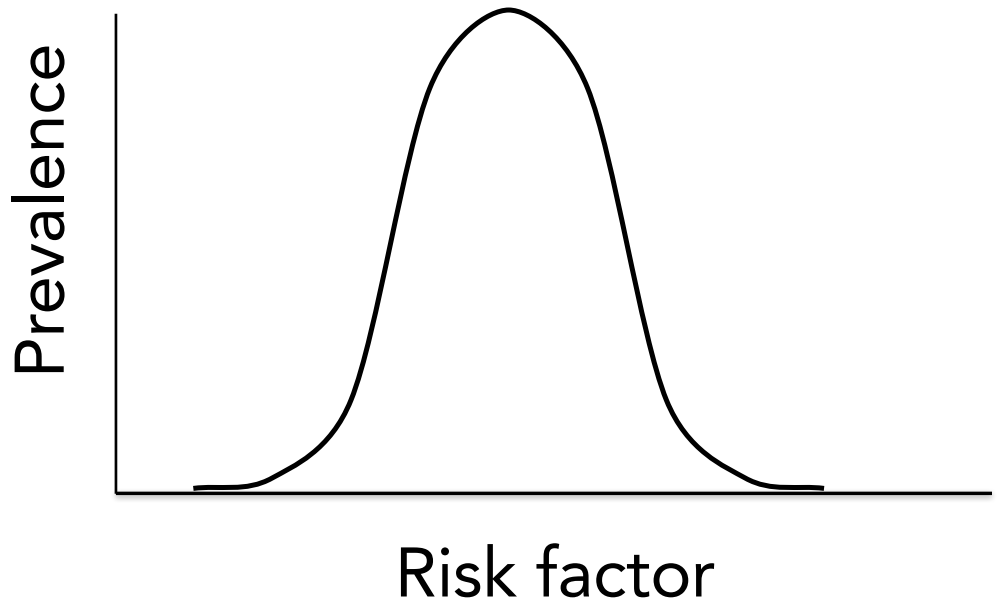
This strategy sees this



But misses all of this

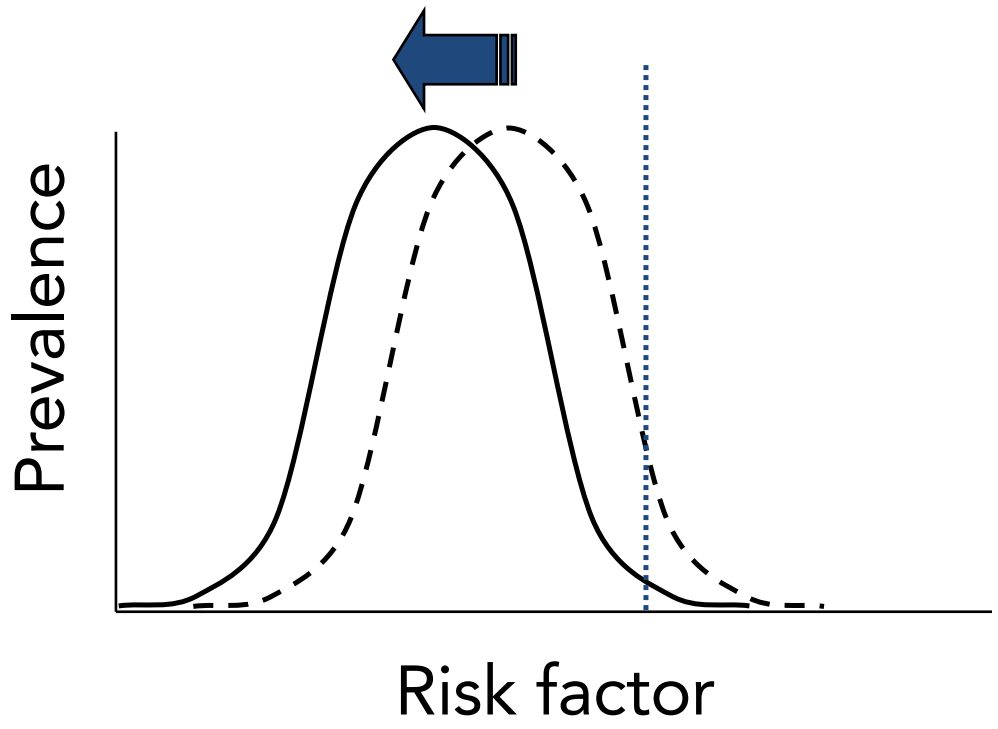


An alternate, population health, strategy



Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

Shifts the entire risk distribution



Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

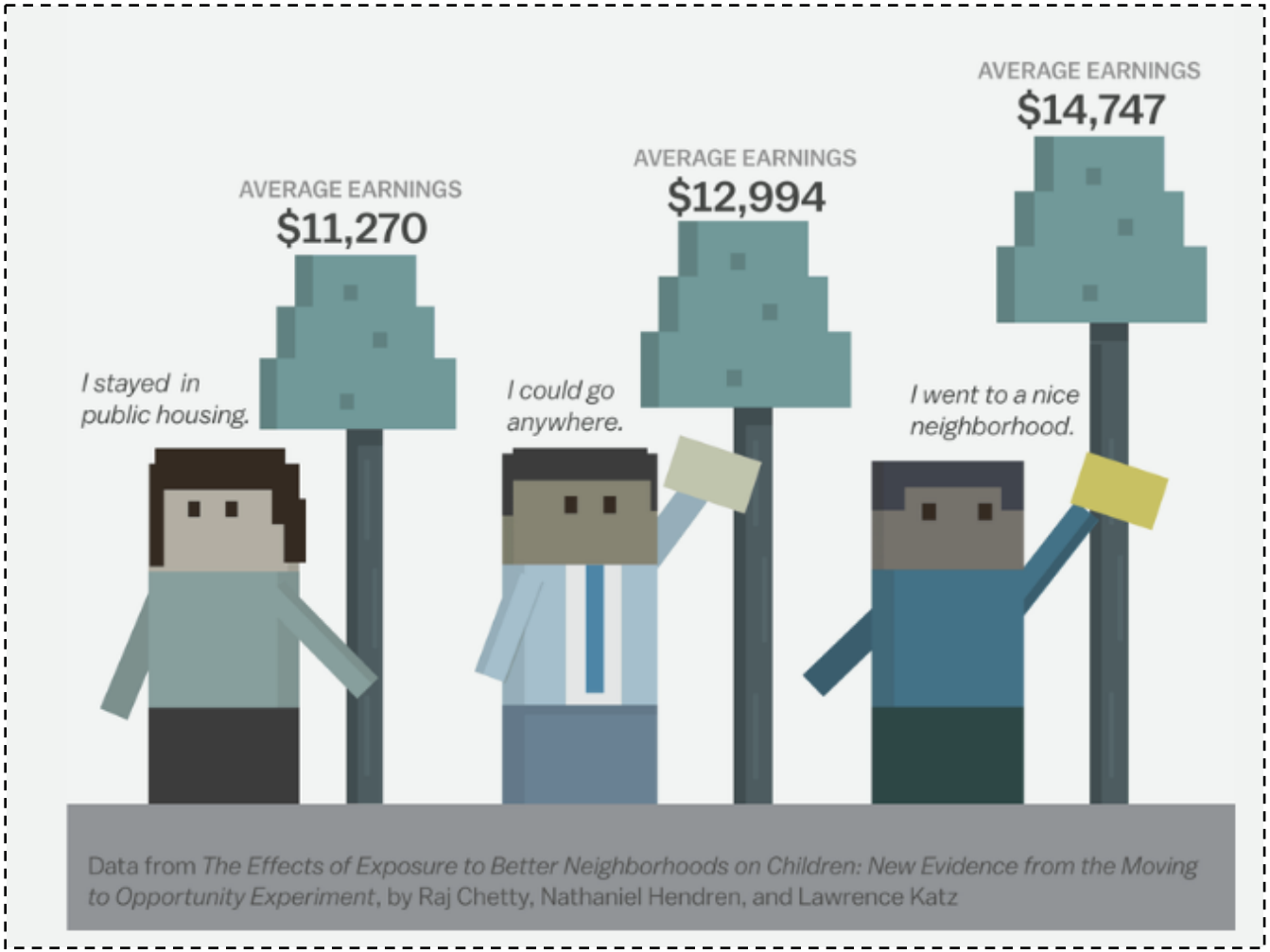
The population health strategy

The population health strategy

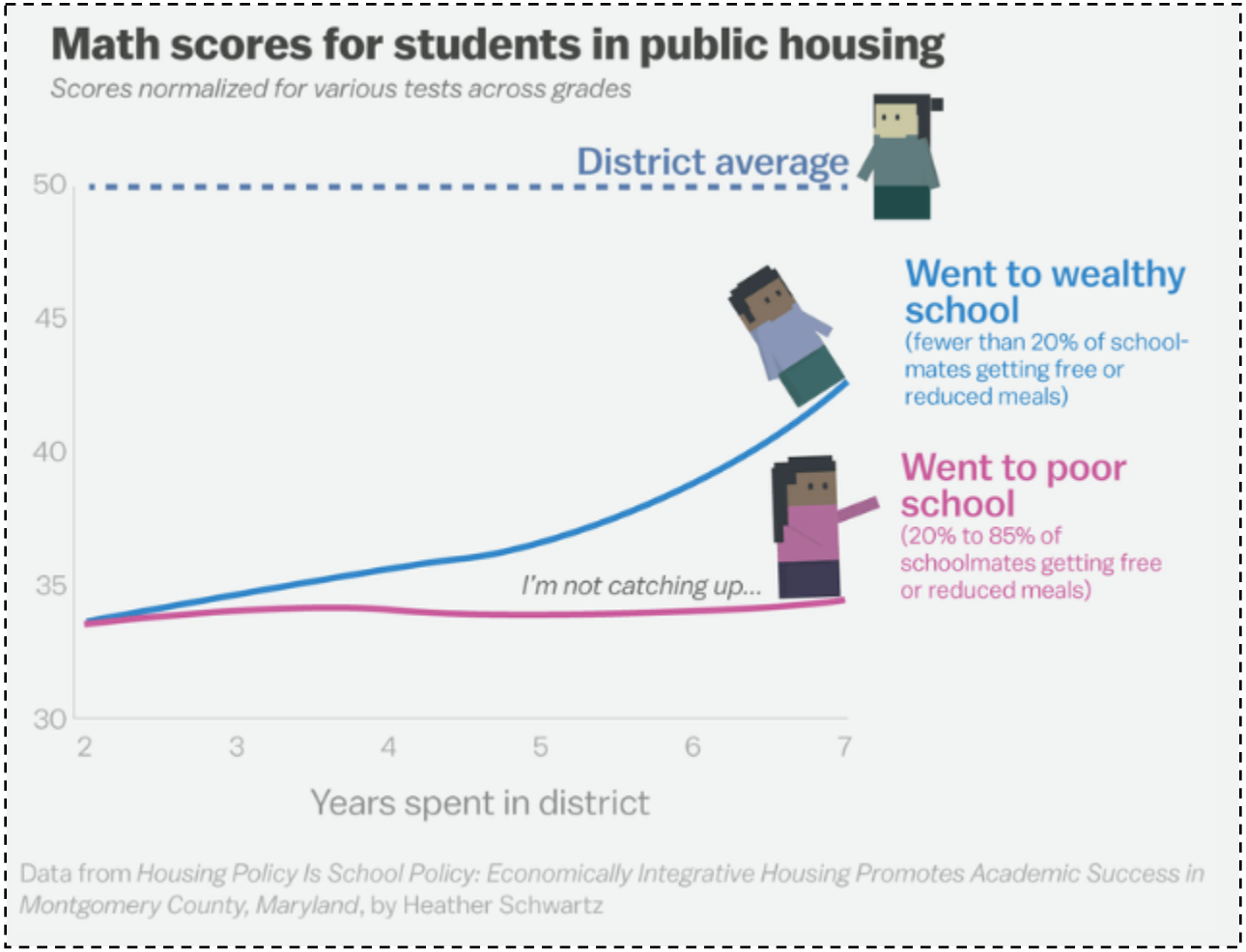
The population health strategy

8. Would that even work?

Yes

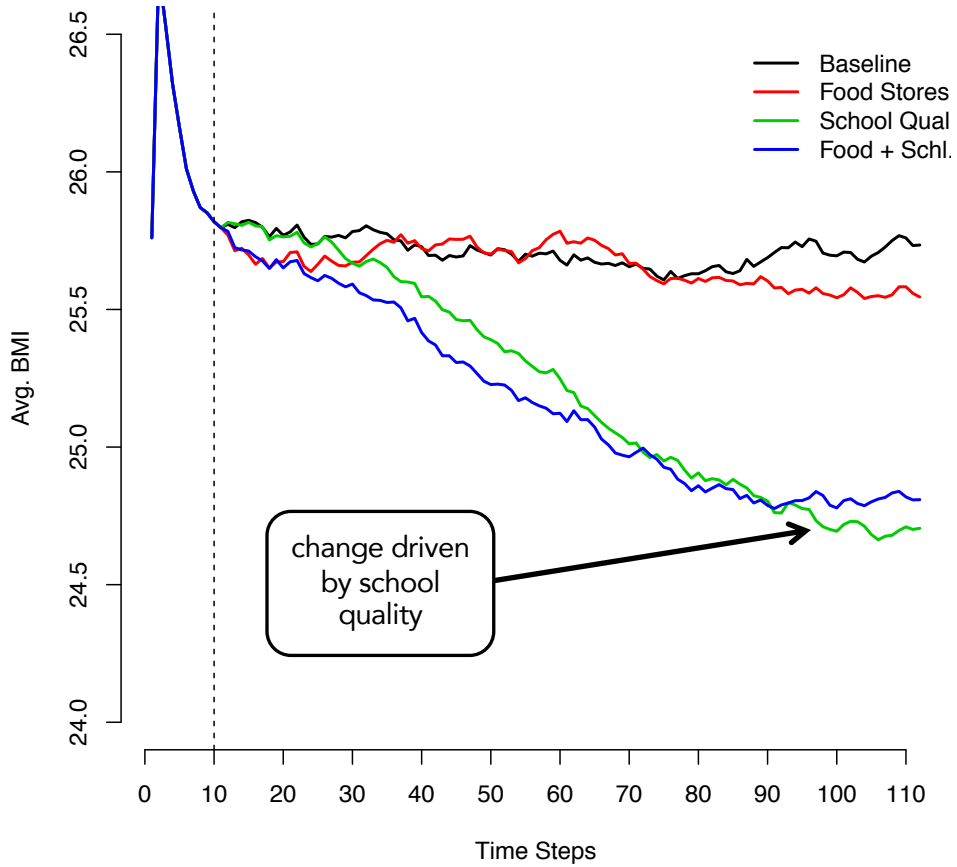


http://www.vox.com/2016/6/6/11852640/cartoon-poor-neighborhoods



http://www.vox.com/2016/6/6/11852640/cartoon-poor-neighborhoods

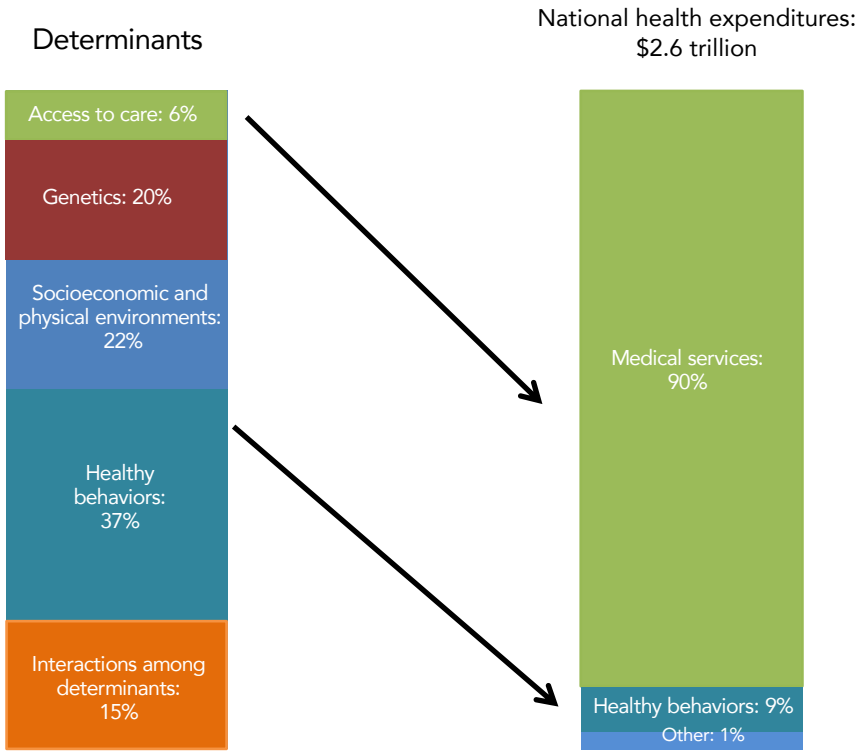
Black Body Mass Index change by policy



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.

9. Looking back, the bigger picture

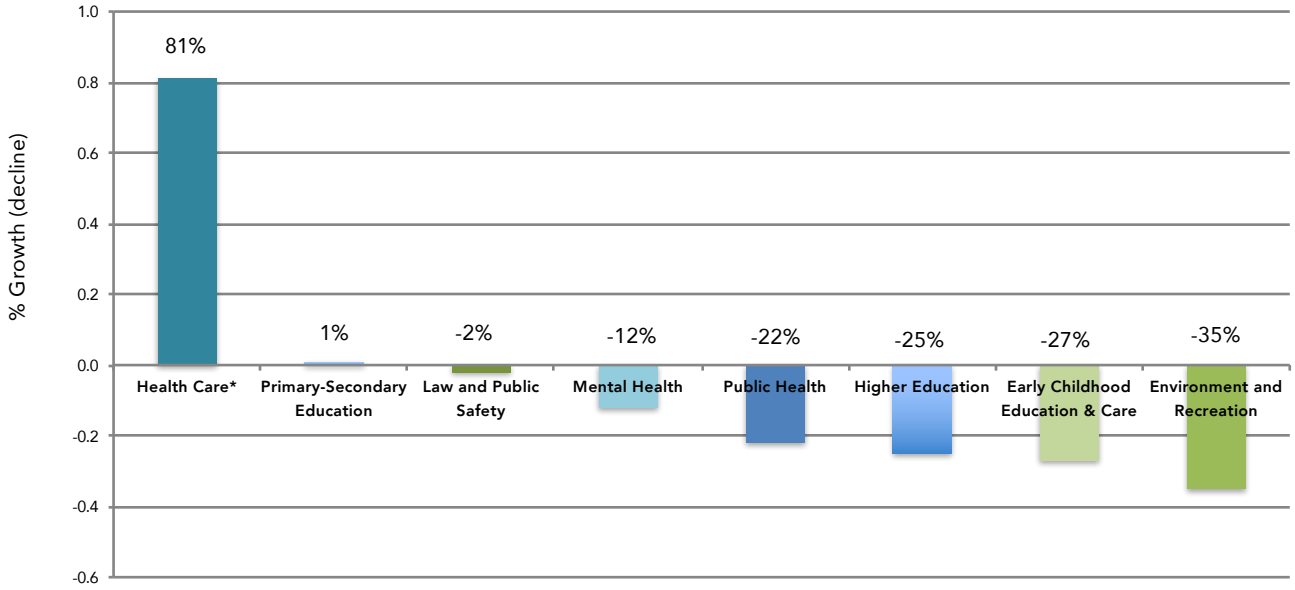
The spending mismatch: Health determinants vs. health expenditures



"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.

Health care spending crowds out investments in key determinants of health: Change in Massachusetts State Government spending, FY01-FY14, adjusted for inflation



* 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>

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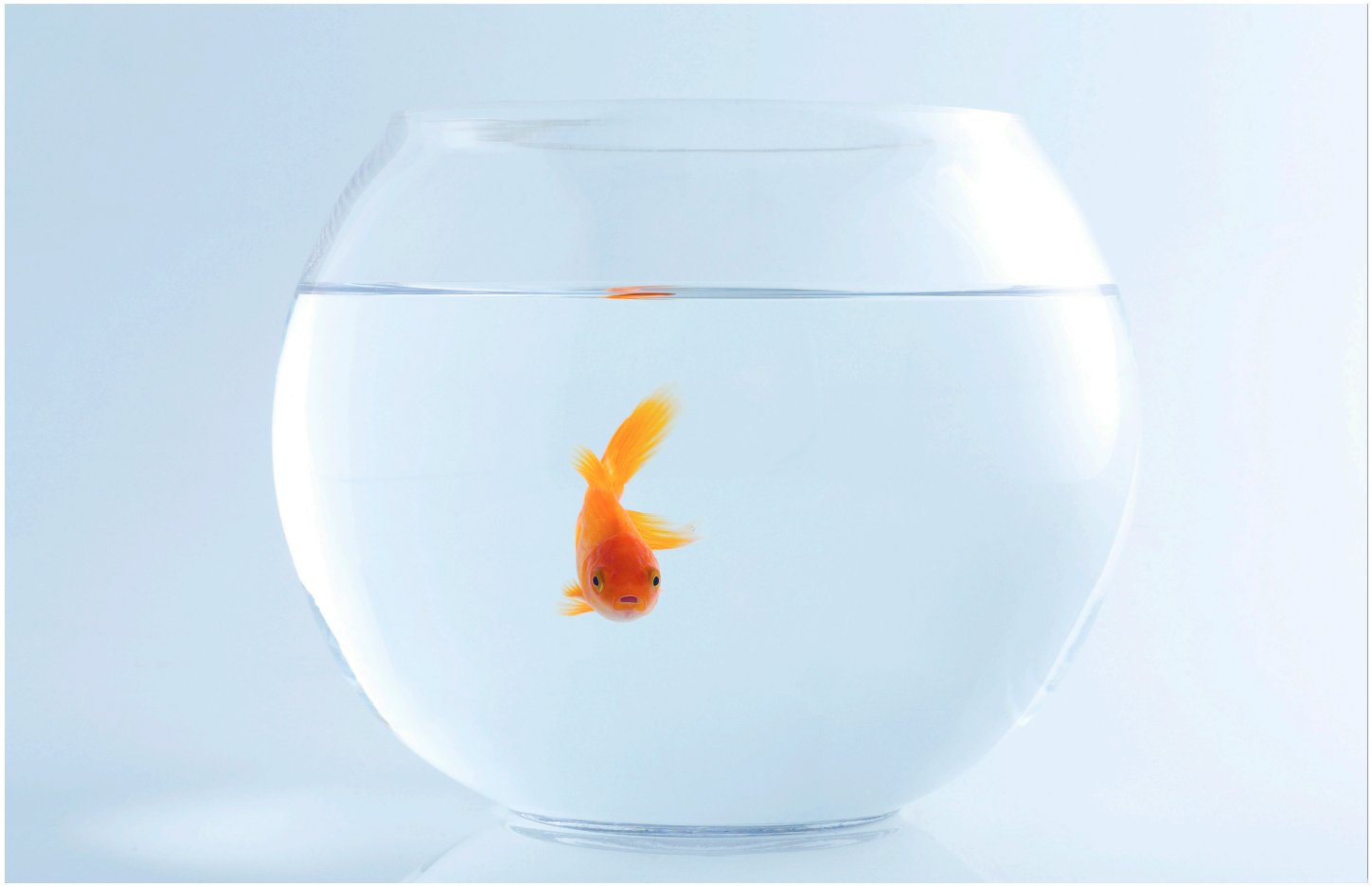

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