

# Behavioural Economics and Insights for Policymaking in an Aging World

Joanne Yoong

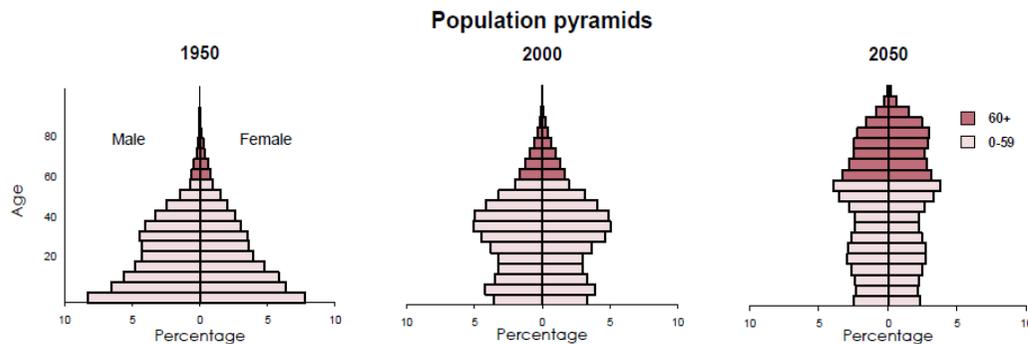
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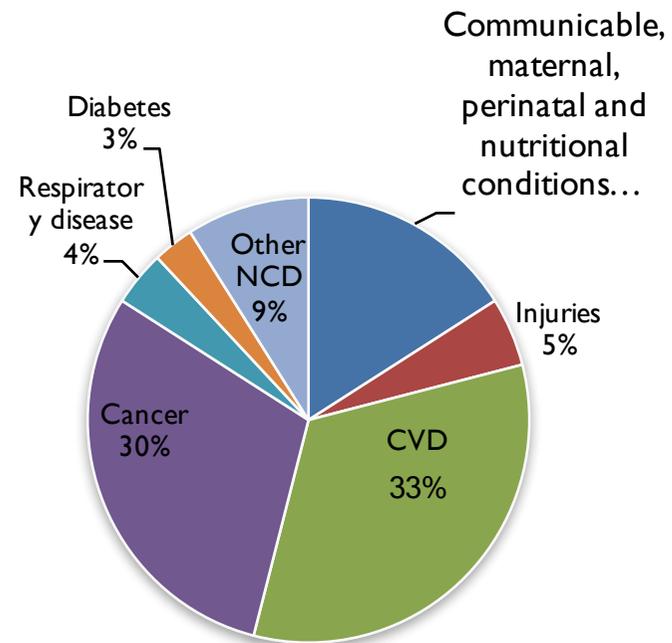
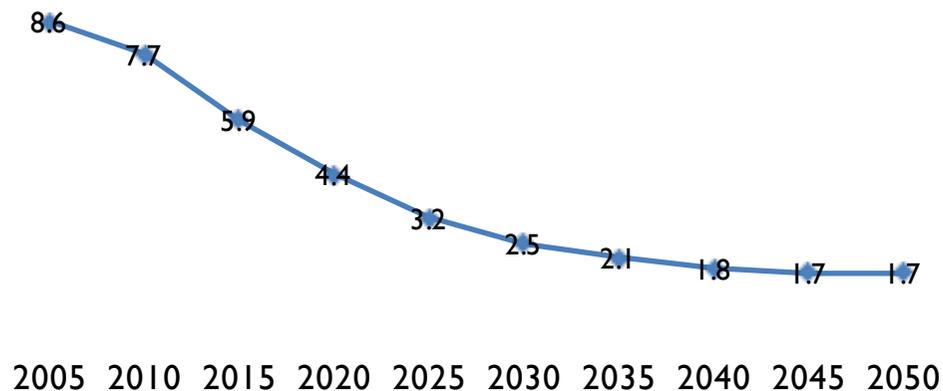
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# What do we know?

We're older, sicker and more self-reliant than ever before

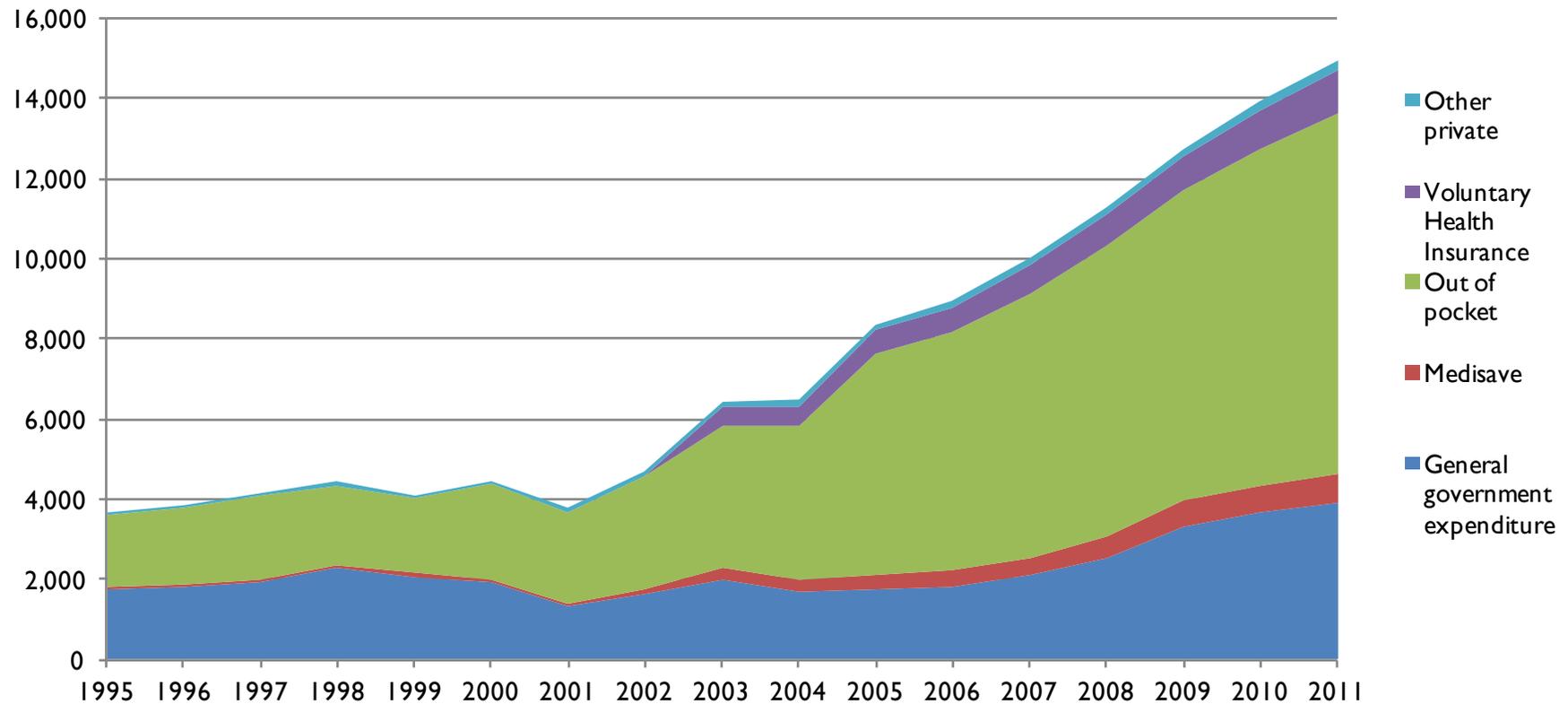


Projected Old Age Support Ratio 2005-2050



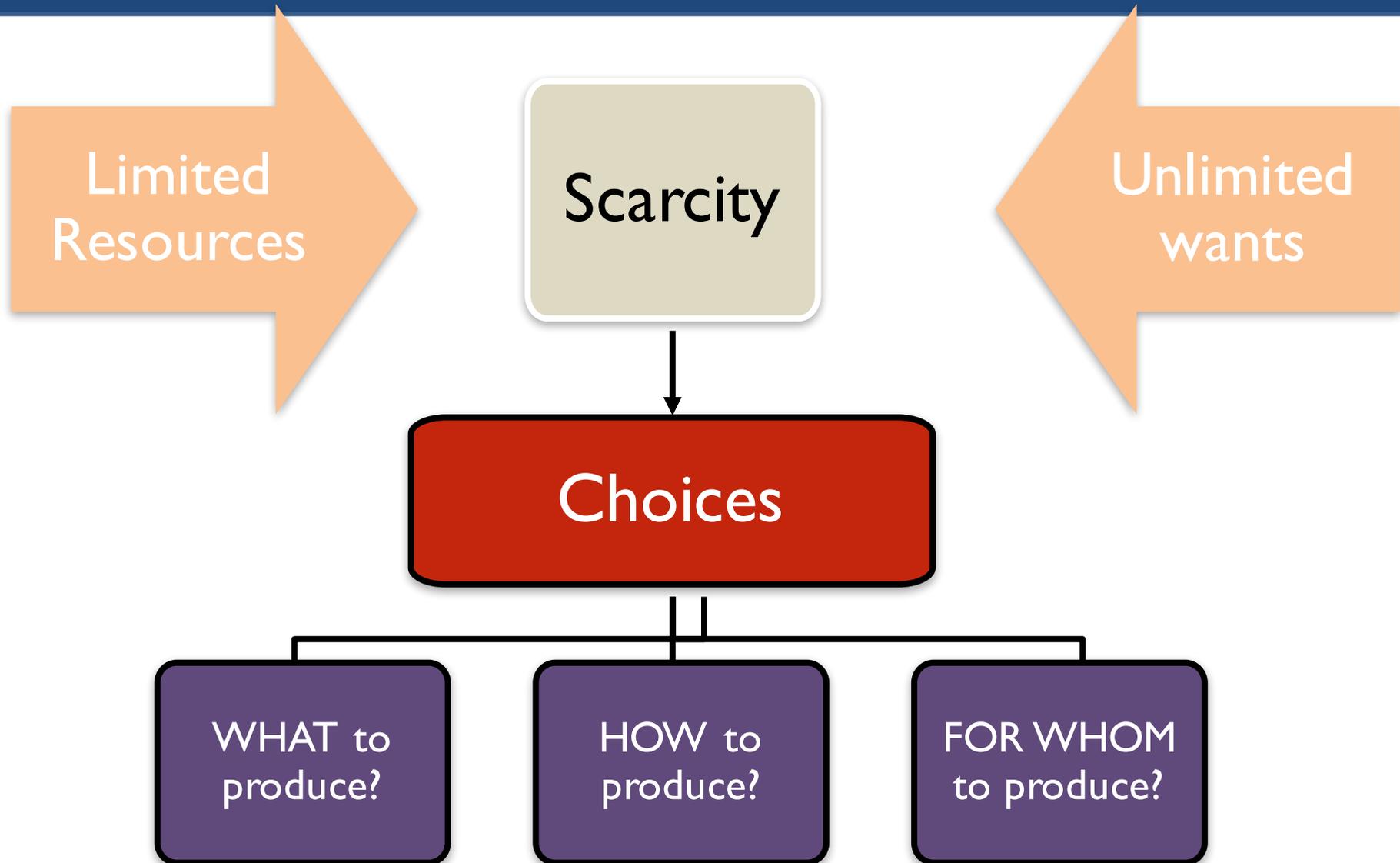
# What do we know?

## We're paying more than ever before



	1995	2000	2005	2006	2007	2008	2009	2010	2011
General government expenditure	47.6%	42.8%	21.3%	20.7%	21.4%	22.5%	26.2%	26.5%	26.2%
Prepaid medical savings accounts (Medisave)	2.0%	2.2%	4.4%	4.7%	3.9%	4.9%	5.0%	4.9%	4.8%
Out of pocket payments	48.9%	52.7%	66.2%	66.5%	66.1%	64.3%	60.8%	60.2%	60.4%
Voluntary health insurance	0.0%	0.0%	6.5%	6.5%	6.9%	6.7%	6.5%	6.9%	7.1%
Other financing	1.6%	2.3%	1.7%	1.7%	1.7%	1.6%	1.4%	1.5%	1.5%

# Economics is the Science of Scarcit



# The traditional setup ...

We are interested in the behavior a consumer whose goal in period  $t$  is to maximize discounted utility from consumption over the remainder of a lifetime that ends in period  $T$ :

$$\max \mathbb{E}_t \left[ \sum_{n=0}^{T-t} \beta^n u(\mathbf{c}_{t+n}) \right],$$

and whose circumstances evolve according to the transition equations<sup>3</sup>

$$\mathbf{a}_t = \mathbf{m}_t - \mathbf{c}_t \quad (2)$$

$$\mathbf{b}_{t+1} = \mathbf{a}_t R_{t+1} \quad (3)$$

$$\mathbf{y}_{t+1} = \mathbf{p}_{t+1} \theta_{t+1} \quad (4)$$

$$\mathbf{m}_{t+1} = \mathbf{b}_{t+1} + \mathbf{y}_{t+1} \quad (5)$$

where

$\beta$  – pure time discount factor

$\mathbf{a}_t$  – assets after all actions have been accomplished in period  $t$

$\mathbf{b}_{t+1}$  – ‘bank balances’ (nonhuman wealth) at the beginning of  $t + 1$

$\mathbf{c}_t$  – consumption in period  $t$

$\mathbf{m}_t$  – ‘market resources’ available for consumption (‘cash-on-hand’)

$\mathbf{p}_{t+1}$  – ‘permanent labor income’ in period  $t + 1$

$R_{t+1}$  – interest factor ( $1 + r_{t+1}$ ) from period  $t$  to  $t + 1$

$\mathbf{y}_{t+1}$  – noncapital income in period  $t + 1$ .

# The rational decisionmaker

I hold individual preferences that are self-interested, consistent, stable

I form beliefs that are rationalizable and based on all available information

My decision process is to maximize my well-being based on perceived constraints

My choices reflect the best-possible course of action to ensure my own well-being



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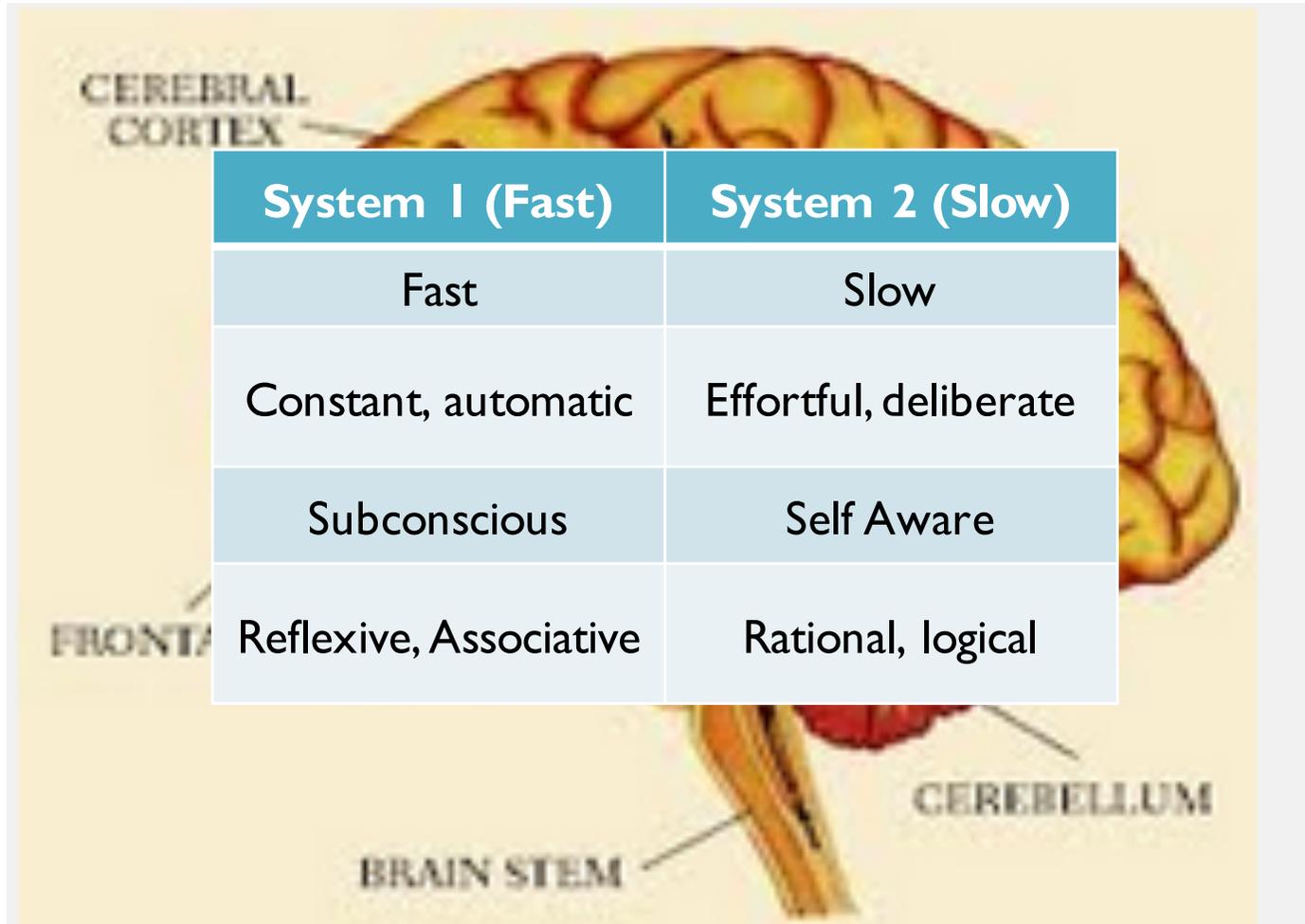


# What Is “Behavioral” Economics?

Behavioral economists contend that people deviate from these standard assumptions in ways that are (i) **systematic** and (ii) **significant for economic modeling**

- *Can be measured and modeled using insights from psychology, cognitive science and biology*
- *Have strong and testable implications for choice*

# The actual decisionmaker



# Unfortunately Not Fake News...

## Heart Attack Survivors Often Fail to Take Statins

By NICHOLAS BAKALAR APRIL 24, 2017



People who survive a heart attack are urged to take statin drugs to prevent recurrent disease, but most patients in a large study either took less of the cholesterol-lowering medicines than needed or stopped taking them entirely within two years.

The [study, in JAMA Cardiology](#), analyzed data on 29,932 Medicare patients ages 66 to 75 who had been hospitalized for a heart attack from 2007 through 2012 and had filled a

prescription for either Lipitor or Crestor.

At six months after their discharge from the hospital, 58.9 percent of them were still taking the medicine with high adherence rates. By two years, only 41.6 percent were taking it as directed; many were taking lower dosages than prescribed, and nearly one in five had stopped

# And also unfortunately...

“Drugs don’t work in patients who don’t take them.”

— —C. Everett Koop, MD

# Policy in a Rational World

Households choose what to consume subject to their budget, given what goods and services firms produce

Firms choose what to produce and how to produce it, given what consumers demand

Maximum Utility

Maximum Profit

Governments intervene to correct market failures i.e. socially suboptimal outcomes

Externalities

Public goods

Natural monopolies

Information asymmetry

# Policy in a BE World

Households choose what to consume subject to their budget, given what goods and services firms produce

Firms choose what to produce and how to produce it, given what consumers demand, **exploiting biases**

Suboptimal Utility

Maximum Profit

Governments intervene to correct market failures i.e. socially suboptimal outcomes as well as support individual welfare

Internalities

Externalities

Public goods

Natural monopolies

Information asymmetry

# For example, financial regulation

I hold individual risk and time preferences that are consistent, stable and self-interested

I form rational beliefs about my investment choices and the market based on all the information I have

Optimal portfolio conditionally maximizes my private utility (subject to budget)

The regulator intervenes to ensure market efficiency and correct market failures

Investor education

Investor protection

Disclosure

Systemic risk management

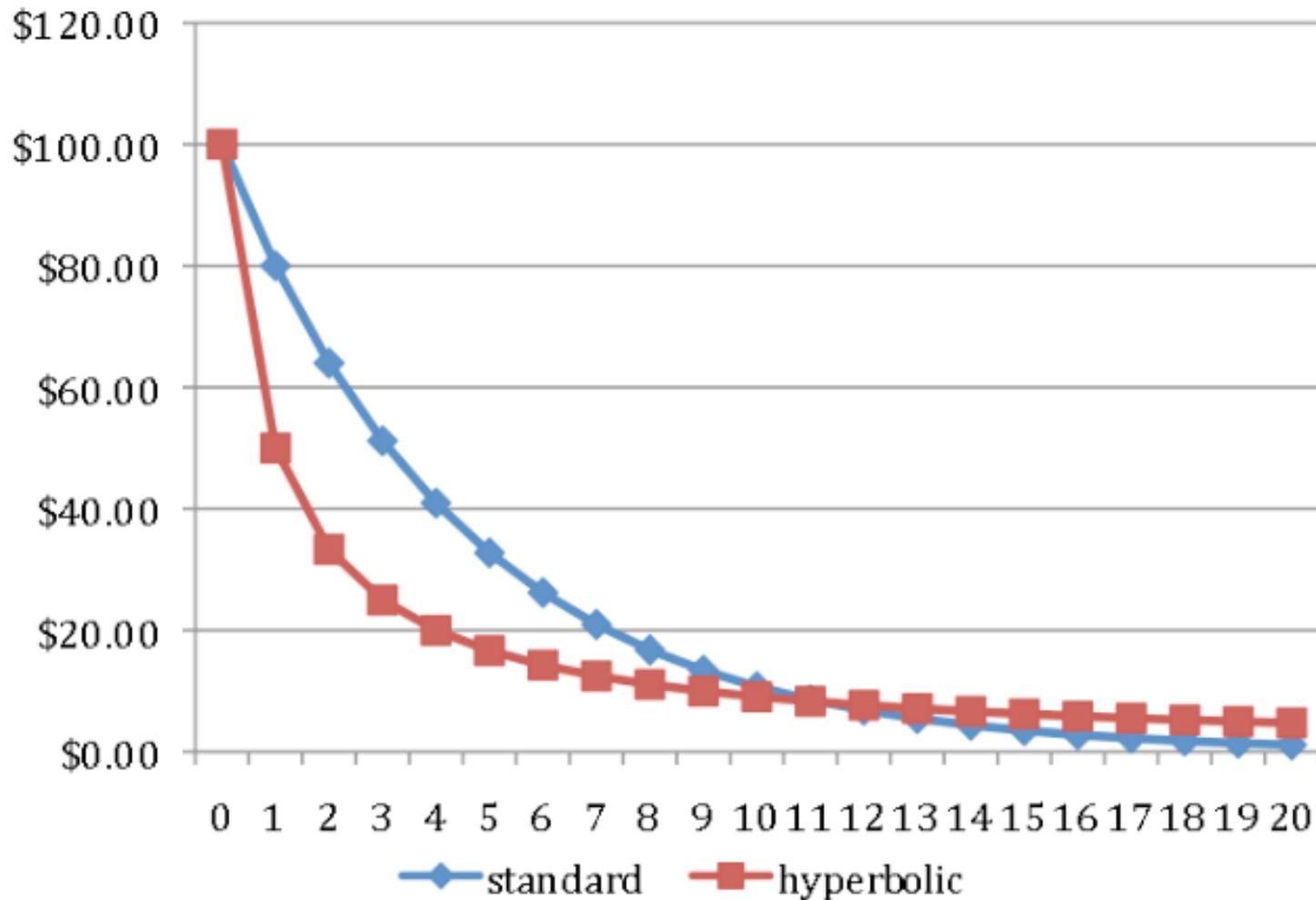
Equity and fairness

# For example, financial regulation

E.g., CFPB mandate defines “abusive” practices as ones that among other things “take unreasonable advantage of...*the inability of the consumer to protect the interests of the consumer* in selecting or using a consumer financial product or service...”

# Five Bad Assumptions

We act in our own long-term best interests



# Five Bad Assumptions

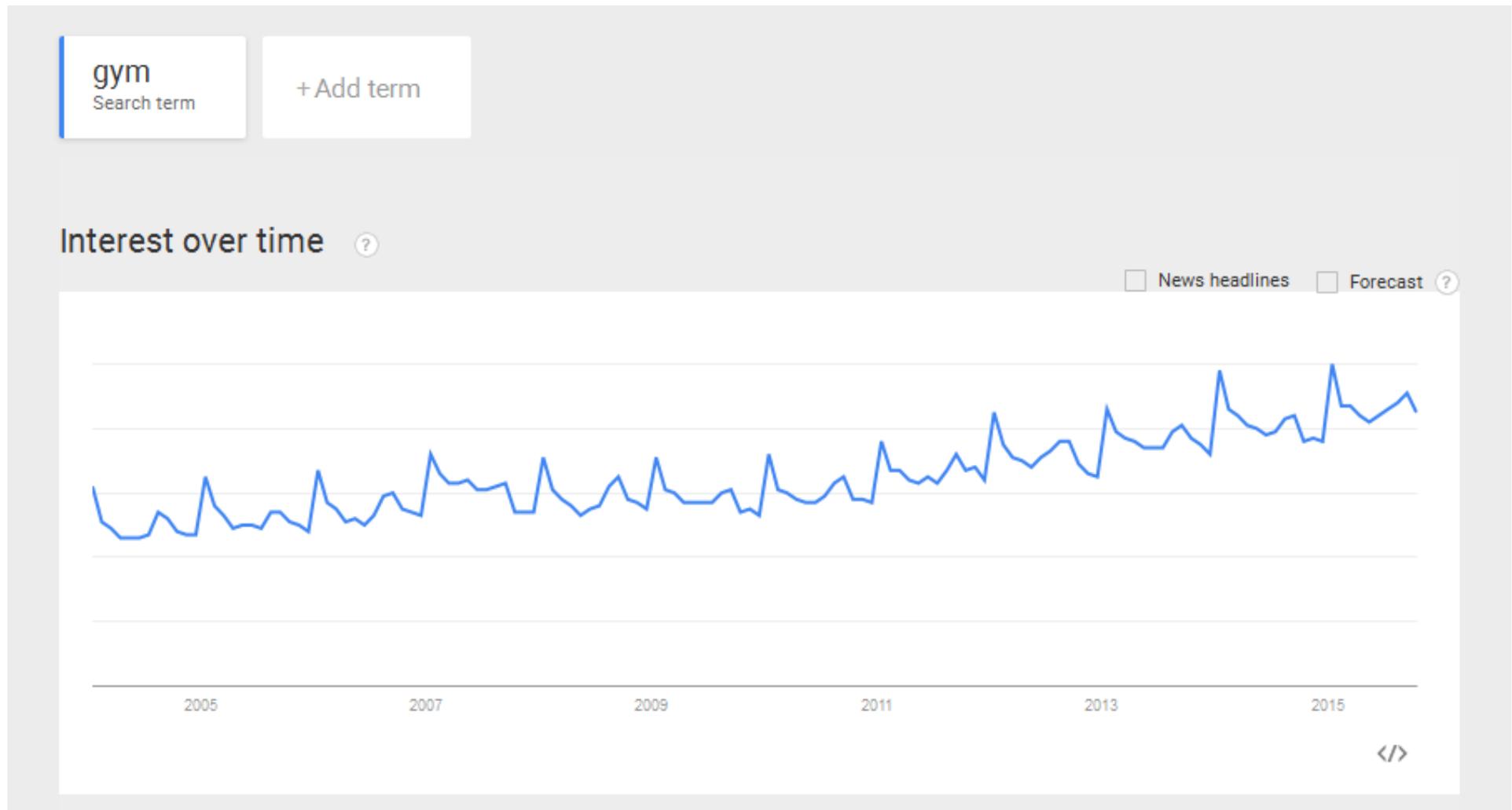
We act in our own long-term best interests



- Would you rather have fruit or chocolate in 2 weeks?
- Would you rather have fruit or chocolate right now?

# Five Bad Assumptions

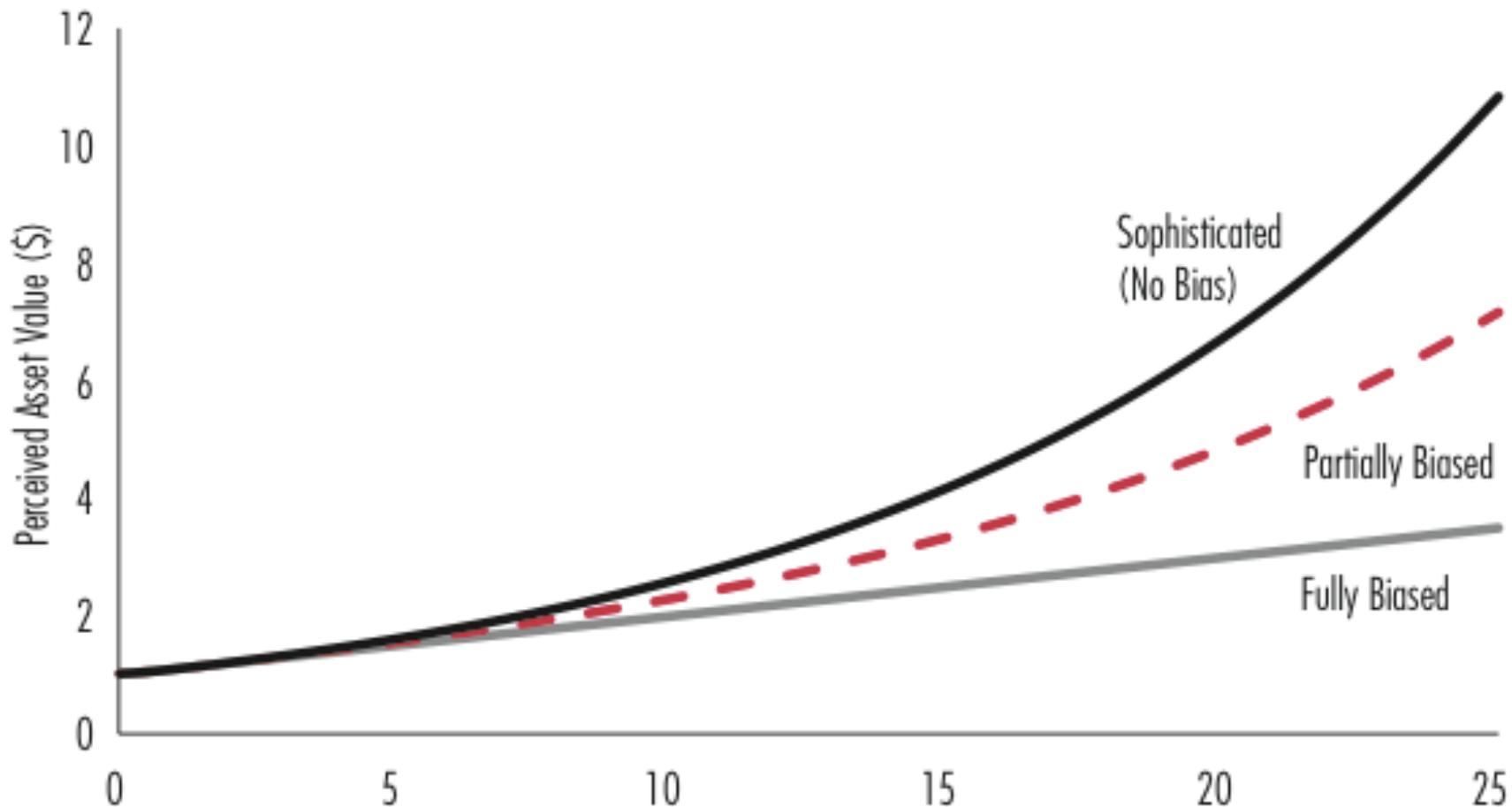
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# Five Bad Assumptions

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## Stylized Perceived Savings Trajectories for Savers with Varying Levels of Linearized Exponential Growth Bias



# Five Bad Assumptions

We act in our own long-term best interests



# Five Bad Assumptions

We have the right beliefs about ourselves

## Obesity: parents unable to recognise if child is overweight

A third of parents underestimate their child's BMI, sparking fears many do not understand the risks associated with being overweight



Parents with obese children may not be able to recognise that their child is overweight unless they are at very extreme levels of obesity, research finds. Photograph: Gareth Fuller/PA

# Five Bad Assumptions

## We have the right beliefs about the world

EUROPE

### *In Europe, Fear of Ebola Exceeds the Actual Risks*

By ANDREW HIGGINS OCT. 17, 2014

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BRUSSELS — After more than a decade working as a charity director setting up schools in West Africa, Miriam Mason-Sesay got an unpleasant surprise recently when she returned to Britain and could not find a school willing to teach her own 9-year-old son.

On previous trips home, Ms. Mason-Sesay said, her son, Kofi, had always enrolled for short periods at a primary school near Manchester, in northern England, but this year the school refused to take him because the parents of other pupils were frightened: They did not want their children sharing classes with a boy who had spent time in Sierra Leone, one of the three countries hardest hit by the [Ebola](#) epidemic.

Across Europe, as in the United States, a virus that, outside Africa, has infected only a handful



Workers at the Carlos III Hospital in Madrid, Spain, wearing protective gear while working with a patient for Ebola testing. Gonzalo Arroyo

By CARTER EVANS / CBS NEWS / October 18, 2014, 10:23 PM

## Ebola panic spreading much faster than disease in U.S.

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The threat of **Ebola** is generating a considerable amount of fear and misinformation across the country, not to mention a growing number of false alarms.

Fears about Ebola have reached a fever pitch in recent days. Hazmat crews boarded a plane in Boston. Traffic was halted near the Pentagon when a woman fell ill on a bus. And at Cleveland's airport -- several days after infected nurse Amber Vinson had passed through -- passenger Tamika Freeman was still worried.

"It was a huge scare," said Freeman. "You know, I'm pregnant. A lot of people touch each other."

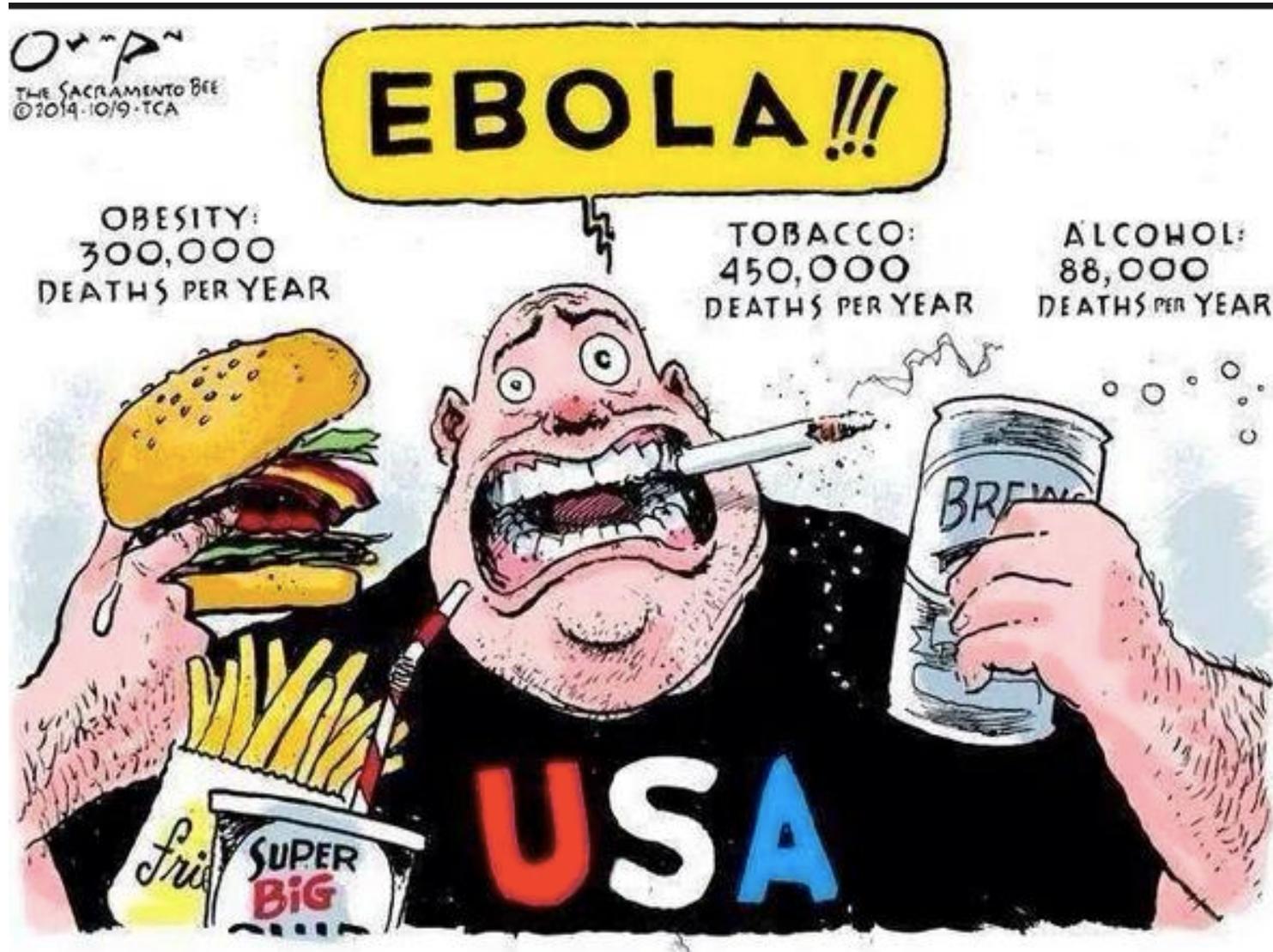
Vinson was in Ohio to plan for her wedding. Now the bridal shop she visited is temporarily closed, the workers on voluntary quarantine.

Public health professor Andrew Noymer studies infectious diseases at University of California, Irvine. He says people do not need to be afraid of Ebola in the U.S.

"I would say the panic is harder to contain than the spread of the disease itself," he said. "People are focusing on that it's a scary disease from far away, and they see scary images of people caring for sick people with protective gear, and it looks frightening."

# Five Bad Assumptions

We have the right beliefs about the world



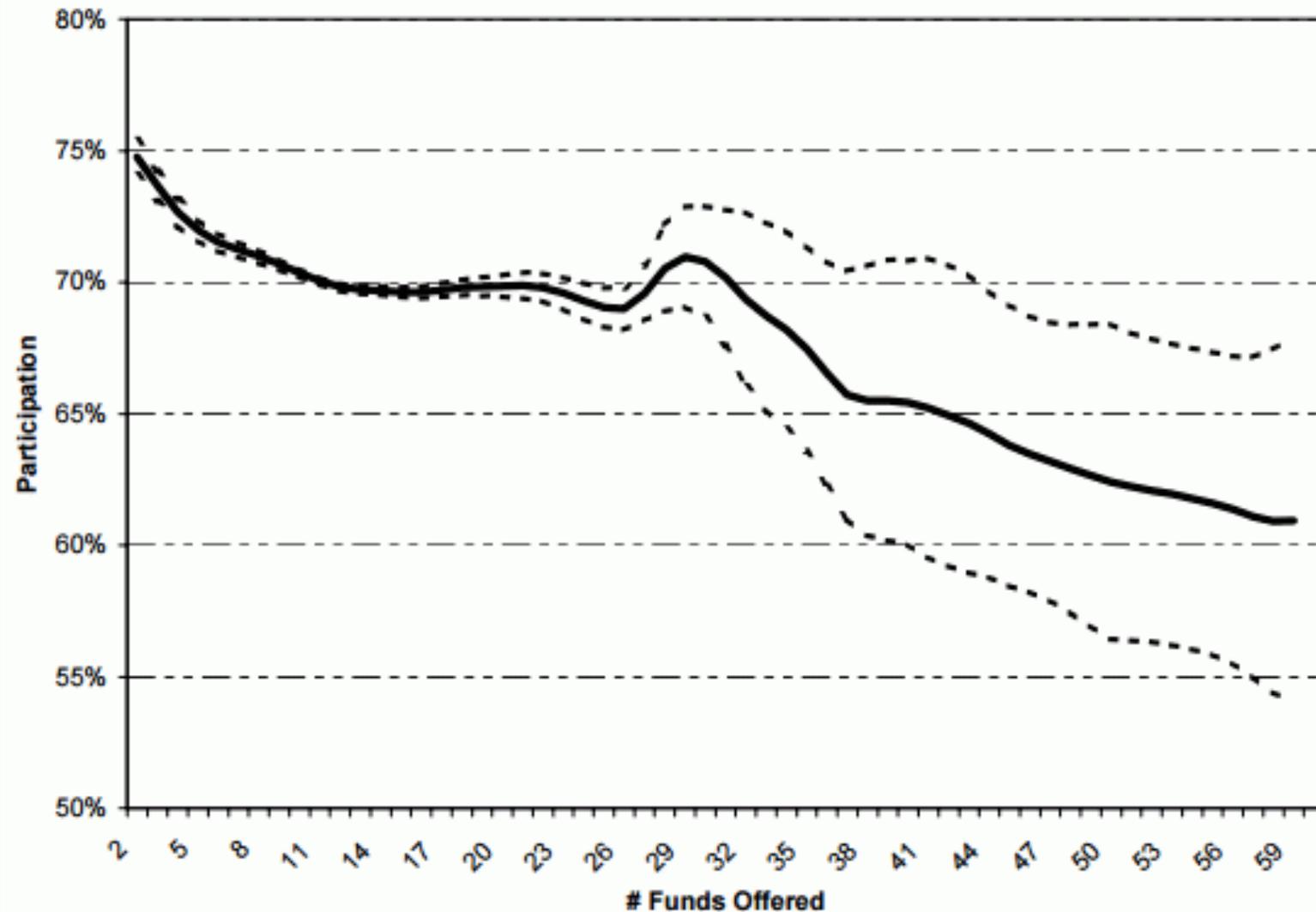
# Five Bad Assumptions

We are always at our decision-making best



# Five Bad Assumptions

We are always at our decision-making best



# Five Bad Assumptions

We are always at our decision-making best

Memorize this number: 7240356



# Five Bad Assumptions

We are always at our decision-making best

Emotion leads to myopic choices



# Five Bad Assumptions

Interventions that “should” work ... will work



User experience

Design

# Five Bad Assumptions

## Interventions that “should” work ... will work

### Vaccine Myth-Busting Can Backfire

For people who mistrust vaccination, learning the facts may make the problem worse.

CARI ROMM | DEC 12 2014, 10:39 AM ET



Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information

Brendan Nyhan<sup>1</sup>, Jason Reifler<sup>2</sup>

[Show more](#)

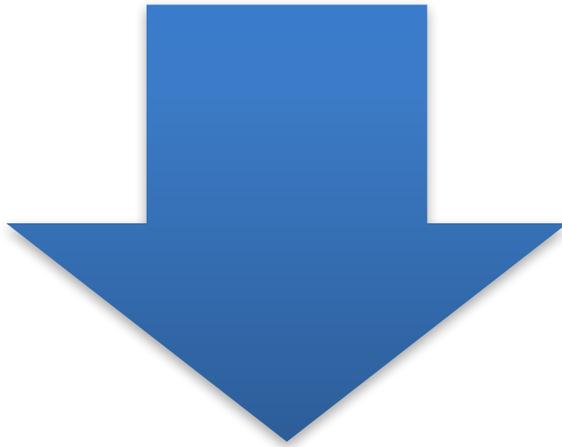
doi:10.1016/j.vaccine.2014.11.017



In Green/Shutterstock

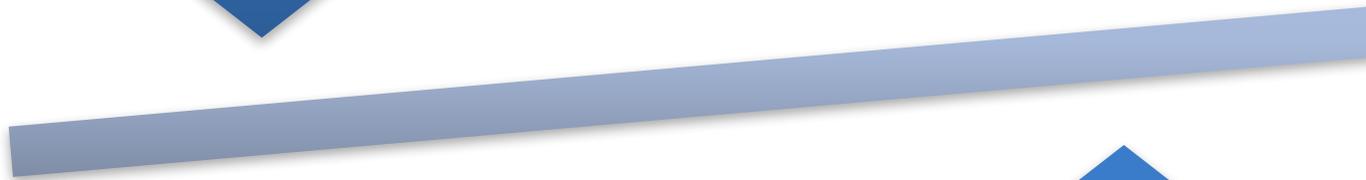
# What do we know about aging?

Young adults find it hard to invest financially/in health



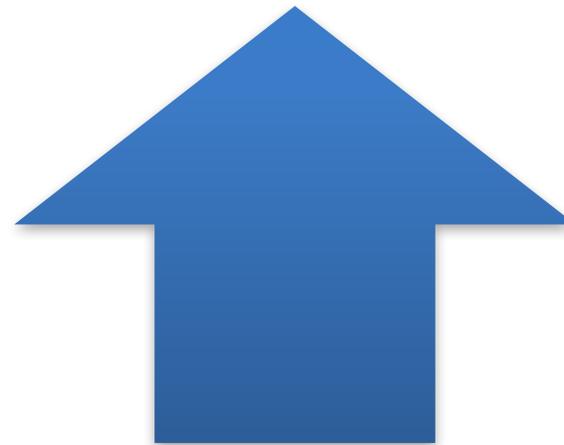
## Short term Impatient

- Delay savings or health investment in favor of short term consumption for immediate gratification”



## Long-term patient

- Desire to save and invest financially and in human capital for long-term goals



# What do we know about aging?

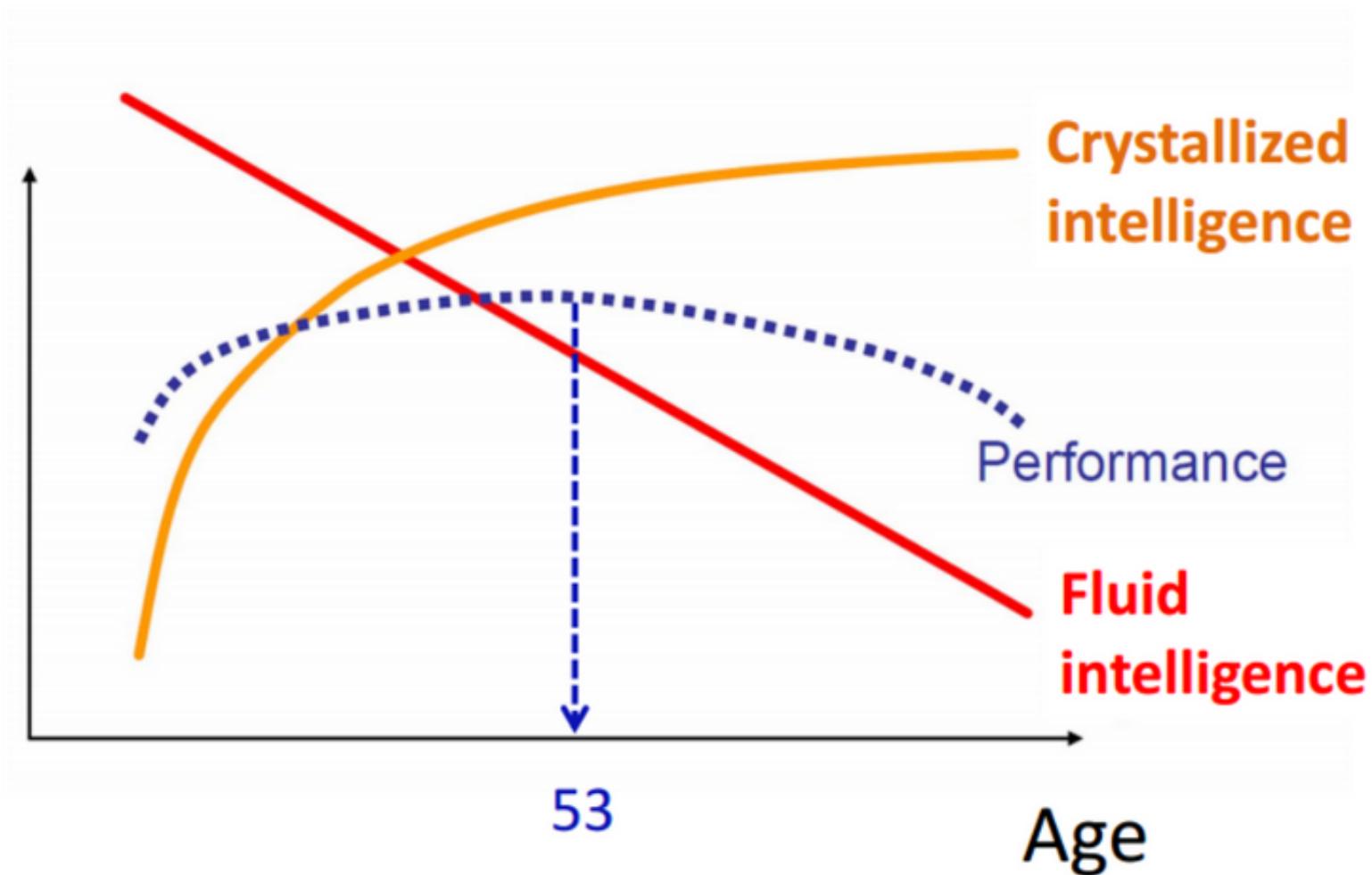
Young adults have little connection with “older self”



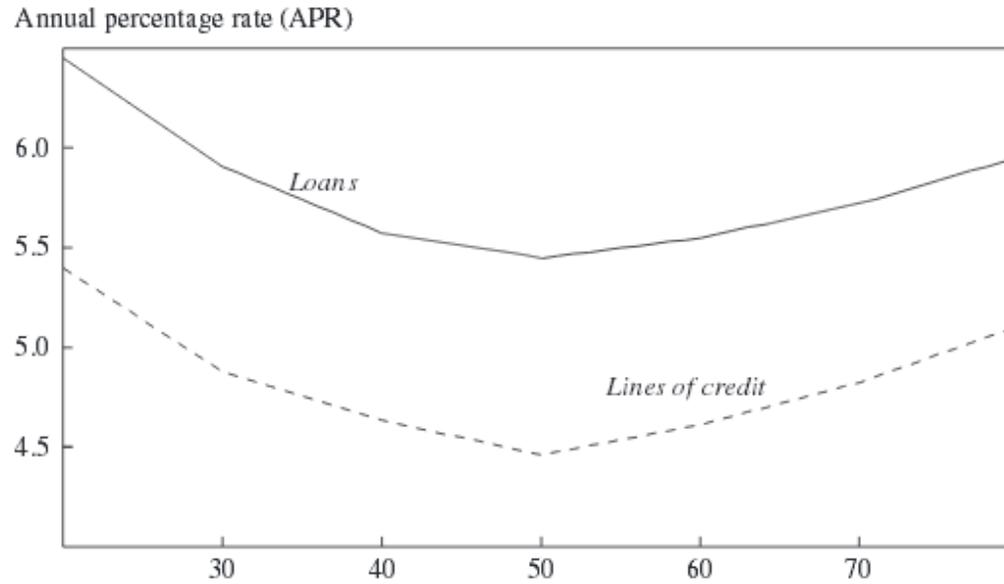
Halpern et al (2013)

# What do we know about aging?

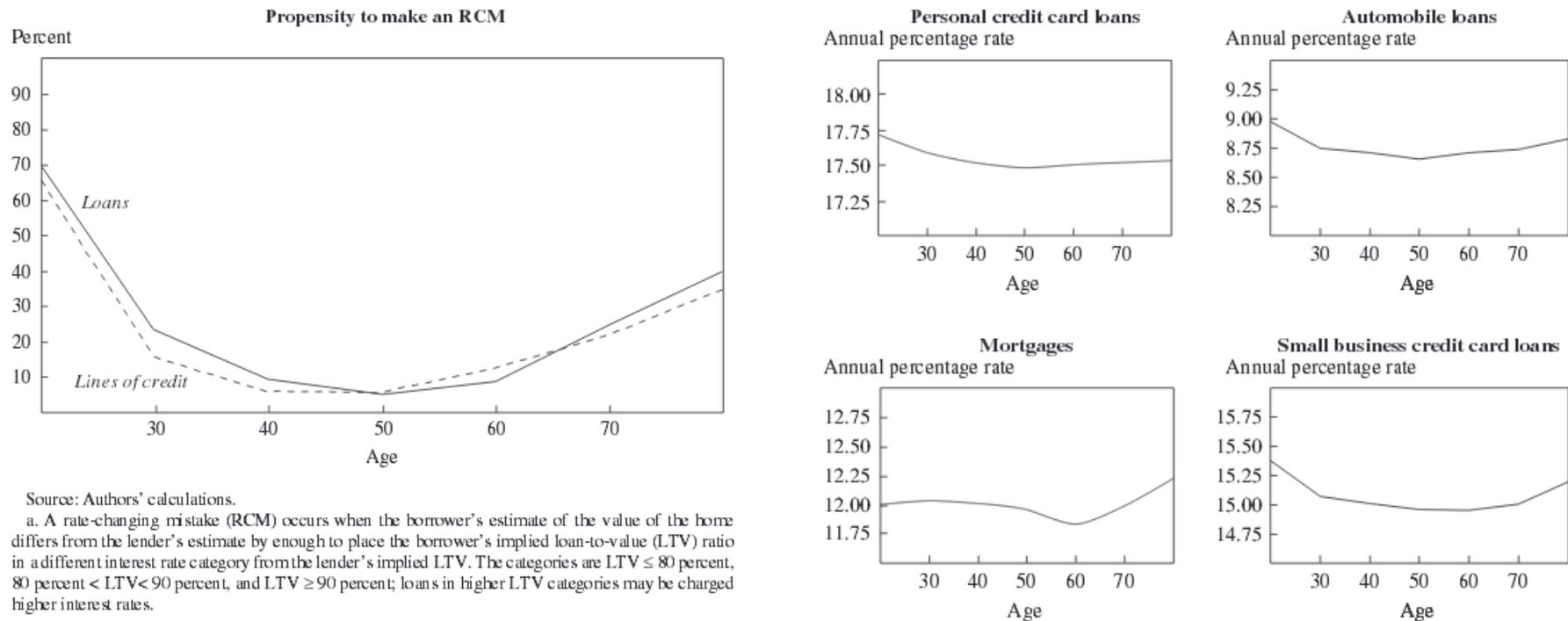
Older adults have less bandwidth



**Figure 7. Interest Rates Offered on Home Equity Loans and Lines of Credit by Age of Borrower**



**Figure 9. Interest Rates Paid by Type of Loan and Age of Borrower**



# What do we know about aging?

Older adults are more receptive to social influences



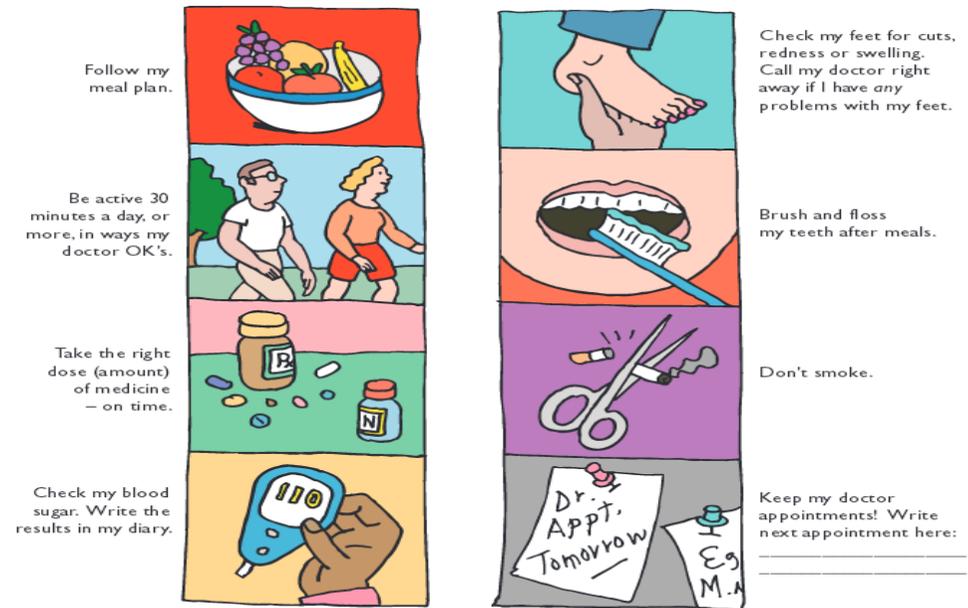
# The 5000 hour problem

Asch, Muller and Volpp, NEJM 2012

*A doctor gives the patients 1-2 consultations a year*



*Patient makes >3000 active decisions on their own*



*<1 waking hour*

*5000 waking hours*

# What is a nudge?



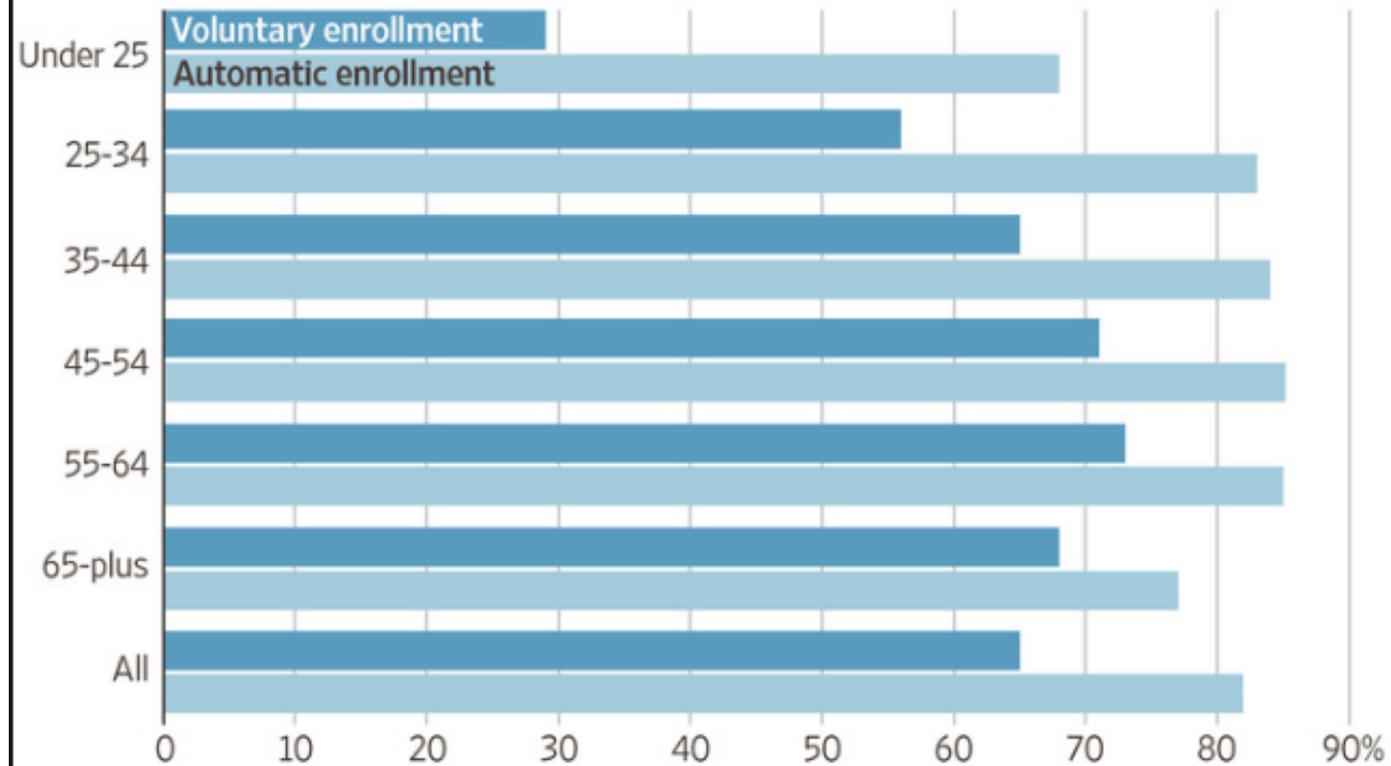
# Making it Easy



# Making it Easy

## Little Nudge, Big Impact

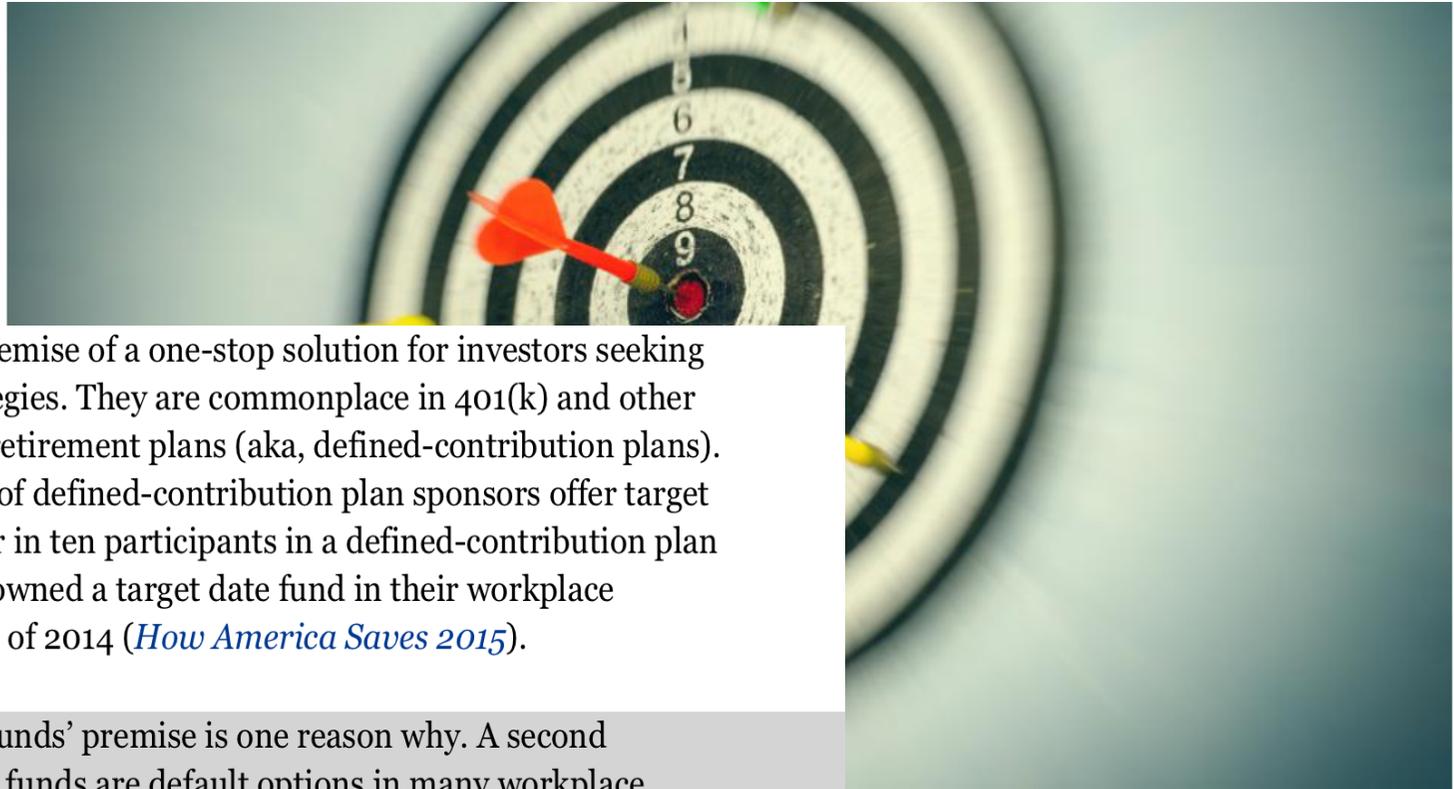
Participation rates by age for Vanguard defined-contribution retirement plans



Source: Vanguard Group data for 2013 on about 400 plans and 800,000 participants and eligible nonparticipants

THE WALL STREET JOURNAL.

# Making it Easy



Target date funds offer the premise of a one-stop solution for investors seeking professional allocations strategies. They are commonplace in 401(k) and other similar employer-sponsored retirement plans (aka, defined-contribution plans). According to Vanguard, 88% of defined-contribution plan sponsors offer target date funds. Furthermore, four in ten participants in a defined-contribution plan using Vanguard funds solely owned a target date fund in their workplace retirement account at the end of 2014 (*How America Saves 2015*).

The simplicity of target date funds' premise is one reason why. A second significant factor is that these funds are default options in many workplace retirement plans. Many employers use target date funds as the default investment alternative for new defined-contribution plan enrollees. Similar to auto-enrollment (employees are automatically enrolled into the retirement plan, often with a starting default contribution rate equal to 3% of an employee's gross salary) and auto-escalation (the contribution rate is automatically increased each year and/or at the time a raise is given), employees have the ability to choose a different option. Many don't.

# Making it Attractive

- Small incentives or bonuses to motivate individuals e.g financial incentives for medication adherence
- Amount may seem “disproportionate” to overall benefit

## For Forgetful, Cash Helps the Medicine Go Down

By PAM BELLUCK  
Published: June 13, 2010

It has long been one of the most vexing causes of America's skyrocketing health costs: people not taking their medicine.



Enlarge This Image

Patients who do not take their prescriptions properly can build up big medical bills.

One-third to one-half of all patients do not take medication as prescribed, and up to one-quarter never fill prescriptions at all, experts say. Such lapses fuel more than \$100 billion dollars in health costs annually because those patients often get sicker.

Now, a controversial, and seemingly counterintuitive, effort to tackle the problem is gaining ground: paying people money to take medicine or to comply with prescribed treatment. The idea, which is being embraced by doctors, pharmacy companies, insurers and researchers, is that paying modest financial incentives up front can save much larger costs of hospitalization.

“It's better to spend money on medication adherence for patients, rather than having them boomerang in and out of the hospital,” said Valerie Fleishman, executive director of the New England Healthcare Institute, a research organization, who said that about one-tenth of hospital admissions and one-quarter of nursing home admissions

Should People Be Paid to Stay Healthy?  
How effective are incentives that prod patients to take pills, lose weight and stop smoking?

ROOM vs DEBATE

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# Making it Attractive

## HOW TO MAKE SAVING HURT LESS

In the moment, we resist saving. Solution: Commit to doing it ... later.

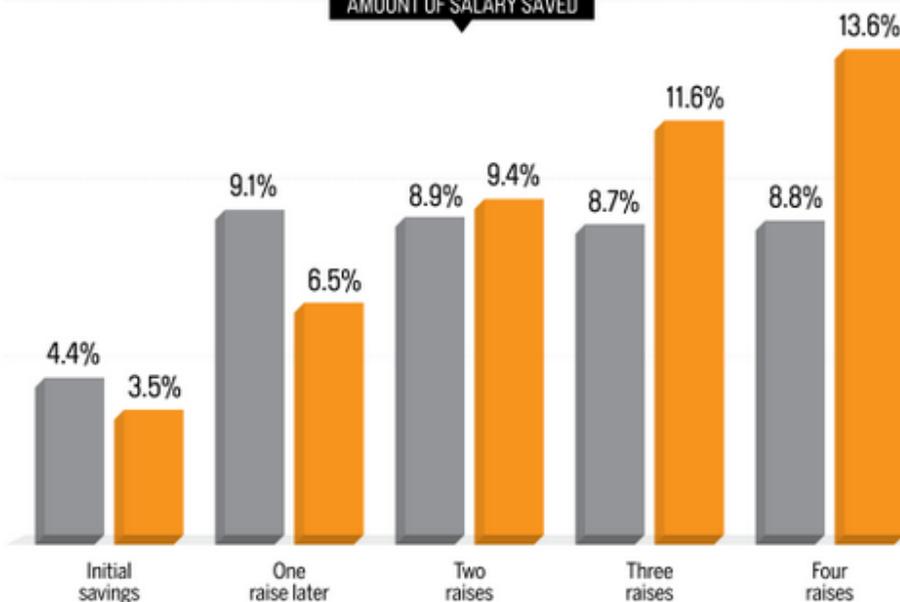
### ■ THEY BIT THE BULLET

At one company, 401(k) participants got advice from a consultant, who told them to save an extra 5% of salary. Some took that advice, and were saving 9% by the time they got their first raise.

### ■ TAKING IT SLOW, BUT AUTOMATIC

Others said 5% was too much. They were given another choice: increase their savings rate by three percentage points each raise. This group ultimately saved more. **Many plans now offer this option.**

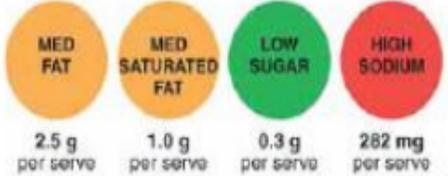
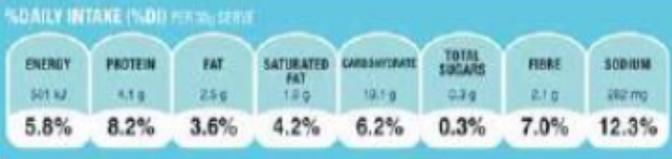
AMOUNT OF SALARY SAVED



SOURCE: Misbehaving, by Richard Thaler

# Making it Attractive

Table 1: Types of front-of-pack food labelling systems

Traffic Light	<p>Per 30 g serve</p>  <p>2.5 g per serve    1.0 g per serve    0.3 g per serve    282 mg per serve</p>																								
Traffic Light + Overall Rating	<p>Per 30 g serve</p>  <p>2.5 g per serve    1.0 g per serve    0.3 g per serve    282 mg per serve</p>																								
Monochrome %DI	<p>%DAILY INTAKE (%DI) PER 30g SERVE</p>  <table border="1"> <thead> <tr> <th>ENERGY</th> <th>PROTEIN</th> <th>FAT</th> <th>SATURATED FAT</th> <th>CARBOHYDRATE</th> <th>TOTAL SUGARS</th> <th>FIBRE</th> <th>SODIUM</th> </tr> </thead> <tbody> <tr> <td>501 kJ</td> <td>4.1 g</td> <td>2.5 g</td> <td>1.0 g</td> <td>19.1 g</td> <td>0.3 g</td> <td>2.1 g</td> <td>282 mg</td> </tr> <tr> <td>5.8%</td> <td>8.2%</td> <td>3.6%</td> <td>4.2%</td> <td>6.2%</td> <td>0.3%</td> <td>7.0%</td> <td>12.3%</td> </tr> </tbody> </table>	ENERGY	PROTEIN	FAT	SATURATED FAT	CARBOHYDRATE	TOTAL SUGARS	FIBRE	SODIUM	501 kJ	4.1 g	2.5 g	1.0 g	19.1 g	0.3 g	2.1 g	282 mg	5.8%	8.2%	3.6%	4.2%	6.2%	0.3%	7.0%	12.3%
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# Making it Social



# Making it Both



**The govt produced a Journey to the West Pioneer Generation Package video just because**

August 1, 2015

We're wondering how they plan to top this one.



The Mo Team

## Hokkien video on Medishield Life for pioneers gets more than 300,000 views in 3 days

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Loh Poh Siong Lky ban dialect. Now I saw this epic dialect MV???????. Then hope more dialect song on TV OK.Happy ever  
August 16 at 2:58am  
4 Replies

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# Making it Timely

## Clinical Study

*British Journal of Cancer* **112**, 1005-1010 (17 March 2015) | doi:10.1038/bjc.2015.36

### Text-message reminders increase uptake of routine breast screening appointments: a randomised controlled trial in a hard-to-reach population

R S Kerrison, H Shukla, D Cunningham, O Oyeboade and E Friedman

#### Background:

**There is a need for interventions to promote uptake of breast screening throughout Europe.**

#### Methods:

**We performed a single-blind randomised controlled trial to test whether text-message reminders were effective. Two thousand two hundred and forty women receiving their first breast screening invitation were included in the study and randomly assigned in a 1:1 ratio to receive either a normal invitation only (n=1118) or a normal invitation plus a text-message reminder 48 h before their appointment (n=1122).**

#### Findings:

**In the intention-to-treat analysis, uptake of breast screening was 59.1% among women in the normal invitation group and 64.4% in the text-message reminder group ( $\chi^2=6.47$ , odds ratio (OR): 1.26, 95% confidence intervals (CI): 1.05–1.48,  $P=0.01$ ). Of the 1122 women assigned to the text-message reminder group, only 456 (41%) had a mobile number recorded by their GP and were thereby sent a text. In the per-protocol analysis, uptake by those in the control group who had a mobile number recorded on the GP system was 59.77% and by those in the intervention group who were sent a reminder 71.7% ( $\chi^2=14.12$ , OR=1.71, 95% CI=1.29–2.26,  $P<0.01$ ).**

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#### SEARCH PUBMED FOR

- ▶ R S Kerrison
- ▶ H Shukla
- ▶ D Cunningham
- ▶ O Oyeboade
- ▶ E Friedman



# We still don't have a magic bullet

BMJ

BMJ 2012;344:e3482 doi: 10.1136/bmj.e3482 (Published 23 May 2012)

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## ANALYSIS

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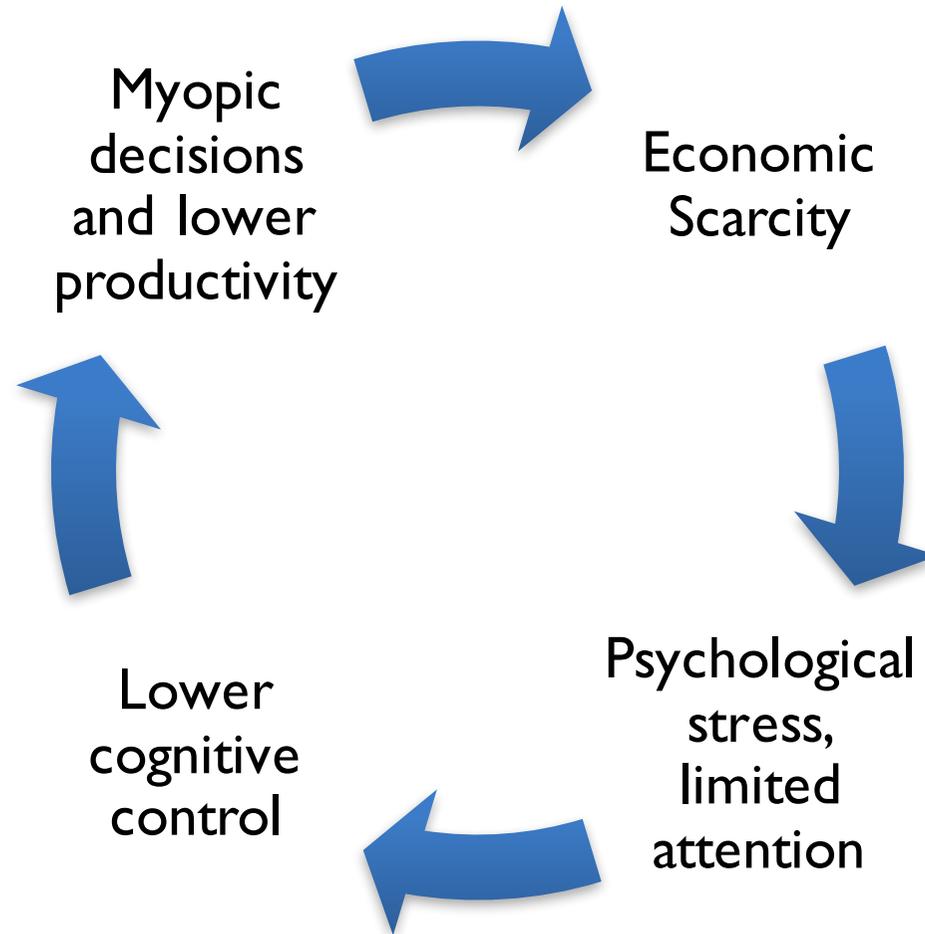
### Can behavioural economics make us healthier?

George Loewenstein *professor of economics and psychology*<sup>1,2,3</sup>, David A Asch *professor of medicine and healthcare management*<sup>2,3,4,5,6</sup>, Joelle Y Friedman *assistant director*<sup>2,3</sup>, Lori A Melichar *senior program officer*<sup>7</sup>, Kevin G Volpp *professor of medicine and healthcare management*<sup>2,3,4,5,6</sup>

<sup>1</sup>Department of Social and Decision Sciences, Carnegie Mellon University, 208 Porter Hall, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA;

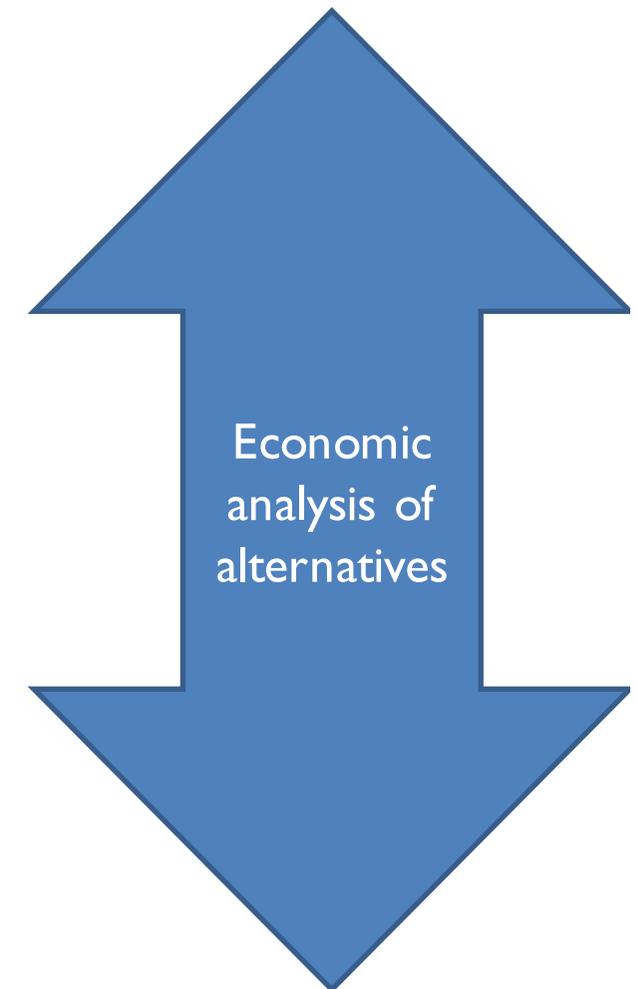
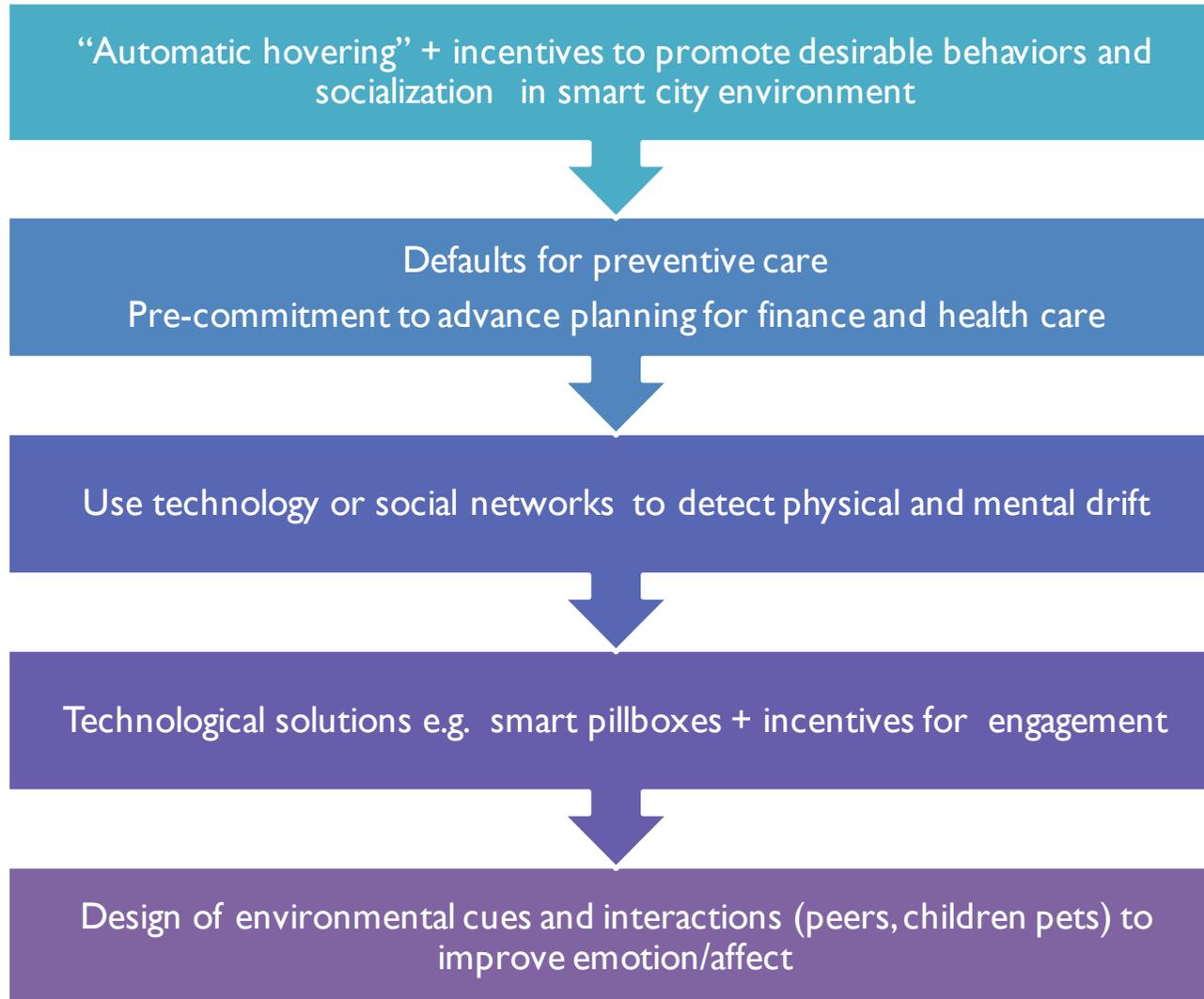
<sup>2</sup>Centre for Health Incentives and Behavioral Economics, University of Pennsylvania, Philadelphia, USA; <sup>3</sup>Penn CMU Roybal P30 Center on Behavioral Economics and Health, Pennsylvania; <sup>4</sup>Department of Medicine, Perelman School of Medicine, University of Pennsylvania; <sup>5</sup>Department of Health Care Management, Wharton School, University of Pennsylvania; <sup>6</sup>Centre for Health Equity Research and Promotion, Philadelphia VA Medical Centre, Philadelphia ; <sup>7</sup>Robert Wood Johnson Foundation, Princeton, NJ, USA

# But we need to first do no harm



Mani, Anandi, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao. "Poverty impedes cognitive function." *science* 341, no. 6149 (2013): 976-980.

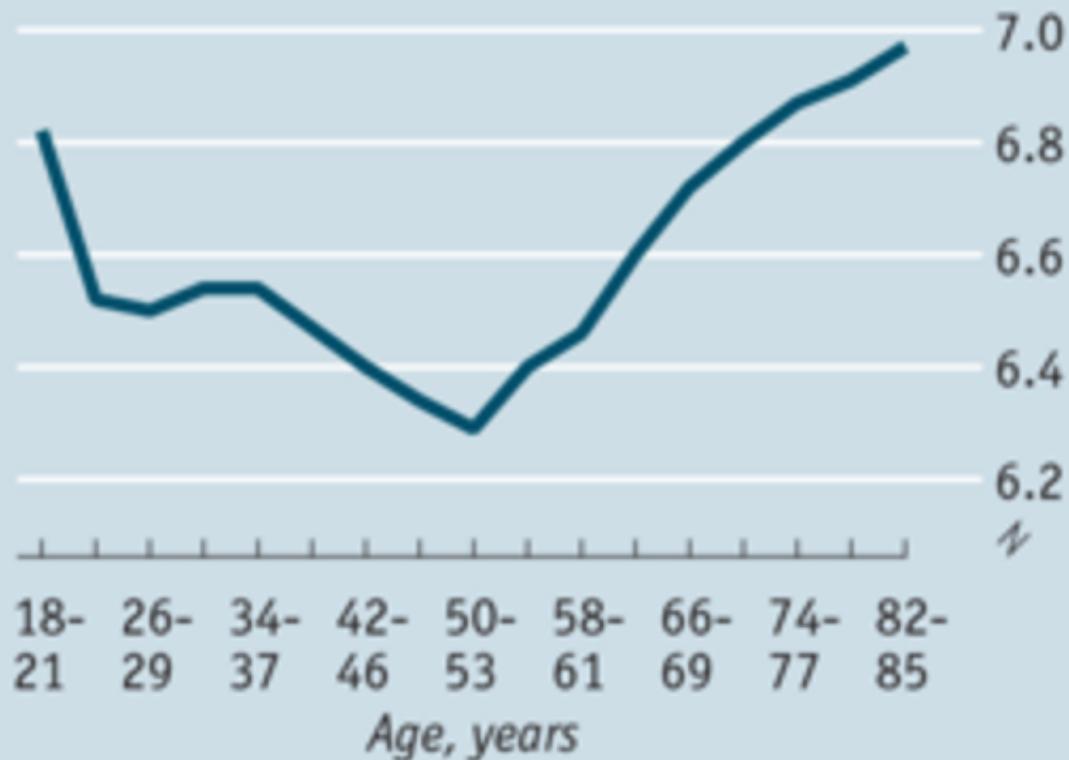
# And potentially we could do better



# All uphill from here...

## The U-bend

Self-reported well-being, on a scale of 1-10



Source: PNAS paper: "A snapshot of the age distribution of psychological well-being in the United States" by Arthur Stone

# Thank you!

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