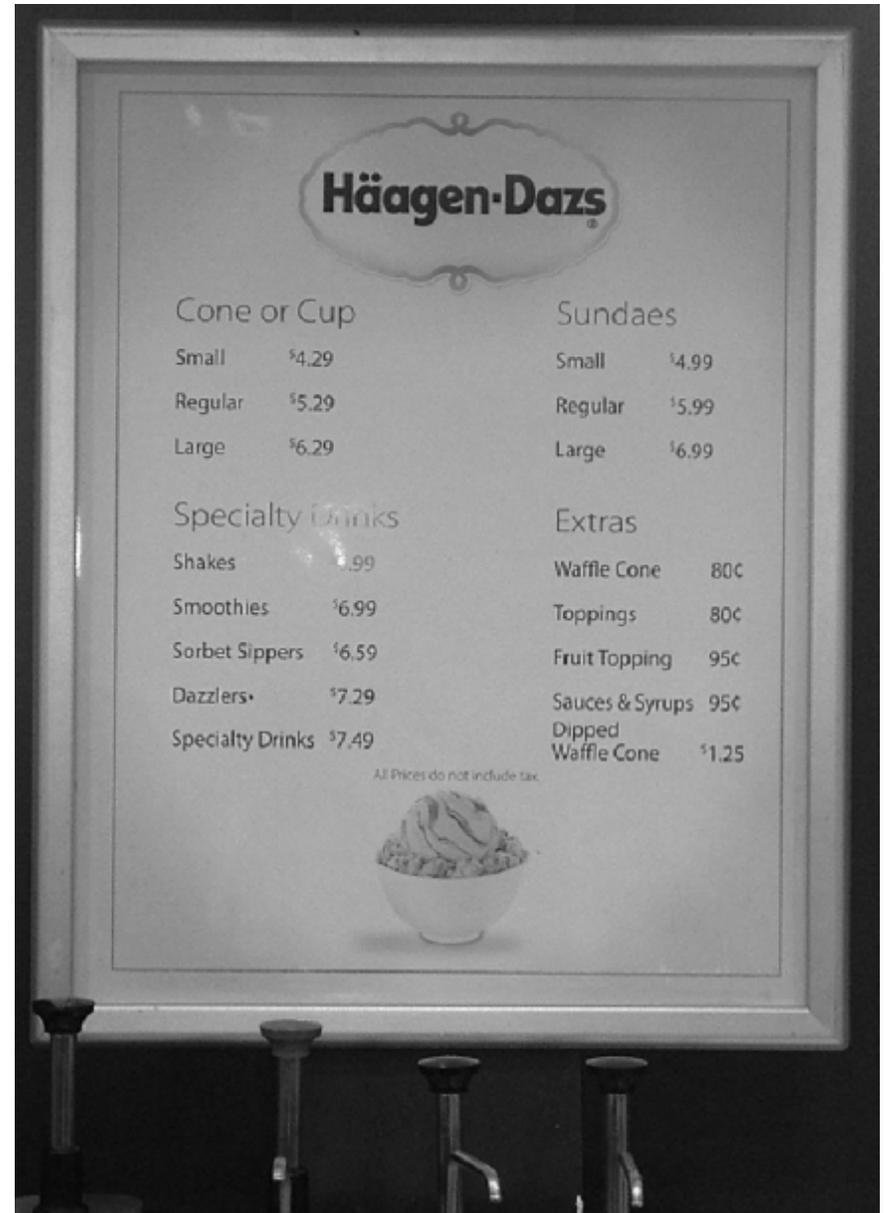


Behavioral Economics: Implications for the Food Environment and Choices

George Loewenstein

IOM Workshop on Sustainable Diets: Food for Healthy People and a Healthy Planet

5/8/2013



My focus: diet and obesity

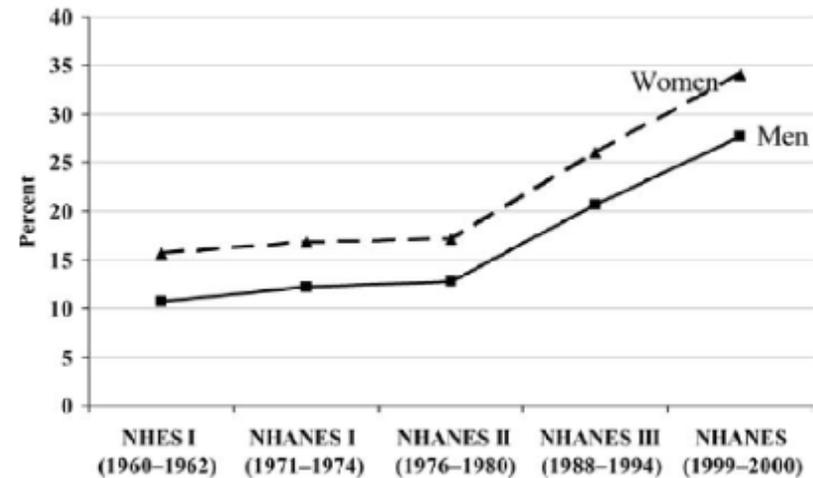


Figure 1 Adult obesity trends by gender, United States, 1960–2000 (Source: Reference 23). NHANES, National Health and Nutrition Examination Survey.

This talk:

- What is responsible?
- What is the most effective way to change diet?
- What is the proper role of behavioral economics?

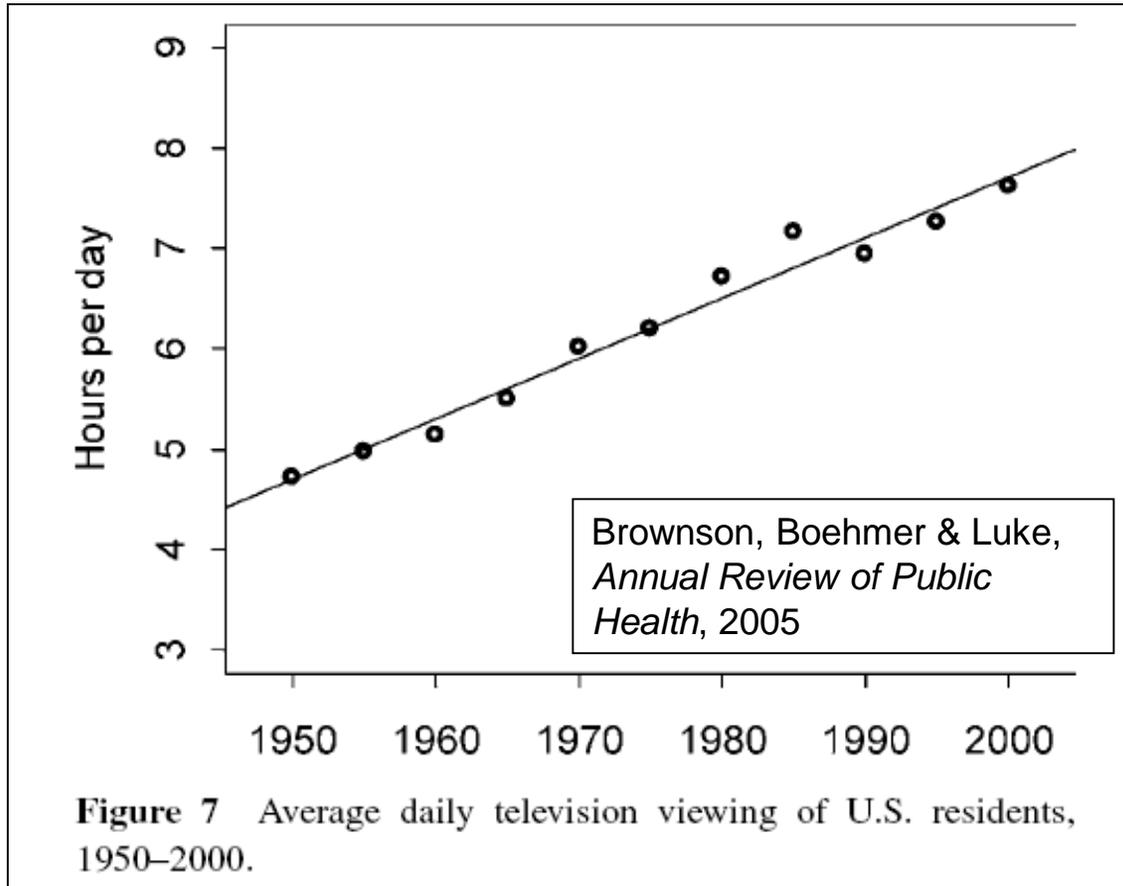
What is responsible? Multiple factors..



Sedentary lifestyles...

“Back when many of us were growing up, we tended to be able to lead lives that kept us at a pretty healthy weight. Most of us walked to and from school every day, and then we ran around all day at recess.. and for hours after school before dinner... Our kids today lead a very different kind of life. Those walks to and from school have been replaced by car and bus rides.”

Michelle Obama, Grocery Manufacturers Association Conference, March, 2010



Recreational internet use close to equaling television viewing...

Lack of physical recreation much more severe for minorities

Consequences of sedentary behavior (Hu et al., JAMA, 2003):

- Each 2 hours/day increment in TV watching associated with a 23% increase in obesity and 14% increase in risk of diabetes
- Each 1 hour per day of brisk walking associated with a 24% reduction in obesity and 34% reduction in risk of diabetes.



Portion sizes...

“And portion sizes have exploded. Food portions are two to five times bigger than they used to be. And beverage portions have grown as well.”

Bagel

20 years ago

Today



140 calories

350 calories

3 inch diameter

6 inch diameter

Cheeseburger

20 years ago

Today



333 calories

590 calories

French Fries

20 years ago

Today



210 calories

610 calories

2.4 ounces

6.9 ounces



Snacking...

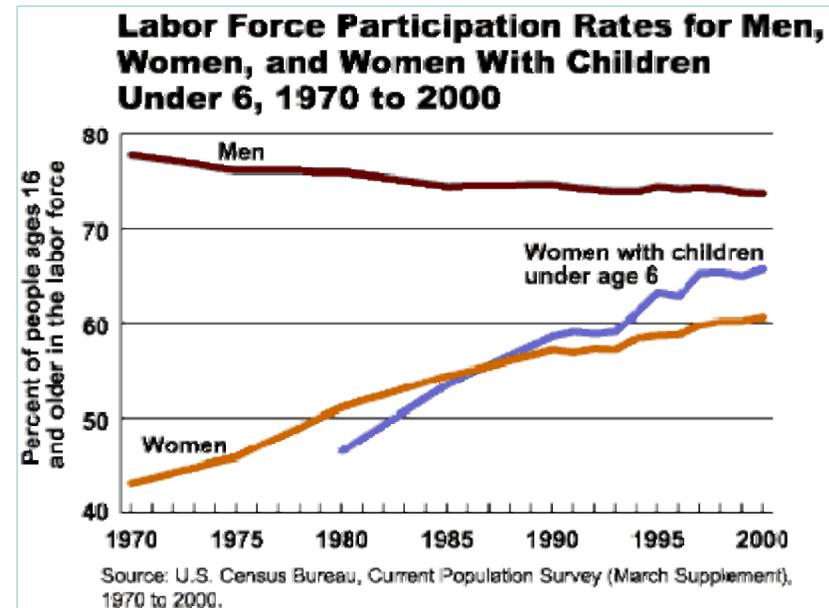
“And today, snacking between meals has become more the norm rather than the exception. While kids 30 years ago ate just one snack a day, we're now trending toward three - - so our kids are taking in an additional 200 calories a day just from snacks alone. And one in five school-age kids has up to six snacks a day.”

- Cutler et al. (J. Econ. Perspectives, 2003): higher snack calories are responsible for the entire rise in energy intake among females between 1977–1978 and 1994–1996 and for 90% of the increase among males
- Nielsen & Popkin (JAMA, 2003): 76% of the growth in calories between these two periods resulted from increased snacking.



Time pressure...

“It wasn't long ago that I was a working mom dashing from meetings and phone calls, ballet and soccer and whatever else. I felt like it was a miracle just to get through the day and get everybody where they were supposed to be...

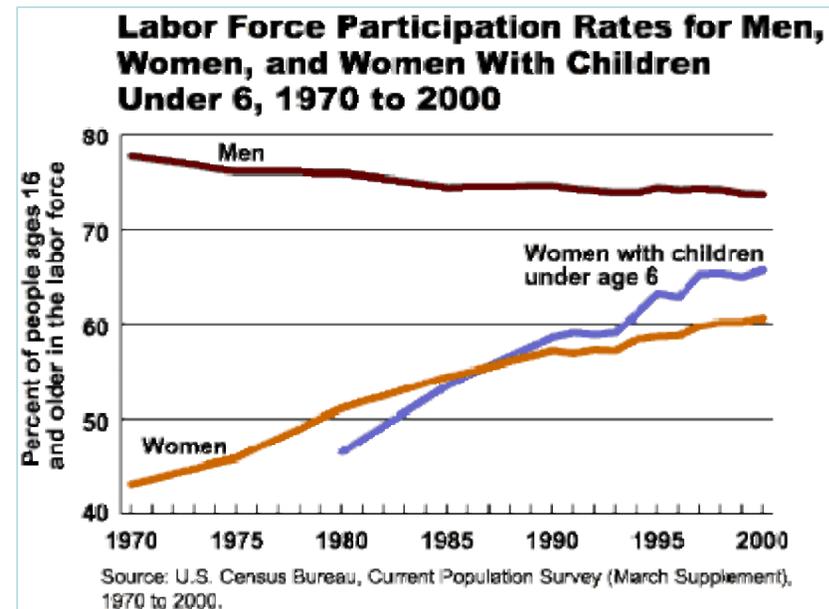




Lack of information...

“It wasn't long ago that I was a working mom dashing from meetings and phone calls, ballet and soccer and whatever else. I felt like it was a miracle just to get through the day and get everybody where they were supposed to be...

So the last thing I had time to do was to stand in a grocery store aisle squinting at ingredients that I couldn't pronounce to figure out whether something was healthy or not.”



Prices are important!

240 FINKELSTEIN ■ RUHM ■ KOSA

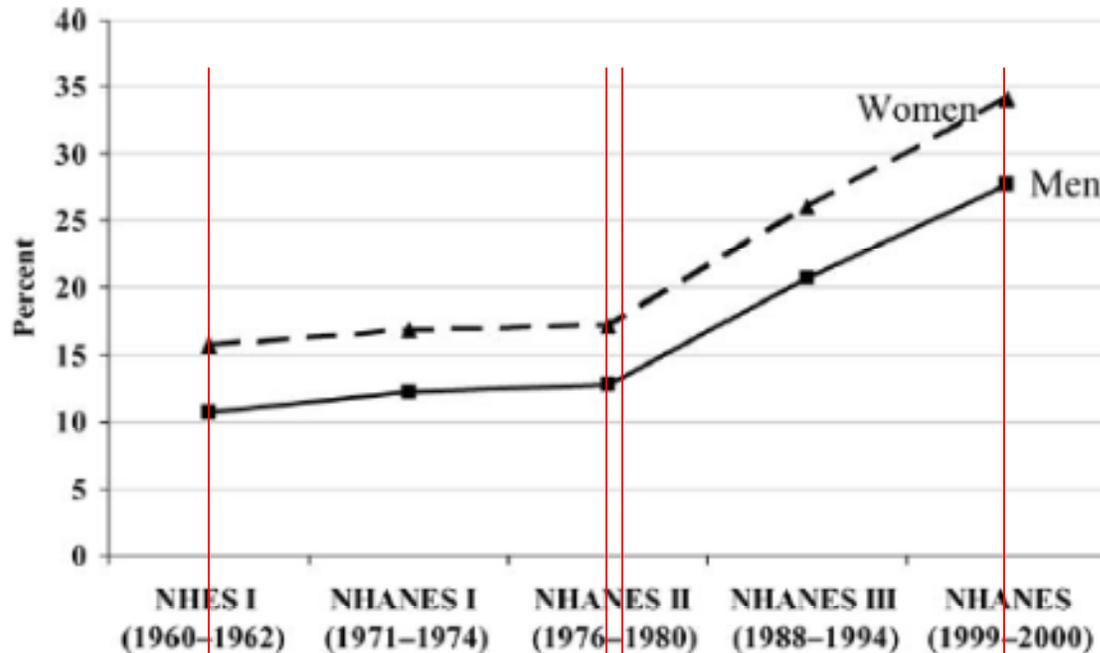


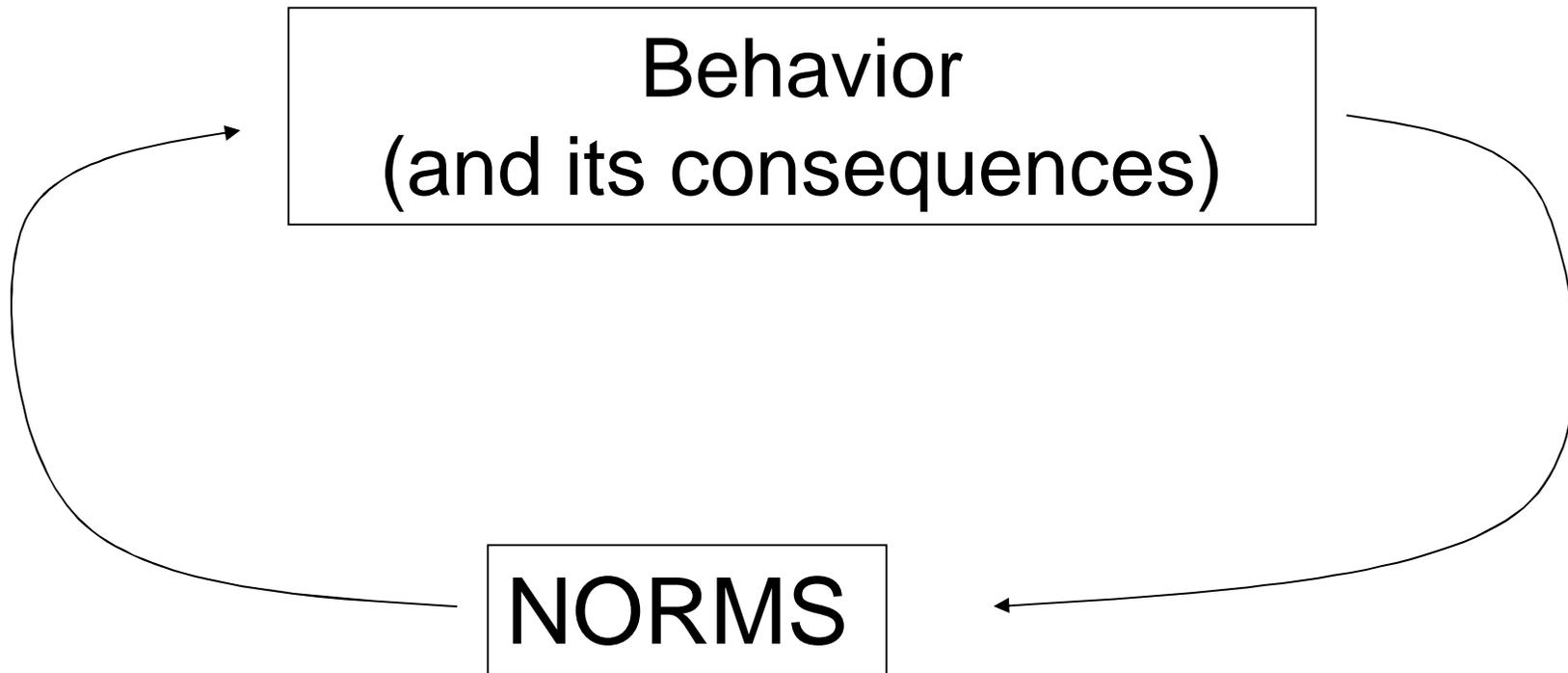
Figure 1 Adult obesity trends by gender, United States, 1960–2000 (Source: Reference 23). NHANES, National Health and Nutrition Examination Survey.

Price of food rose 1% during this period!

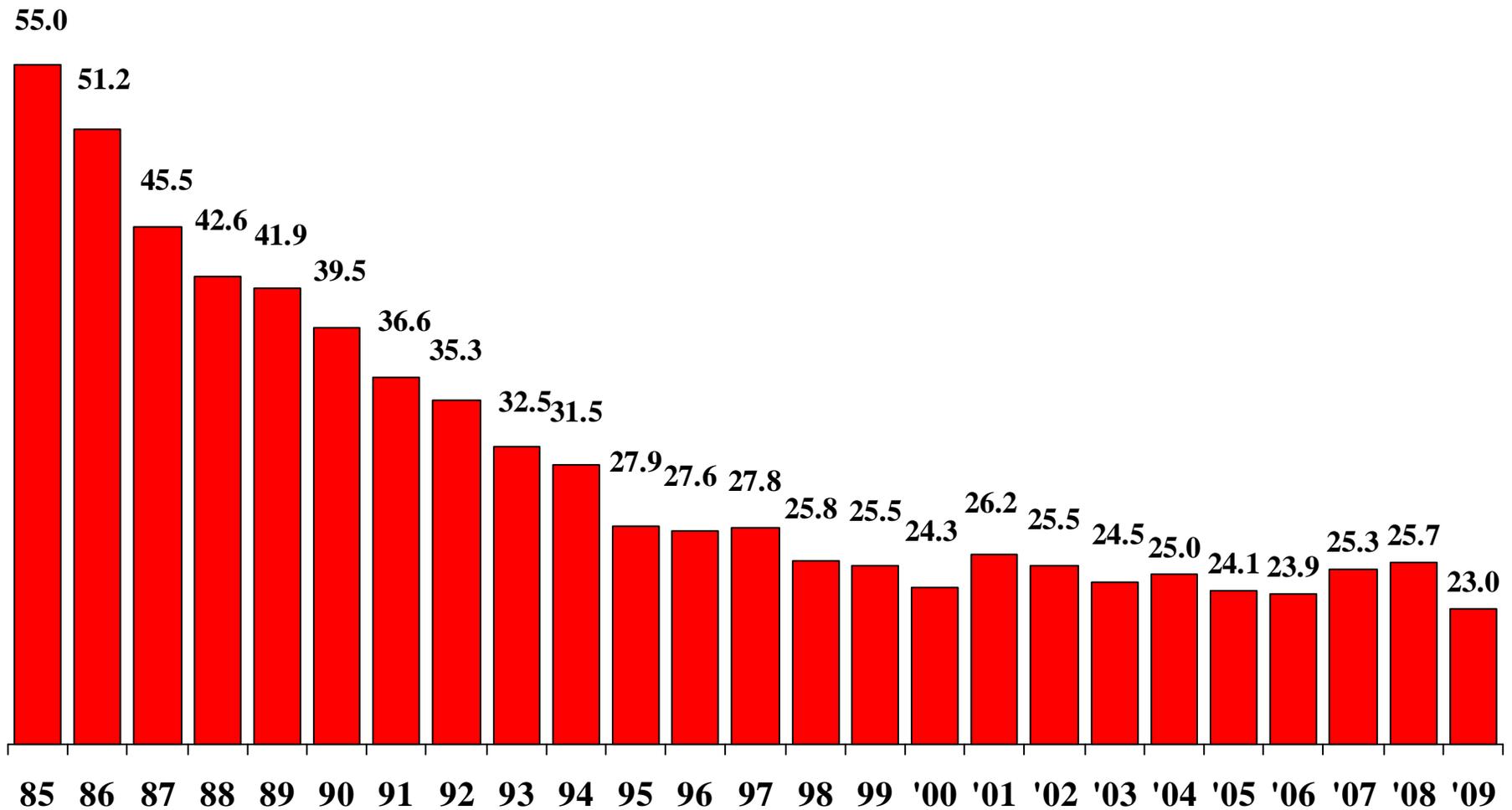
Price of food fell 14% during this period!

- Estimated that ↓ food prices explains 42% of ↑ young adults' BMI 1981-1994
- Relative prices of *unhealthy* (processed) foods have dropped disproportionately
- Low SES families most sensitive to change in price of fast food

An additional factor: norms



“People who are then look a lot more attractive.”
Percent of Homemakers *Completely Agreeing* with the Statement

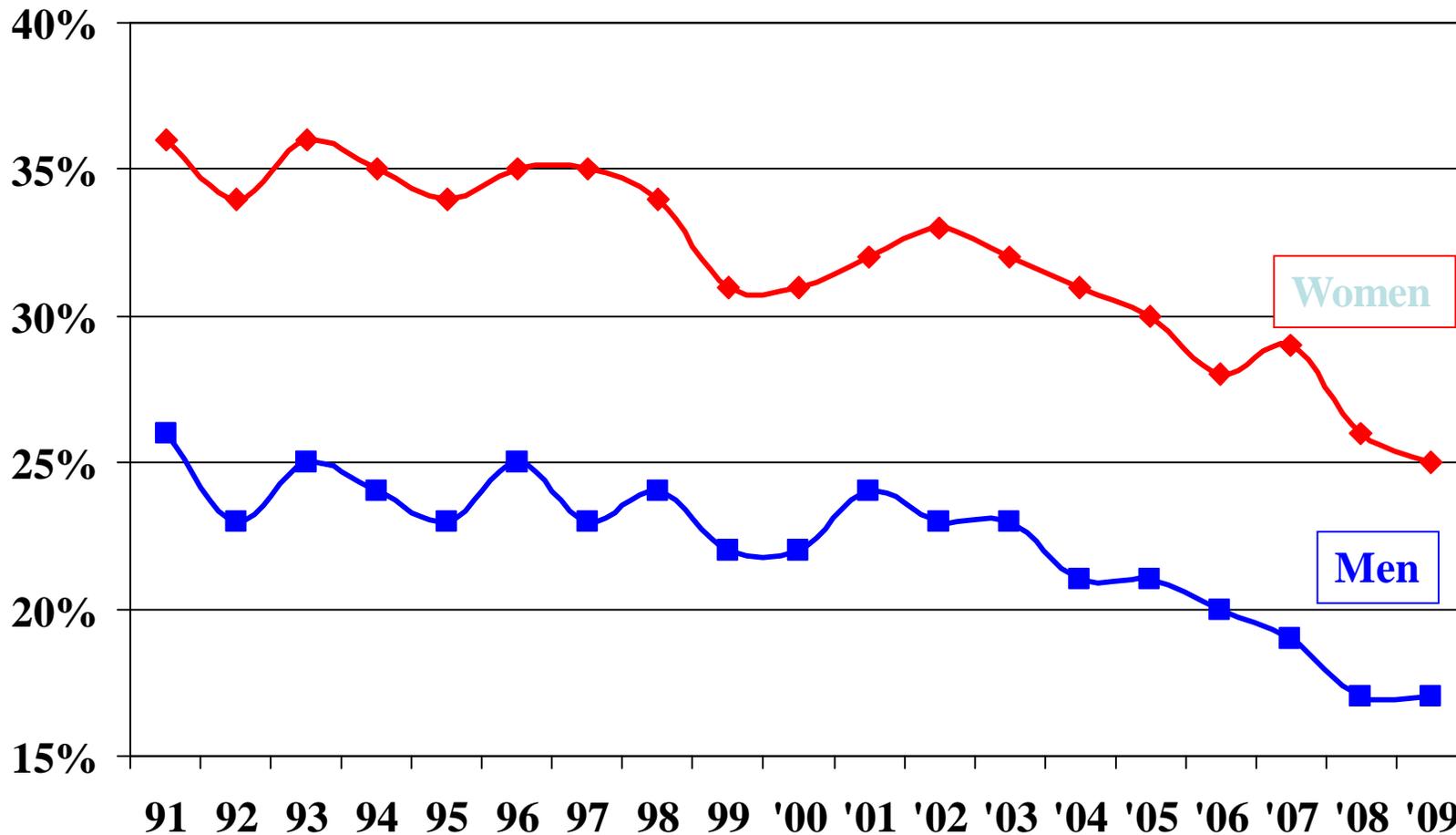


Source: The NPD Group's National Eating Trends® Service

Carnegie Mellon

Dieting Trends:

Percent of Adults on Any Diet



Source: The NPD Group's Health Track Service

Carnegie Mellon

What can behavioral economics contribute?

- Better understanding of factors that contribute to obesity
 - desire to get a good deal
 - present-biased preferences
 - drop-in-the-bucket effects
 - lack of knowledge
- New approaches to policy:
 - Better ways of providing information
 - Nudges/'choice architecture'
 - Better ways of delivering incentives

Not much evidence that information helps

E.g., NLEA (implemented in 1994)

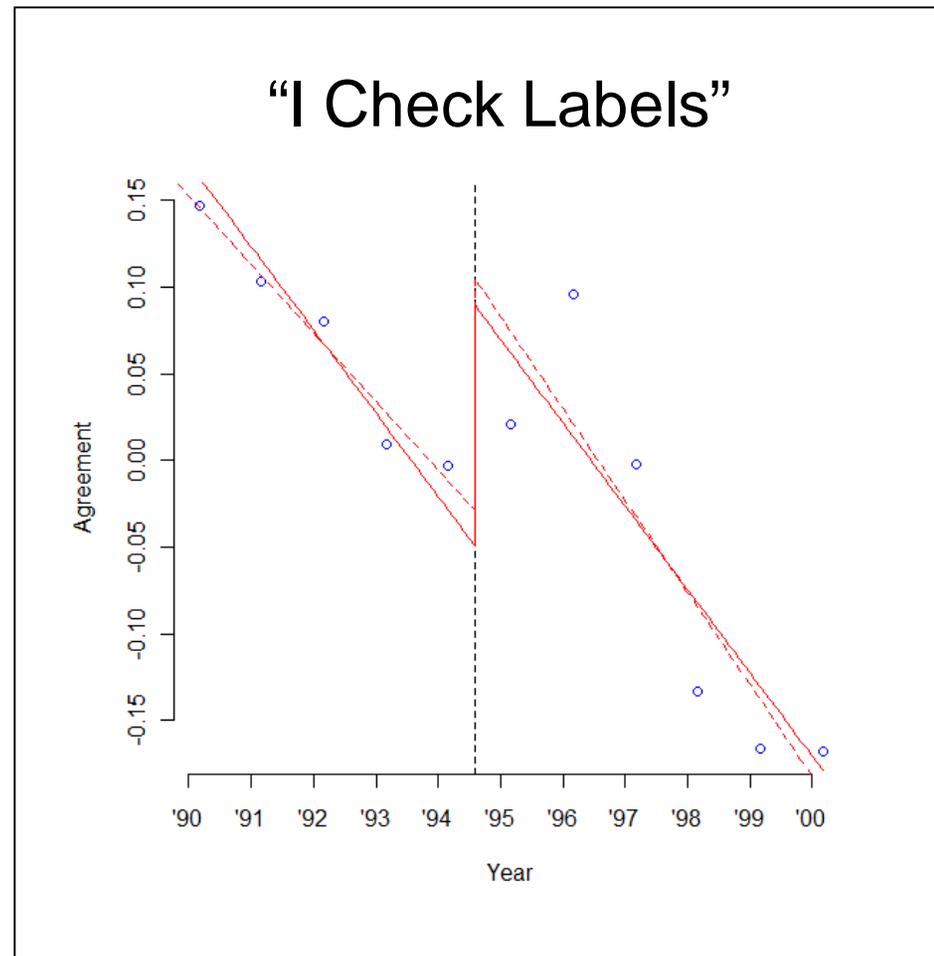
- increase in consumption of iron and fiber; no impact on total fat, saturated fat, or cholesterol
- ↓ Obesity among white females *who use the labels, but no* impact on other groups.

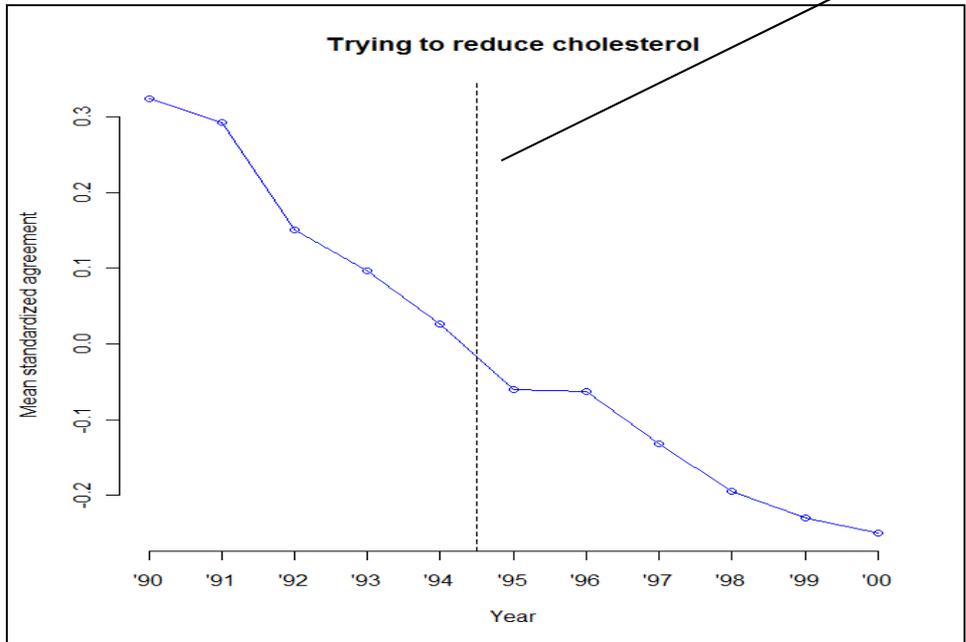
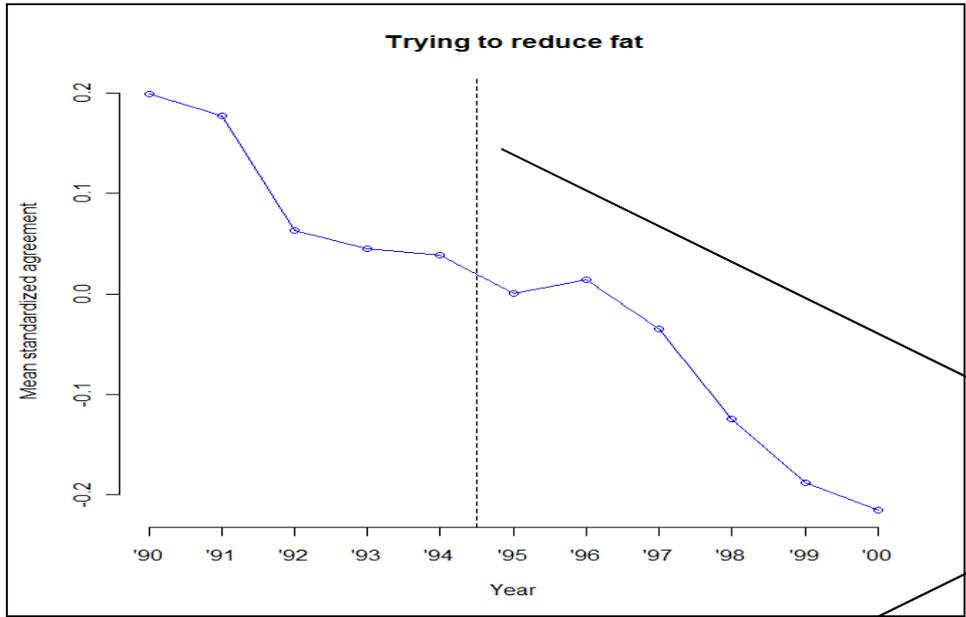
(Variyam, 2007)

| Nutrition Facts | | | |
|---|-----------|-----------------------|------------|
| Serving Size 1 cup (228g) | | | |
| Servings Per Container 2 | | | |
| Amount Per Serving | | | |
| Calories 250 | | Calories from Fat 110 | |
| % Daily Value* | | | |
| Total Fat 12g | | | 18% |
| Saturated Fat 3g | | | 15% |
| Cholesterol 30mg | | | 10% |
| Sodium 470mg | | | 20% |
| Total Carbohydrate 31g | | | 10% |
| Dietary Fiber 0g | | | 0% |
| Sugars 5g | | | |
| Protein 5g | | | |
| Vitamin A 4% | • | Vitamin C 2% | |
| Calcium 20% | • | Iron 4% | |
| * Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs: | | | |
| | Calories: | 2,000 | 2,500 |
| Total Fat | Less than | 65g | 80g |
| Sat Fat | Less than | 20g | 25g |
| Cholesterol | Less than | 300mg | 300mg |
| Sodium | Less than | 2,400mg | 2,400mg |
| Total Carbohydrate | | 300g | 375g |
| Dietary Fiber | | 25g | 30g |

Impact of NLEA on Attitudes, Behavior, and Health (with Mark Patterson)

- Data source: NPD Group
- 2000 respondents annually 1989-1999
 - Attitudinal data
 - Behavioral data
 - Food diaries completed over two-week period
 - Health data
 - BMI





Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250 **Calories from Fat 110**

% Daily Value*

| | |
|-------------------------------|-----------------------|
| Total Fat 12g | 18% |
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| Cholesterol 30mg | 10% |
| Sodium 470mg | 20% |
| Total Carbohydrate 31g | 10% |
| Dietary Fiber 0g | 0% |
| Sugars 5g | |
| Protein 5g | |
| Vitamin A 4% | • Vitamin C 2% |
| Calcium 20% | • Iron 4% |

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

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Collaboration with Mark Paterson; Source, NPD

Fast-forward to the present...

- Calorie posting introduced in NYC, then other municipalities, in 2007/2008
- NYC's policy motivated by flawed study at Subway (Bassett et al., 2007) interpreted as showing that calorie posting led to 50 calorie reduction

| SUPER VALUE MENU | | |
|---|--------------------------------------|------|
| Crispy Chicken Nuggets (5 pc) | 230 cal. | .99 |
| Crispy Chicken Sandwich | 380 cal. | .99 |
| Jr. Cheeseburger Deluxe | 360 cal. | .99 |
| Value Soft Drink | 16 oz. 196 cal. Regular, 0 cal. Diet | .99 |
| Strawberry Flavored Yogurt | with Granola 250 cal. | .99 |
| Mandarin Oranges Cup | 80 cal. | .99 |
| Chili, Chips & Cheese | 380 cal. | .99 |
| Jr. Bacon Cheeseburger | 370 cal. | 1.29 |
| Sour Cream & Chive Potato | 320 cal. | 1.29 |
| Side Salad 35 cal. or Caesar Side Salad | 80 cal. | 1.29 |
| Chili | Small 220 cal. | 1.29 |
| French Fries | Small 370 cal. | 1.39 |
| Frosty Dairy Dessert | Small 320 cal. | 1.49 |
| SANDWICHES | | |
| Jr. Hamburger | 280 cal. | .89 |
| Jr. Cheeseburger | 320 cal. | .95 |
| Danish | 170 cal. | .99 |
| Orange Juice | 80 cal. | .99 |
| We Accept     | | |
| DELUXE VALUE MEALS | | |
| Jr. Bacon Cheeseburger | 370 cal. | 2.99 |

Confirming suspicions of conclusions from original study, most subsequent research has found that calorie posting has little if any impact – e.g.,

EXHIBIT 2 Elbel et al., Health Affairs (2009)
Regression-Adjusted Nutrient Content For Food Purchases In New York City And Newark, New Jersey, Before And After Calorie Labeling In Restaurants, 2008

| | New York City | | Newark | |
|-----------------------|-----------------|----------------|-----------------|----------------|
| | Before labeling | After labeling | Before labeling | After labeling |
| Number of calories | 825 | 846 | 823 | 826 |
| Saturated fat (grams) | 11.7 | 10.9 | 11.9 | 11.9 |
| Sodium (milligrams) | 1,414 | 1,450 | 1,369 | 1,502 |
| Sugar (grams) | 42 | 41 | 41 | 33 |

SOURCE: Authors' data.
NOTES: There were no statistically significant differences. A version of this exhibit showing 95 percent confidence intervals is available online at <http://content.healthaffairs.org/cgi/content/full/hlthaff.28.6.w1110/DC2>.

Many, but not all, studies have reached similar conclusions – e.g., Elbel et al., 2011; Dumanovsky et al., 2011; Finkelstein et al., 2011

- Nutritional labeling *as it has been implemented* has not been successful in cutting calorie consumption
- Could it be more successful if implemented in more innovative fashion?

One common approach: traffic light labeling

Very mixed results

- Null effects
 - No effect of labels on increasing purchase of healthy “ready meals” and sandwiches in UK (Sacks, Rayner, & Swinburn, 2009)
 - No effect on relative healthiness of products purchased online in Australia (Sacks, Tikellis, Millar, & Swinburn, 2011)
- Calorie reduction effects
 - Reduction in purchase of red-light items and increase in green-light items, especially beverages, in hospital cafeteria in Boston (Levy et al., 2012)
 - Reduction in caloric intake of patrons at sit-down restaurant, primarily by reducing calories in main entrée selection, compared to no label condition (Ellison, Lusk, & Davis, 2013)
- Our own in-progress research (VanEpps, Downs & Loewenstein)

What about *calorie recommendations*?

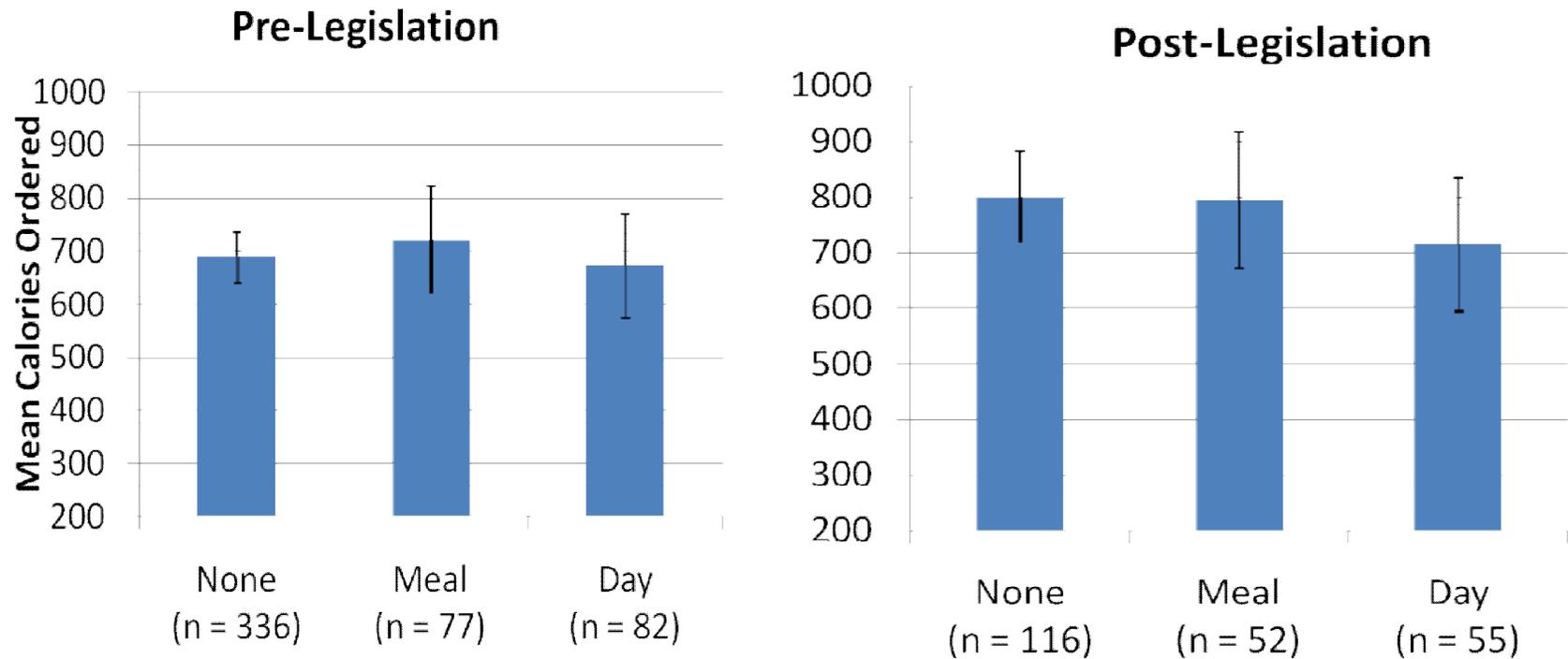
- Several diet experts have argued that posting hasn't affected behavior because people lack guidelines about recommended caloric intake that could help them interpret the labels.
 - à regulators in NYC launched educational campaign publicizing daily calorie recommendations
 - à requirement to post daily recommended calories directly on menus likely to be part of national labeling

Downs, J., Wisdom, J., Wansink, B. & Loewenstein, G. (forthcoming). Calorie Recommendations Fail to Enhance the Impact of Menu Labeling. *American Journal of Public Health*.

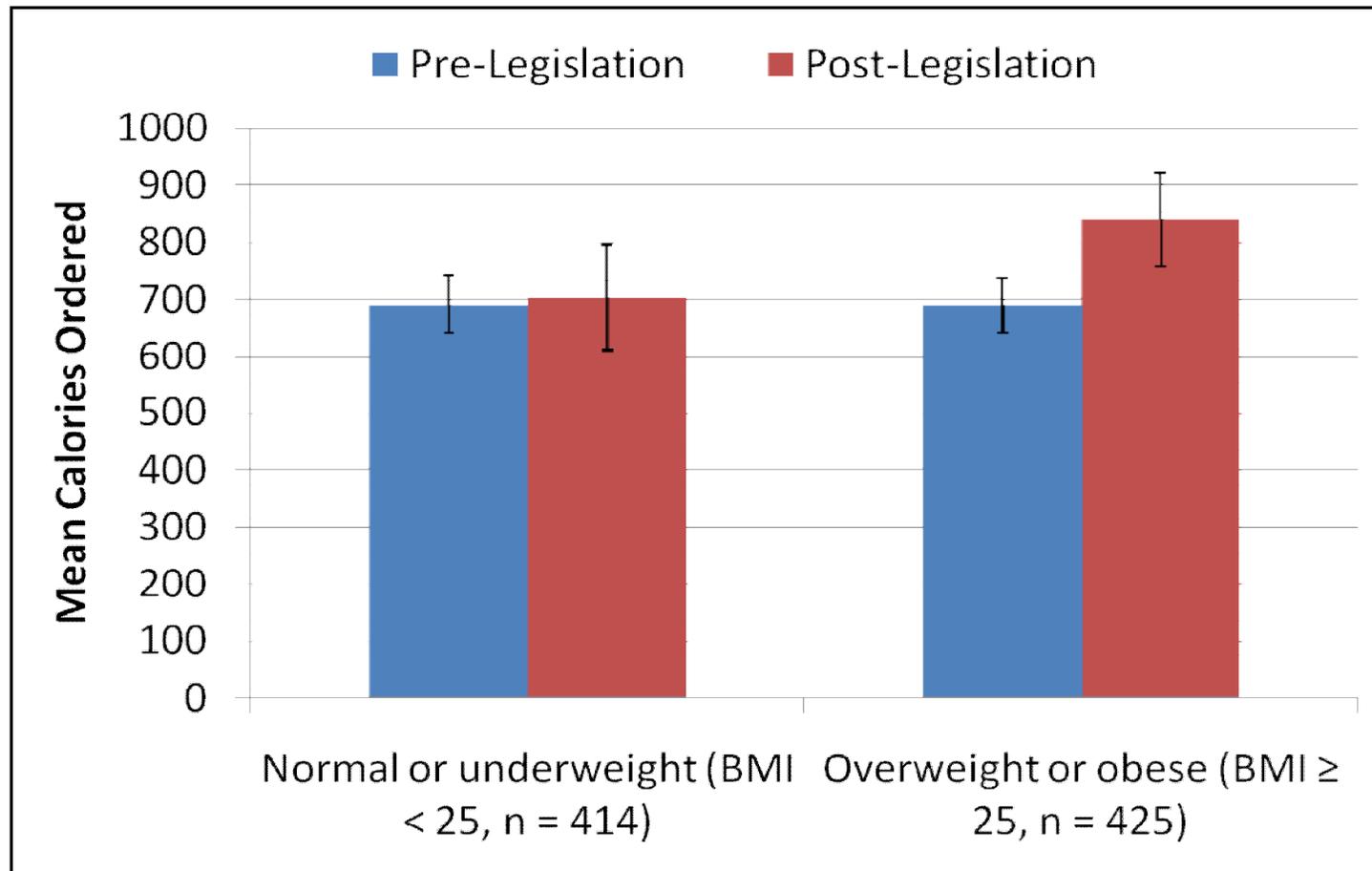
Method

- R.A.s stood outside McDonalds in NYC
 - Two pre-calorie-posting periods, summer of '07 & '08
 - One post-calorie-posting period, late summer of '08
- Customers told to keep receipt and get paid to fill out a short survey on their way out
- When entering, customers handed either:
 - “Day” recommendation: # calories they should eat per day
 - “Meal” recommendation: # calories they should eat per meal
 - No recommendation

- No effect of providing a calorie reference, pre-legislation ($p = .78$) or post-legislation ($p = .49$) in 2008



Splitting sample by Body Mass Index, those overweight or obese eat significantly more calories post-legislation, $p = .002$



FAST FOOD: CALORIES PER DOLLAR

McDonald's



Burger King



KFC



Taco Bell



Pizza Hut



IHOP



Subway



Nudges/choice architecture?

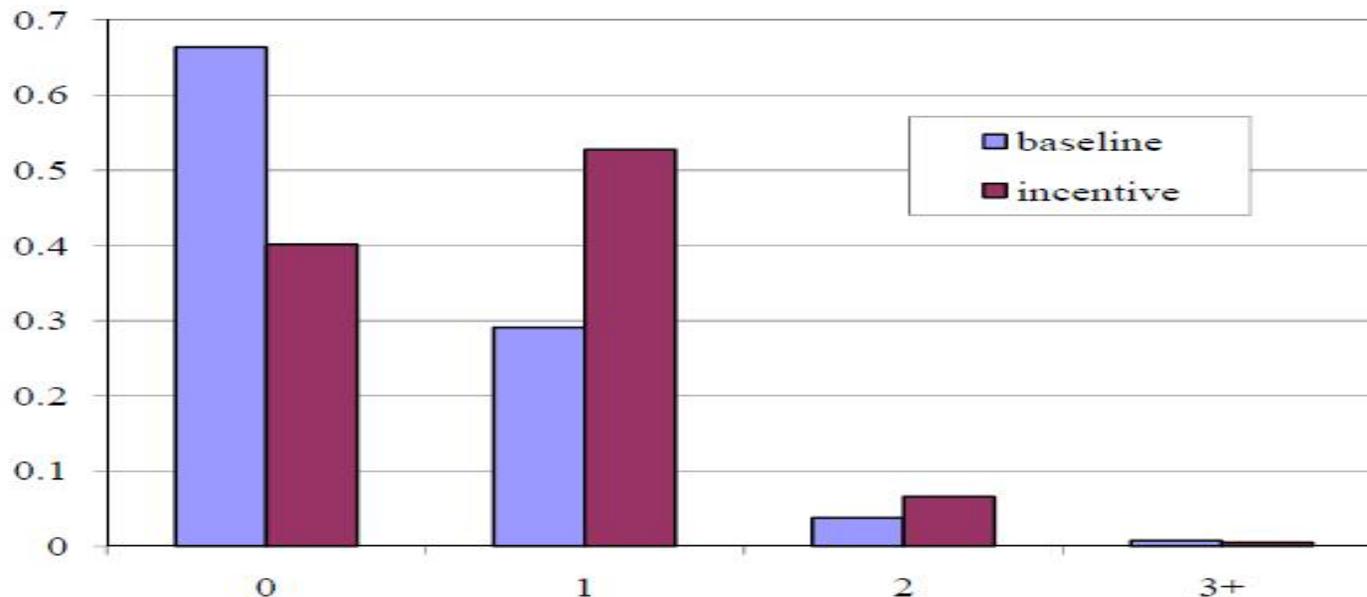
- Schwartz et al., 2012: 14-33% of customers at Chinese fast-food restaurant voluntarily took half-portion of side dish (rice) → ≈ ↓ 100 calories by those who accepted downsize.
- Hanks et al. (2012): changed cafeteria so one of two lunch lines only displayed healthier foods → increase in healthy food's share of total consumption went from 33 to 36%
- Just & Wansink (2009) studies of food choice in school cafeterias:
 - Giving choice between carrots or celery increased sales of carrots
 - Improving location of salad bar led to sustained increase in salad sales
 - Trayless cafeterias led to 26% fewer salads taken, but only 8% fewer bowls of ice cream and more waste

Incentives?

\$ \neq \$ \neq \$

Just & Price, 2011: Incentives for fruits and veggies

- Field experiment at 15 elementary schools
- 5 treatment conditions and a control condition (each school randomly assigned to one condition)
 - Receive money (\$.25) immediately
 - Receive prize (raffle ticket with EV equiv. to \$.25) immediately
 - Receive money at end of month
 - Receive prize at end of month
 - Receive small money (\$.05) immediately

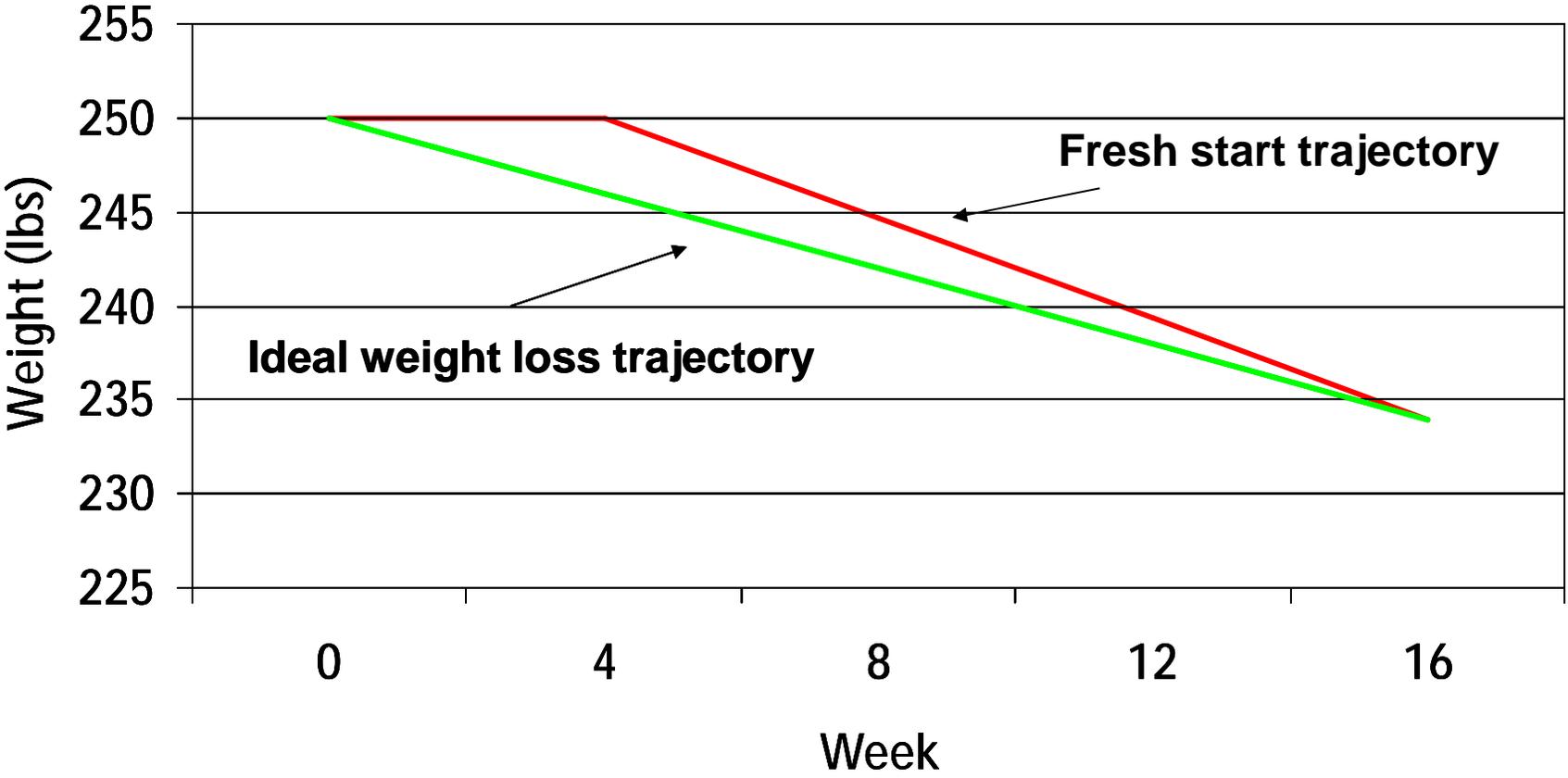


Applying behavioral economics to weight loss

Volpp, K.G., John, L.K., Troxel, A.B., Norton, L., Fassbender, J., and Loewenstein, G. (2008). Financial Incentive-based Approaches for Weight Loss: A Randomized Trial. *Journal of the American Medical Association*, 300(22), 2631-2637.

- 3 condition randomized controlled trial
 - Control
 - Lottery
 - Deposit contract
- At study start, Ss were...
 - obese (BMIs of 30-40)
 - given a 1-hour consultation with dietician
 - given goal of losing 4 pounds per month for 4 months
 - asked to return to lab at end of each month for weigh-in
 - given scale to take home

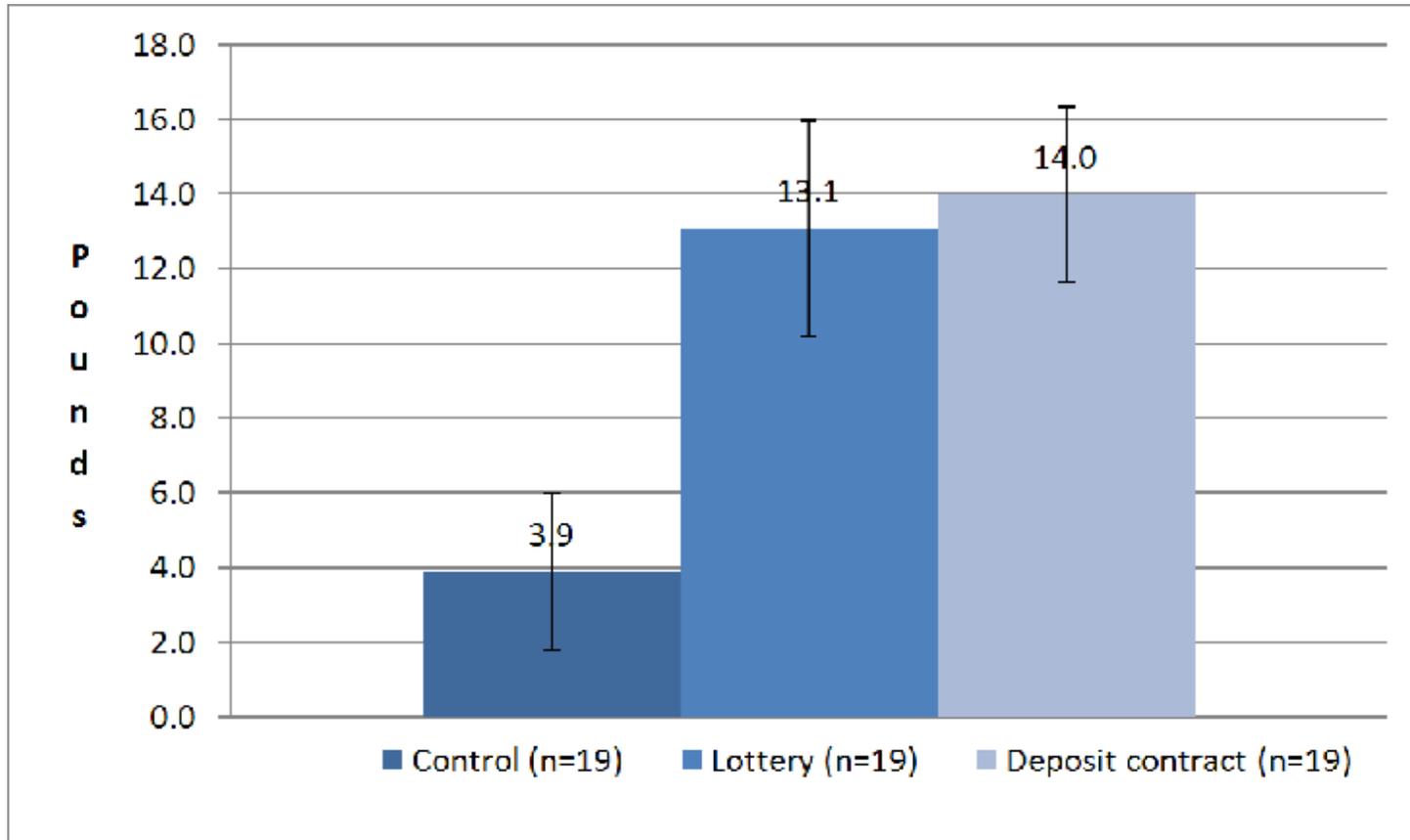
Goal weight loss trajectory



Incentive conditions

- Lottery:
 - Enrolled in daily lottery, but only paid if they call in and below target (Message transmitted to subject whether they won or *would have won* if they had called in below-target weight)
- Deposit contract:
 - Ss can put “money down” (from \$.01 to \$3.00 per day) toward weight loss at beginning of month. Matched 1:1 by us
 - If at or below weight loss goal at end of month, gets paid, and money back; if not, forfeits the \$
- Both conditions:
 - Ss phoned in weight daily
 - Sent daily text message
 - Receive \$ at end of month if study scale corroborated self-reported weights

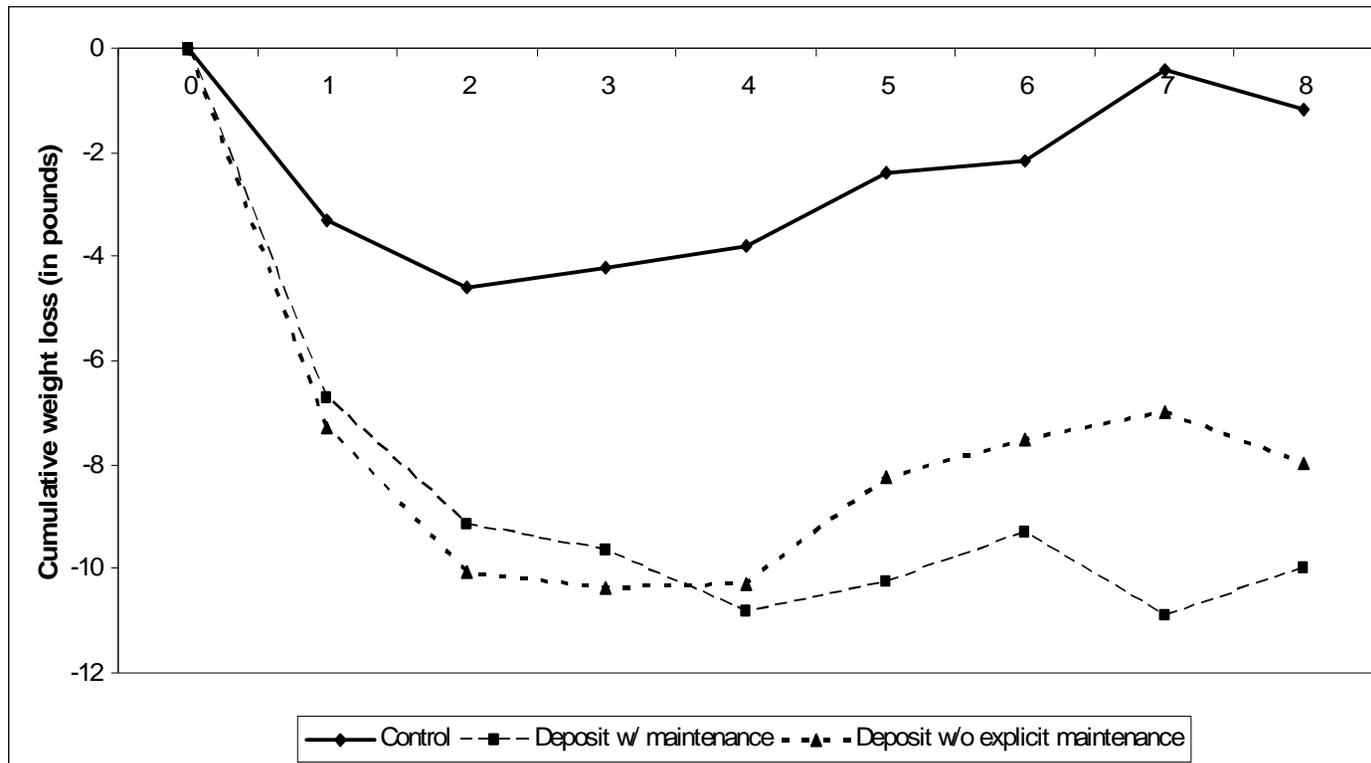
Mean weight loss by condition



- Those successful reported change in exercise, not diet
- However, most weight regained by 7 month follow-up

Similar (but less expensive) approach applied to *extended* weight loss

John, L., Loewenstein, G., Troxel, A., Norton, L., Fassbender, J. & Volpp, K. (2011). 'Financial Incentives for Extended Weight Loss: A Randomized, Controlled Trial. *Journal of General Internal Medicine*.



However, most weight regained at 17 month follow-up

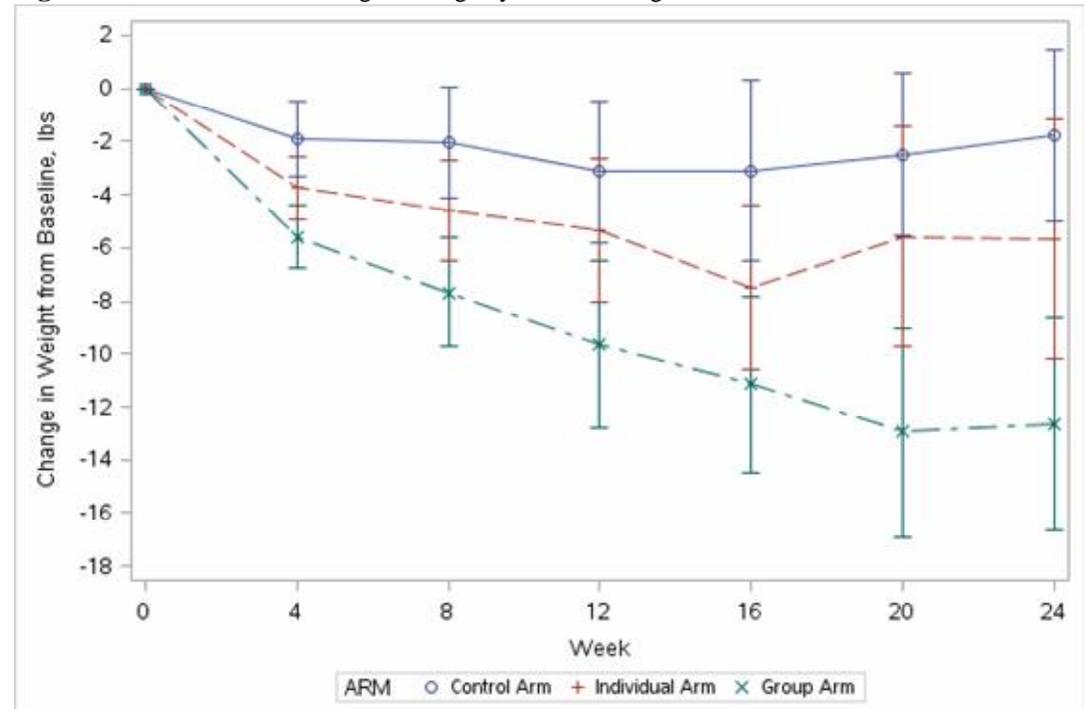
In new work, trying out new types of – e.g., social -- incentives...

- 105 employees of Children’s Hospital of Philadelphia with $40 > \text{BMI} > 30$ given weight loss goal of 1 pound per week for 24 week. 36 week follow-up.

Conditions:

- control: weigh-ins alone
- individual (crude) incentives: \$100/month for hitting target
- group incentives; \$500 per month split between groups of 5, with money shared between those who achieved goal

Figure 2. Mean Cumulative Weight Change by Month during 24-Week Intervention Period



What would it take to reverse the obesity epidemic?



Piecemeal solutions aren't going to do the trick

"We need you not to just tweak around the edges but entirely rethink the products you are offering, the information that you provide about these products, and how you market those products to our children."

But we can't just beg the food industry to do the right thing; we have to realign prices so it is in stake-holders' interest to do the right thing.

The fundamental problem: misaligned incentives

Food industry, schools, other stakeholders, don't directly bear the huge costs to society of health consequences of unhealthy food

The image shows a Cinemark menu board with various food and drink options. The board is divided into several sections: Popcorn, Fountain Drinks, Snacks, Bottled Drinks, and Candy. A large cup of Coca-Cola Zero is featured in the center. The menu items and prices are as follows:

| Section | Item | Price |
|-----------------|------------------|-----------|
| POPCORN | Large Tub | 6.50 |
| | Large | 6.00 |
| | Medium | 5.50 |
| | Small | 4.75 |
| | Junior | 4.00 |
| FOUNTAIN DRINKS | Large | 4.25 |
| | Medium | 4.00 |
| | Small | 3.50 |
| | ICEE | 4.00/4.25 |
| | DAŠANI | 3.75/4.25 |
| SNACKS | Hot Dog | 3.75/4.25 |
| | Nachos | 4.50 |
| | Extra Cheese | 1.50 |
| | Movie Snack Pack | 4.75 |
| | Pickles | 2.25 |
| BOTTLED DRINKS | vitaminwater | 4.25 |
| | FUZE | 4.25 |
| | 20 oz. Sodas | 3.75 |
| | CANDY | 3.50 3.00 |

real Coca-Cola taste zero calories

APPLICABLE SALES TAX INCLUDED

CINEMARK cinemark.com

To align incentives:

- Tax production and sale of unhealthy foods
- Subsidize production and sale of healthy foods (e.g., vegetables and fruit)
- Mandate proportionate pricing of junk food (end supersizing)
- Provide incentives to, e.g., supermarkets and chain restaurants for improving patrons' diets

If we do..

- the food industry will devote its creativity to selling healthy foods
- people, including (low income) parents, will buy healthy food because it is cheaper
- norms will eventually adapt to, and reinforce, healthy behaviors

The best and the good

- Some of the most beneficial interventions are unlikely to be implemented
- If we implement all the easy interventions, however, they don't add up to much (and might even add up to something we don't like)

à We need mid-level solutions – e.g., meatless weekdays, more spending on school lunches