ECONOMIC INCENTIVES AND DISINCENTIVES FOR LIFESTYLE MODIFICATION

Eric Finkelstein, PhD, MHA
Associate Director,
Health Services and Systems Research Program
Outline

- The rational and perhaps not so rational economic agent?
- Literature Review
- My Prior U.S. Studies
- Our Singapore Research Agenda
- Concluding Comments
“Singaporeans are not exercising enough, and they are not eating properly.” ST (8 Nov. 2010, p1-4)

No question that Singaporeans are inactive and do not meet dietary guidelines, but WWAES?
The rational economic agent?
Classical Economic Model

- Individuals maximize the present value of expected future utility subject to constraints
  - Max $U$ (physical activity, diet, …)
    - But health is only one of many things in the utility function, and may be fairly low down?
    - Individuals tend to place a high value on present consumption over future savings
  - Given possible choices, we choose the options that make us best off (i.e., the ones that give us the most utility)
    - Subject to constraints: time, money, biology
- So are we exercising enough and eating properly?
Does reality fit the classical economic model?

What would the model predict if:

- Food prices decrease, which they have, and more so for energy dense foods?
- Technology that promotes a sedentary lifestyle increases, which it has?

The model would predict higher rates of unhealthy food consumption, less physical activity, and more obesity and chronic disease

Which fits the data exceedingly well

Although this may not be the whole story
Behavioral economists and others have developed alternative models to explain the rise in obesity and chronic diseases:

- Prospect Theory
- Bounded Rationality
- Heuristics
- Anchoring
- Irrationality
- Loss Aversion
- Regret
- Myopia/Time inconsistent preferences

Classical model is a tough sell for food consumption:

- Food marketers are well aware they can manipulate behavior
Eating and Irrationality

- Reasons for non-optimizing behavior with respect to food consumption
  - Invisible and uncertain costs vs. immediate benefits
  - Long-run best interest vs. short-term temptation
  - ‘Hard-wired’ to overconsume
Non-Utility Maximizing Behavior

- My view:
  - Classical model
    - Explanation for past
    - Roadmap for trend reversal
  - Insights from other models will also be helpful
  - Even if utility maximizing, individuals do not bear the full costs of their decisions
    - Provides a financial motivation to address rising rates of obesity for employers and government
    - Non-optimizing behavior and other potential market failures provide additional motivation
Economic-Based Solutions

- **Utility Max Answer:**
  - Make it cheaper and easier to engage in healthy behaviors
    - Including thoughtfully designed tax/subsidy policy
  - Use incentives and disincentives to change the costs and benefits of behaviors linked to chronic diseases

- **But other interventions may also be effective that would not be if all were utility maximizers**
  - **Examples:**
    - Changing order of food presentation
    - Changing the size of the plates
Incentives
Evidence

- To date, incentives/disincentives have taken the following forms:
  - Incentives for weight loss or activities that promote weight loss,
  - Effects of price changes on food consumption.
Monetary Incentives in Practice

- Evidence that both traditional and behavioral economic incentives are effective, at least in the short run
  - Positively affect participation and retention in health promotion programs
  - Health behaviors and health outcomes, including diet, physical activity, and weight, all improved in the short-term
    - Degree of effectiveness varied greatly across studies, as did the magnitude and type of incentives offered
- Linking incentives directly to weight was more effective than linking incentives to participation in diet or physical activity-related programs
We used a randomized design to examine the impact of monetary rewards tied directly to the magnitude of weight loss among overweight and obese employees (body mass index [BMI] > 25) in the absence of a structured weight loss program.

- Based on traditional utility maximization theory

The study employed a three-group, randomized design:
- Group A participants received no cash incentive
- Group B participants received $7 for each percentage point of weight lost from baseline (IBW)
- Group C participants received $14 for each percentage point of weight lost.

At 3 months:

- Group A ($0) participants lost an average of 2 pounds (.91 kg)
- Group B ($7) participants lost an average of 3 pounds (1.36 kg)
- Group C ($14) participants lost an average of 4.7 lbs (2.13 kg)
  - Weight loss differences between Group A and Group B were not statistically significant
  - $7 per percentage point of weight loss may be too low
- Odds of achieving 5% weight loss were 5.4 times greater for Group C participants than for Group A participants ($p < .05$).
- Economic incentives of at least $14 per percentage point of weight loss were enough to generate clinically significant weight loss, at least over a 3-month time period.
Another of our studies showed incentives were very effective at increasing short term step activity as measured by a pedometer.

Long-term effects are less compelling.

Meta-analysis of 9 published RCTs that used traditional pay for performance incentives for weight loss with a follow-up of at least 1 year were unable to reject the null hypothesis of no effect (Paul-Ebhohimhen and Avenell).

Jeffery and colleagues (1970s and 1980s) tested the impact of behavioral economic incentives on weight outcomes:

- Individuals assigned to deposit contracts lost significantly more weight than control subjects.
- Larger deposit contracts generated greater weight loss although this difference disappeared over time.
- Group contracts were associated with more weight loss than individual contracts.

More recently, Volpp et al. also showed positive short-term effects for deposit contracts and for lotteries.

Long term weight losses were modest in all cases.
Summary of Incentives For Weight Loss

- Both traditional and behavioral incentives have a short term positive effect
  - Consistent with utility max model
- Little evidence that behavioral economic incentives are better
- Neither produce compelling long term results
  - But that’s the rub for nearly all weight loss interventions
- Research Question: Can we structure an incentive strategy that encourages long term positive behavior changes?
Food Pricing
Food Tax/Subsidy Policy

- World’s First fat tax recently implemented in Denmark
  - 16 kroner ($2.87) levied per kilo of saturated fat
- Utility max model and empirical data suggest this and other tax/subsidy policies will change food purchasing patterns
- But effect on health depends on own and cross price elasticities (i.e., substitutions to alternative products)
  - It is possible some taxes could have perverse effects on both demand and supply side
### Effects of Food Taxes (Examples)

<table>
<thead>
<tr>
<th>Policy</th>
<th>Change in Weight/BMI/Obesity/Deaths</th>
<th>Source</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20% tax on all salty snacks</td>
<td>Weight loss &lt; 0.25 pounds</td>
<td>Kuchler, Abebayehu, and Harris [38]</td>
<td>Simulation based on elasticities</td>
</tr>
<tr>
<td>10% tax on fat (dairy products only)</td>
<td>Negligible. Fat consumption falls about 0.67 grams per day = 6 calories per day</td>
<td>Chouinard et al. [40]</td>
<td>Simulation based on elasticities calculated from scanner data</td>
</tr>
<tr>
<td>10% tax on food away from home</td>
<td>Weight gain of 0.372 pounds (men) and 0.322 pounds (women)</td>
<td>Schroeter, Lusk, and Tyner [34]</td>
<td>Simulation based on elasticities</td>
</tr>
<tr>
<td>10% tax on soft drinks</td>
<td>Weight loss of 0.189 pounds (men) and 0.122 pounds (women)</td>
<td>Schroeter, Lusk, and Tyner [34]</td>
<td>Simulation based on elasticities; diet drinks exempt from tax</td>
</tr>
<tr>
<td>Each 1 percentage point increase in tax on soft drinks</td>
<td>0.003 percentage point decrease in body mass index; 0.01 percentage point decrease in obesity and overweight</td>
<td>Fletcher, Frisvold, and Tefft [36]</td>
<td>Regression; tax has statistically significant effect; bigger effects for low-income persons</td>
</tr>
</tbody>
</table>

- When statistically significant effects were found, the effects were generally small (Powell and Chaloupka)

Study 1: Impact of Targeted Beverage Taxes on Higher and Lower Income Households
Study 2: The Impact of Targeted Beverage Taxes on Higher and Lower Income Households

- In US, SSBs account for 7% of all calories consumed
- Average American consumes 50 gallons of SSBs annually
- Real price of SSBs has declined dramatically relative to other food items
- 40 States and DC have levied small taxes on SSBs.
- Many locations have or are considering larger taxes
Two Concerns

1. Are they effective?
   - May reduce calories from SSBs, but consumers may switch to other beverages or even foods
   - Net effect could be less

2. Are they regressive?
   - Might disproportionately affect lower-income households
Research Questions

- Explore the effects on calories and weight by income strata resulting from a 20% or 40% tax on:
  - Carbonated SSBs only
  - All SSBs
- Estimate the tax revenues generated from a tax that raised market prices by 20% and 40%
- Note – analyses limited only to beverage calories, including carbonated sugar-sweetened beverages (SSBs), fruit drinks, sports/energy drinks, diet carbonated beverages, fruit juices, skim milk and whole milk
Daily Per Capita Effect of 20% or 40% All SSB Tax Increases on 1) All SSB Calories or 2) All Beverage Calories Purchased

Full results published in Archives of Internal Medicine
Effect on Weight

- An SSB tax that raises prices by 40% results in a weight reduction of at most 0.6 kg per household member per year, nearly all in middle income households.
  - But a 40% tax does not raise prices by 40%.
  - At least part of the decrease may be offset by increases in consumption of other foods.
- Hold that thought
Tax Implications

- Largest effect of the tax would likely be to **raise revenue**.
  - 20% tax on store-bought SSBs would generate US$1.5 billion per year
  - 40% tax generates US$2.52 billion per year
- Even fairly large SSB taxes would have only a **modest effect on food expenditures**.
  - Tax burden is less than US$30 per household per year on average for a 40% tax.
Ongoing Research: Effect of SSB Taxes: Part II (with same authors)

- Prior study was almost guaranteed to show a reduction in total calories.
- Switching occurred from higher calorie per dollar drinks to lower calorie per dollar drinks.
- What happens when switching includes products that are higher in calories per dollar than SSBs and viable substitutes?
- Ongoing study testing the effects when expanded to include both food and beverage categories.
Taxes on a single product line (e.g., SSBs) are unlikely to have a significant effect on calories or weight (supported by several studies)

- Too small a percent of total calories consumed
- Too easy to substitute to other products

Suggests tax/subsidy strategy will need to be broad-based to be successful
Study 2 - The Influence of Taxes and Subsidies on Total Energy Purchased

- Research Question – To what extent can modest broad-based taxes and subsidies on less and more healthful foods be used to improve diet quality?

- Key Considerations
  - Substitution effects
  - Could subsidies lead to weight gain?
The Setup:

- Lab experiment in which participants were brought in to ‘shop’ as if it were a real store.
- Shoppers faced current prices, subsidies of 12.5% and 25%, and taxes of 12.5% and 25% (but not both together).
  - Taxes were on high-calorie for nutrient (HCFN) foods.
  - Subsidies on low-calorie for nutrient (LCFN) foods.
- Participants were provided with a range of HCFN and LCFN foods and beverages and a fixed budget and asked to purchase food for the family for one week.
Experiment: The influence of taxes and subsidies on energy purchased

- **Results**
  - Subsidy *increased* purchases of both LCFN and HCFN foods
  - Tax *reduced* purchases of unhealthy foods and increased purchases of healthy foods, but not enough to generate an increase in calories
    - Results suggest that a 10% tax on HCFN foods would reduced calories by 6.5%, fat by 12.8% and carbohydrates by 6.2%
Take Away Points

- Taxes alone appeared more effective than subsidies alone for improving diet quality (consistent with a few other studies).
- Subsidy resulted in an *increase* in calories, carbohydrates, protein and fat purchased.
- Tax resulted in a *decrease* in energy, fat and carbohydrates purchased.
- But is this the best tax/subsidy strategy?
  - I doubt it
  - We are currently testing several others, including one based on overall nutritional quality of the foods.
  - Have plans to continue this research in Singapore.
Singapore Research Agenda (funded projects)
Singapore Research Agenda (Funded Projects)

- An Exploratory Randomized Controlled Trial of a Novel Family-Based Intervention (FIT) to increase Outdoor Time for the Prevention of Myopia and Increase Physical Activity among Singaporean Youth (Funded by NMRC)
- A Blueprint for Identifying Successful Walking Program Targeting Singaporeans Age 50+(Funded by NUS-VISA)
- A Randomized Incentive-Based Weight Loss Trial in Singapore (Funded by GAI-NIHA)
- A Randomized Trial of Economic Incentives to Promote Walking Among Full Time Employees (Funded by MOH)
AN EXPLORATORY RANDOMIZED CONTROLLED TRIAL OF A NOVEL FAMILY-BASED INTERVENTION TO INCREASE OUTDOOR TIME FOR THE PREVENTION OF MYOPIA AND INCREASE PHYSICAL ACTIVITY AMONG SINGAPORE YOUTH

PRINCIPAL INVESTIGATORS:

DR. SAW SEANG MEI, Associate Professor, Epidemiology and Public Health, NUS
DR. ERIC A. FINKELSTEIN, Associate Director & Associate Professor, Health Services and Systems, Duke-NUS

CO-INVESTIGATORS:

DR. ECOSSE LAMOUREUX, Associate Professor, Ophthalmology, University of Melbourne
DR. VICKY BLAIR DRURY, Assistant Professor, Nursing, NUS
DR. WONG TIEN YEN, Professor, Singapore Eye Research Institute, Singapore National Eye Center
DR. CHAN MEI FEN, Deputy Director, Research and Evaluation, Health Promotion Board
DR. ROBERT ALAN SLOAN, Deputy Director, Adult Health Division, Health Promotion Board
DR. TAN SAY BENG, Associate Professor, Statistics, Singapore Clinical Research Institute
DR. LEE CHUN FAN, Statistician, Statistics, Singapore Clinical Research Institute
Motivation

- Myopia and physical inactivity are huge public health problems in Singapore and worldwide.
- Studies have shown that successful efforts to increase outdoor time among youth could improve myopia outcomes.
- **The research question**: *Can we develop a strategy to increase outdoor physical activity among Singapore youth?*
Strategy and Research Design

- **Strategy**: Combine incentives for walking (as measured via pedometers) with structured outdoor programs
  - Incentive – $30 value per month if a child logs 8,000 steps per day on at least half the days of a month
  - A structured weekend outdoor program organized in conjunction with National Parks
    - Monthly lottery of roughly $100 eligible to families who attend park visits

- **Research Design** - Randomized Controlled Trial (RCT) with two arms (incentives and control)
Primary outcome:
- 6 min walk test
- Pedometer steps
- Time spent outdoors and on physical activity

Key Secondary outcomes:
- BMI of family members
- Assessment of refraction of child
- Intervention costs and who pays

Hypothesis is that intervention program will increase step activity and outdoor time
FIT Study results

Number of days with 8000+ steps: 30 out of 31 days = 97% (compared to 77% for all children)
Average steps per day: 10361 steps (compared to 9102 steps for all children)

Won the prize: YES
FIT Study Preliminary Results

Average steps

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>9000</td>
</tr>
<tr>
<td>July</td>
<td>9500</td>
</tr>
<tr>
<td>June</td>
<td>8500</td>
</tr>
<tr>
<td>May</td>
<td>8000</td>
</tr>
<tr>
<td>April</td>
<td>7000</td>
</tr>
</tbody>
</table>

Percentage of children who won award

<table>
<thead>
<tr>
<th>Month</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>75%</td>
</tr>
<tr>
<td>June</td>
<td>80%</td>
</tr>
<tr>
<td>April</td>
<td>85%</td>
</tr>
</tbody>
</table>
Status Update

- Follow-up assessments to begin in February, 2012
A BLUEPRINT FOR IDENTIFYING A SUCCESSFUL WALKING PROGRAM TARGETING SINGAPOREANS AGE 50+

PRINCIPAL INVESTIGATOR:

**DR. ERIC A FINKELSTEIN**, Associate Director & Associate Professor, Health Services & Systems Research Program, Duke-NUS

COLLABORATORS:

**DR. ANGELIQUE CHAN**, Associate Professor, Dept of Sociology & Program in Health Services and Systems Research, DUKE-NUS

**DR. BENJAMIN A HAALAND**, Assistant Professor, Office of Clinical Sciences, Duke-NUS

**DR. ROBERT A SLOAN**, Deputy Director, Adult Health Division, Health Promotion Board
Motivation

- Majority of Singaporean adults do not meet public health recommendations for physical activity.

- Older adults age 50+ are of particular interest. Compared to the general population:
  - Higher proportion are inactive or engage in limited physical activity (60+%).
  - Higher prevalence of chronic disease.
  - Have significantly higher medical costs.
  - May avoid disability through physical activity.
  - Retired do not benefit from workplace health promotion.

- Overwhelming evidence that many age-related diseases can be prevented through sustained increases in physical activity.
Research Design

- **2 year research study:**
  - Year 1: Focus groups, Stated preference conjoint survey
  - Year 2: Pilot testing through randomized controlled trial

- Special emphasis on the role of modest financial incentives in influencing participation rates
  - 4 types of financial incentives: Cash, Medisave dollars, Sporting vouchers and Supermarket vouchers
  - Hypothesize that participants will value cash above other forms, but by how much

- Goal of survey is to identify a cost-effective strategy to increase program uptake, which will be tested in Year 2
Stated Preference Survey:
What is Conjoint Analysis?

- Quantitative method that is a form of stated preference (SP) research
- First developed in marketing, environmental economics (80s)
- More recently used in public health and health care:
  - Diabetes prevention program (NCCDPHP)
  - Newborn screening (NCBDDD)
  - Vaccination for HPV (NCIRD)
  - Pharmaceuticals, etc.
What is Conjoint Analysis? (cont.)

- Method centers around choices and tradeoffs
  - Which do you prefer: A or B?
  - Realistic, in theory—we make tradeoffs continually every day
- Tends to be very good at unpacking preferences of what is important to respondents
  - What matters and how much?
  - Not as good as predicting uptake (buy/enroll)
- Useful when we seek data on scenarios or choices that
  - Do not yet exist (potential walking programs)
  - For which there are no alternatives (1 vaccine)
  - Cannot directly be purchased in the marketplace (clean air)
Which program do you prefer?

<table>
<thead>
<tr>
<th>Features</th>
<th>Program A</th>
<th>Program B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of sessions required per week (over 6 months)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Travel time (round trip)</td>
<td>45 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Travel cost (round trip)</td>
<td>S$5</td>
<td>S$5</td>
</tr>
<tr>
<td>Incentive payment (at 6 months)</td>
<td>S$450</td>
<td>S$300</td>
</tr>
<tr>
<td>Type of incentive</td>
<td>Cash payment</td>
<td>Credit into your Medisave account</td>
</tr>
<tr>
<td>One time Enrollment fee</td>
<td>S$50</td>
<td>S$20</td>
</tr>
</tbody>
</table>

How likely is it that you would join your preferred program if it were offered to you?
## Example Conjoint Question 2

**Which program do you prefer?**

<table>
<thead>
<tr>
<th>Features</th>
<th>Program A</th>
<th>Program B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of sessions required per week (over 6 months)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Travel time (round trip)</td>
<td>30 minutes</td>
<td>45 minutes</td>
</tr>
<tr>
<td>Travel cost (round trip)</td>
<td>S$2</td>
<td>None</td>
</tr>
<tr>
<td>Incentive payment (at 6 months)</td>
<td>S$450</td>
<td>S$300</td>
</tr>
<tr>
<td>Type of incentive</td>
<td>Supermarket voucher</td>
<td>Cash payment</td>
</tr>
<tr>
<td>One time Enrollment fee</td>
<td>S$50</td>
<td>None</td>
</tr>
</tbody>
</table>

Which program do you prefer? (Please check one box.)

How likely is it that you would join your preferred program if it were offered to you?
Status Update

- Results allow for understanding tradeoffs between attribute levels (such as the value of a cash $ vs. a Medisave $) and for identifying the program with the maximum uptake.

- Survey is being fielded between Oct. and Dec. 2011.

- Pilot study to begin in the spring of 2012.
A RANDOMIZED INCENTIVE-BASED WEIGHT LOSS TRIAL IN SINGAPORE

PRINCIPAL INVESTIGATOR:
Dr. Eric A Finkelstein, Associate Director & Associate Professor, Health Services & Systems Research Program, Duke-NUS

COLLABORATORS:
Dr. Tham Kwang Wei, Consultant, Dept of Endocrinology, SGH
Dr. Shanker Pasupathy, Consultant Surgeon, Dept of General Surgery, SGH
Dr. Benjamin A Haaland, Assistant Professor, Office of Clinical Sciences, Duke-NUS
Motivation

- Obesity is increasingly prevalent and costly in Asia
- Existing weight loss and diet/exercise programs have universally shown limited reach, high attrition, and only short term effectiveness
- **The research question:** *Can we develop a program that addresses these shortcoming and that is within the range of what employers, insurers and governments might would be willing to endorse?*
- **Strategy:** Incorporate economic incentives into existing evidence based weight loss programs to increase their reach and effectiveness
Use a Randomized Controlled Trial (RCT) to test the extent to which traditional or behavioral economic incentives, when combined with an existing evidence-based weight loss program, improve weight loss and weight loss maintenance.

The program is designed so that:

- It is grounded in economic theory
- It appeals to potential participants
- It appeals to potential funders
- It has a strong chance of being effective and cost-effective
- It is easily adaptable to other behaviors (e.g., physical activity) and other settings (e.g., worksites, communities, …)
Randomize overweight participants into one of 2 Arms

All participants receive a 14 week intensive weight loss program adapted from the Diabetes Prevention Program for use in Singapore

Those randomized to Arm 2 receive traditional or behavioral economic incentives for meeting weight loss and step goals

- Behavioral incentive options involves receiving a lottery ticket of the same expected value
- Theory says lotteries may work better

All participants pay a fee to access the program such that 3rd party cost sharing is minimized (but not zero)

- Provides ‘skin in the game’
Research Design: Incentive Payouts

- Participant pay-in:
  - $235 for Program
  - $165 for access to the Incentive programs

- Maximum Incentive payout:
  - $560 per participant.

- Behavioral incentive payouts replace Amount with a lottery ticket with a 10% chance of winning 10x the amount and a 90% chance of winning $0.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Timing</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly weight-loss goal (1kg)</td>
<td>Weeks 1, 2, 3, 4 Months 3, 4, 5, 6, 7, 8</td>
<td>$20 sub-total: $200</td>
</tr>
<tr>
<td>Monthly pedometer goals (10k steps on 20 days/mo)</td>
<td>Months 1-8</td>
<td>$20 sub-total: $160</td>
</tr>
<tr>
<td>4-mo weight loss goal (5% WL)</td>
<td>Month 4</td>
<td>$100</td>
</tr>
<tr>
<td>8-mo weight loss goal (8% WL)</td>
<td>Month 8</td>
<td>$100</td>
</tr>
<tr>
<td></td>
<td>Total: $560</td>
<td></td>
</tr>
</tbody>
</table>
Primary outcome:
- weight loss at 12-months

Key Secondary outcomes:
- weight loss at 4- and 8-months
- Intervention costs and who pays

Hypothesis is that incentive program will increase weight loss at all time points through month 12 and be good value for money (cost–effective) to funders
Status Update

- Awaiting IRB approval to begin recruitment
A RANDOMIZED TRIAL OF ECONOMIC INCENTIVES TO PROMOTE WALKING AMONG FULL TIME EMPLOYEES

PRINCIPAL INVESTIGATOR:

DR. ERIC A FINKELSTEIN, Associate Director & Associate Professor, Health Services & Systems Research Program, Duke-NUS GMS

CO-INVESTIGATORS:

DR. ROBERT A SLOAN, Deputy Director, Adult Health Division, Health Promotion Board
DR. BENJAMIN A HAALAND, Assistant Professor, Office of Clinical Sciences, Duke-NUS GMS
DR. DAVID B MATCHAR, Program Director & Professor, Health Services & Systems Research Program, Duke-NUS GMS
Motivation

- Focus on worksites:
  - National Health Survey 2010 reveals a large decrease in physical activity levels among employees, especially among those above age 35
  - MOM data reveal that 77% of Singaporeans aged 25-64 participate in the work force in some way;
  - Worksites are a natural and effective setting in which to promote the health and well-being of both employees and management.
  - There are health and financial benefits from implementing effective worksite programs
Motivation

- The research question: Can we develop a worksite program that is 1) effective, 2) has broad appeal among employees, and 3) is within the range of what employers, insurers and/or governments might be willing to pay?

- The strategy:
  - Focus on walking/jogging and build the intervention around evidence-based programs that include pedometers, goal setting, activity logs and timely feedback.
  - Test direct cash incentives against incentives dedicated to a charity of the participant’s choosing.
RCT Design: 6 Month Program with Assessments at 6 and 12 months

- Work site recruitments (16 worksites)
- Primary Assessments: (Accelerometry and UKK2KM Test)
- Randomization (Per study arm: 4 work sites, n=30 each)

Arms:
- Arm 1: Control Arm
- Arm 2: Basic Pedometer Program
- Arm 3: Cash Incentive Group
- Arm 4: Charitable Incentive Group

Follow-up Assessments 6 and 12 months

Outcome:

- **Primary outcome:**
  - MVPA (Moderate to Vigorous Physical Activity) bouts at 6 and 12 months via accelerometry
  - UKK2KM Test Results

- **Key Secondary outcomes:**
  - Cardiovascular fitness: VO\textsubscript{2Max}
  - Self-reported PA: CHAMPS questionnaire
  - Health and Health-Related Quality of Life: SF36
  - Others tbd

- **Hypothesis:**
  MVPA bouts and fitness scores will be lowest in the control group, followed by group with basic pedometer program and will be highest in the incentive arms.
## Research Design: Payouts

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Timing</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline and follow-ups</td>
<td>Month 1, 6 and 12</td>
<td>$15, $25, $25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-total: $65</td>
</tr>
<tr>
<td>Monthly pedometer goals (10k steps on 20 days/month)</td>
<td>Weekly</td>
<td>$0 for clocking &lt; 60 minutes for aerobic activity a week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$15 for clocking between 60 and 150 aerobic minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$30 for &gt;150 aerobic minutes during the week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-total: $780</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total: $845</td>
</tr>
</tbody>
</table>

- Maximum incentive payout is $780.
Status Update

- Awaiting IRB approval
Concluding Comments
Rising rates of diabetes and other chronic diseases per se do not suggest individuals are making ‘bad’ choices.

But that is little consolation to payers.

**WWAES**
- Government interventions are justified to address market (or govt.) failures.
- Saving money may be a goal but cost-saving interventions remain elusive.
- Better to look for good value for money.
- Successful interventions will need to make it cheaper and easier to engage in healthy behaviors if they are to be sustained.

More research is needed to find effective, sustainable interventions.