Behavioral Economics as An Implementation Strategy to Improve Reach

Wen You

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Road Map

- Behavioral Economic Brief Intro
- Implementation Research + BE = ?
- Selected Concepts & Applications
- BE Informed Implementation Research Protocol Example
- Case Study Illustration
Behavioral Economics

- Interdisciplinary field: psychology + economics + ...
- Differs from psychology: considers the contexts and institutions under which decisions are made
- Differs from economics: uses more realistic and more complicated model for decision making
- Overall: BE studies how the context of decisions interacts with our expanding understanding of human psychology

- It is not based on “irrationality”
- It is not about “controlling” behaviors
Behavioral vs. Traditional Economics

- Traditional view of economics:
  - have unlimited rationality and stable preferences
  - have absolute self-control
  - can do optimization effectively under all circumstance

- BE challenge those: We are just human
  - have bounded rationality → not accurately processing all info
  - have bounded willpower → not have absolute self-control
  - have bounded selfishness → not max benefit for self always
Nudge

Improving Decisions About Health, Wealth, and Happiness

Richard H. Thaler and Cass R. Sunstein

Revised and Expanded Edition

Thinking, Fast and Slow

Daniel Kahneman

Winner of the Nobel Prize in Economics

NEW YORK TIMES BESTSELLER

MORE THAN 750,000 COPIES SOLD
Context:
This is the menu of J.J. lunch order for tomorrow’s workshop working lunch time together

What is your choice?
Context:
This is the menu of J.J. lunch order for your lunch break when you will eat alone

What is your choice?
You had a long day at work. You picked up your kid from daycare and stopped by J.J. to order for you and your husband. You are trying to be careful with calories. You had 620 cal for BF and 550 cal for lunch. You try to stay within 2,000 cal.

Now, what is your choice?
Implementation Research + BE = ?

<table>
<thead>
<tr>
<th>Implementation Research</th>
<th>Implementation Research + BE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed to increase knowledge</td>
<td>Designed to change the environment/context</td>
</tr>
<tr>
<td>Encourages stakeholder involvement but needs more efficient operation of how</td>
<td>Multilevel-incentivized systematic approach recognizing asymmetric information flow</td>
</tr>
<tr>
<td>RCT testing of whether or not IS work but lacks testing of mediation and pathways</td>
<td>Provide platform for developing statistical approaches that allow multilevel mediation analysis</td>
</tr>
</tbody>
</table>
4 REASONS
you should add behavioral economics (BE) to your implementation team's toolkit.

New perspectives on the work & the team.
BE insights can prompt the team to explore new approaches, as well as reflect on how its own biases impact the work.

Increased empathy for 'change resisters'.
BE helps us to understand the biases, which most of us have, that make resistance happen. Resistors aren’t difficult so much as they are human.

More realistic expectations – change is hard!
Research from BE illustrates why change is inherently hard to implement. Challenges are not a sign a failure; they should be expected and planned for.

It’s a complement, not an alternative.
BE insights are not all purpose solutions. BE can best be used in conjunction with other methods, and a strong understanding of context.
Selected Concepts & Applications

- The Power of Social Norms:
  - People tend to behave in accordance with real or perceived social norms
  - Example: Pro-environmental behaviors uptake

Injunctive

Descriptive

Fig. 1. Home energy report: social comparison module.
Selected Concepts & Applications

- Framing Effect:
  - Present choices in a way that highlights the positive or negative aspects of the same decision, leading to changes in their relative attractiveness
  - ✓ risky choice framing
  - ✓ attribute framing
  - ✓ goal framing

- Substance use disorder treatment
- Anxiety or mood disorder treatment

Targeting less stigmatized risk factors/disorders that are associated with main treatment goal
Selected Concepts & Applications

- Status Quo Bias / Inertia
  - People tend to prefer for things to remain the same: tendency not to change behavior without strong incentives
  - Classic application: ‘opt-in’ vs. ‘opt-out’

Do Defaults Save Lives?

Eric J. Johnson*, Daniel Goldstein
* See all authors and affiliations

DOI: 10.1126/science.1091721

![Graph showing effective consent rates, online experiment, as a function of default.](image-url)
Selected Concepts & Applications

- **Incentives:**
  - Something that motivates an individual to perform an action
  - They can help to create desirable and break undesirable habits
  - Upfront incentives can address present bias (i.e., focusing on immediate gratification)

*Figure 2: BEA™ Behavioral Change Matrix*
How to Design Better IS Through BE?

Transforming Mental Health Delivery Through Behavioral Economics and Implementation Science: Protocol for Three Exploratory Projects

Rinad S Beidas¹,²,³, PhD; Kevin G Volpp²,³,⁴,⁵,⁶,⁷,⁸, MD, PhD; Alison N Buttenheim²,³,⁴,⁹, PhD, MBA; Steven C Marcus¹⁰, PhD; Mark Olfson¹¹, MD, MPH; Melanie Pellecchia¹, PhD; Rebecca E Stewart¹,³, PhD; Nathaniel J Williams¹², PhD, LCSW; Emily M Becker-Haimes¹, PhD; Molly Candon¹,³, PhD; Zuleyha Cidav¹,³, PhD; Jessica Fishman¹,¹³, PhD; Adina Lieberman¹, MPH; Kelly Zentgraf¹, BA; David Mandell¹, ScD
Protocol Example

- Project: motivating outpatient therapists to implement: valuing a team effort (organizational-level)
  - Participatory design approach:
    - 1st: **innovation tournament** among clinicians (end users) → best ways for organizations to use incentives
    - 2nd: **behavioral diagnosis process** to refine ideas from 1st → identify specific barriers impeding the use of EBP → IS
    - 3rd: **discrete choice experiment** to systematically elicit and quantify stakeholder’s preferences on how IS are designed and structured → quantify the extent to which specific design features are desired
Case Study Illustration

Designing Financial Incentives to Enhance Participation of Target Populations in Weight Loss Programs

Research Team:
- Wen You (AAEC VT, VT Fralin Translational Obesity Research Center)
- Kevin Boyle (AAEC VT)
- Paul Estabrooks (HNFE, VT Fralin Translational Obesity Research Center, VT Carilion)
- Richard Seidel (PSYC, VT Carilion)
- Yuan Yuan (Ph.D. Candidate, AAEC VT)
- Barbara Kanninen (BK Econometrics, LLP)
- Christopher Parmeter (ECON, U of Miami)
Puzzle: Is Help Not Needed?

Figure S.3: Average Participation Rates of Employees Identified for Inclusion in Select Wellness Program Components

<table>
<thead>
<tr>
<th>Wellness program component</th>
<th>HRA</th>
<th>Clinical</th>
<th>Fitness</th>
<th>Smoking cessation</th>
<th>Weight/obesity</th>
<th>Disease management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation rate</td>
<td>46%</td>
<td>46%</td>
<td>21%</td>
<td>7%</td>
<td>10%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Notes: The graph represents information from employers with at least 50 employees that offer the specific component as part of a wellness program.
Literature Summary

- Four decades ago (Jeffery, 1978)
- Mostly focused on Effectiveness and “Stick”
- Short-term effectiveness that cannot be sustained
- Few reported Representativeness and Reach
- Arbitrarily set incentive arms with limited variations

Kane et al. 2004a,b; Paul-Ebhoimhen and Avenell, 2008; Wall et al., 2006; Finkelstein et al., 2007; Volpp et al., 2008, 2012; Jeffery 2012
"...many important questions about the use of incentives have not yet been clearly answered..."

"...Major obstacles to sustained applications of incentive in weight control are funding sources and acceptance by those who might benefit."

"Another important issue that has received almost no attention is whether financial incentives for weight control are useful at all in people who are not interested in losing weight."

"...little or no research has been published to evaluate population reach..."
Why Reach is Unique Here?

**Diabetes Program**

- Are you saying that I am fat?
- This is a sickness?!
- Heavier is not a bad thing in my culture
- Is my schedule flexible?

**Weight Loss Program**

- Is my schedule flexible?
Importance of Reach

- Incentivize people into doing exercise first
- The habits can be maintained after incentives are withdrawn
- Crowding-Out (i.e., backfire)?
Study Objectives

- Answer: how can we get people into the program at the first place?

- Examine: whether program acceptance differ across subgroups:
  - Obesity-vulnerable group: Black, low-income females
  - Intervention trials under-studied group: males

- Investigate: how to better construct incentive arms for weight loss programs to achieve better population reach
Methods

- Participatory Approach:
  - 1\(^{\text{st}}\): Focused group meetings to identify attributes and levels of incentive design
  - 2\(^{\text{nd}}\): Discrete choice experiment (DCE) to elicit and quantify individual preference towards incentive constructions

- Policy-friendly ways to translate DCE results
  - Partial log-likelihoods and probability analysis
  - Form a synthetic population via cross-tabulation of NHANES
1st: Involving the End-Users

- A two-hr listening sessions with 22 EFNEP program assistance and nutrition outreach instructors (Richmond, VA)

- Four focus group meetings were held with DCE eligible participants (overweight/obese adults) recruited from Virginia Cooperative Extension and Carilion Clinic
Weight control program

This section is about a weight control program to start people on the path to losing weight. It is 6 months long, which is 24 weeks. People who followed this program closely lost about

1-2 lbs per week results in 24-48 lbs over 24 weeks

Each picture below represents one part of the program.

Dietitian meeting
Have a one-time meeting with a dietitian to develop personal diet and exercise plans.

Coaching calls
Receive weekly calls to help you follow your diet and exercise plans.

Diet plan
Use a personal workbook with recipes and more to plan healthy meals.

Diet tracking
Record meals and snacks online or on paper. Find out how many calories you ate.

Exercise plan
Use a personal workbook to plan exercise that’s just right for you.

Exercise tracking
Record physical activity online or on paper. Find out how many calories you used.

Program weigh-ins
Weekly weight checks at program location. Only program staff will see your weight.

Weight Control Survey
brought to you by CARILLONCLINIC
Program Incentives

The weight control program described in Section B can include incentives for participation. The information on this page is about different incentives that can be added to the program.

Program location
This is where you go for the weekly weight checks and meet with the dietician. It is not where you have to exercise.

Examples
- Clinic
- Workplace
- Community center
- Church

Weekly weight control goal
You must achieve this goal to earn the reward each week. Some weeks you may not meet the goal. In those weeks you will not earn the reward.

Examples
- Losing 2 lbs
- Turning in complete records of diet and exercise
- Attending weekly weigh-ins

Weekly reward available
This is the dollar value of the weekly reward. You have an opportunity each week to earn this reward by achieving your weekly weight control goal.

Examples
- $5 per week
- $24 per week
- $36 per week

Payment Frequency
This is how often you get paid the rewards you have earned. Remember that you earn rewards by achieving the weekly weight control goal.

Examples
- Weekly
- Monthly
- Quarterly
- Once at program end

Payment Form
This is how you are paid. Each type will have the same dollar value as if you were paid in cash.

Examples
- Cash or debit card
- Pre-paid gym pass
- Health debit card for doctor’s visits, prescriptions, and other medical expenses
2\textsuperscript{nd}: DCE – Incentive Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Attribute levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward amount</td>
<td>$0, $48, $96, $216, $384, $576</td>
</tr>
<tr>
<td>Payment form</td>
<td>Cash Pre-paid gym pass (gym) Health debit card for doctor’s visits, prescriptions, and other medical expenses (medical) Debit card (debit)</td>
</tr>
<tr>
<td>Payment frequency</td>
<td>Once at end of program (once) Quarterly Monthly Weekly</td>
</tr>
<tr>
<td>Program location</td>
<td>Clinic Workplace Community center Church</td>
</tr>
<tr>
<td>Reward condition</td>
<td>Losing 2 lbs (weight) Attending weekly weight checks (attendance) Turning in records of diet and exercise (compliance) Attending weekly weight checks and turning in records of diet and exercise (att.comp)</td>
</tr>
</tbody>
</table>

Full-Factorial Design would need: $6 \times 4^4 = 1,536$ unique combination

D-efficiency Design reduces to 96 pairs!
Please consider the following two weight control programs.

<table>
<thead>
<tr>
<th></th>
<th>Program A</th>
<th>Program B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program location</td>
<td>Workplace</td>
<td>Church</td>
</tr>
<tr>
<td>Weekly weight control goal</td>
<td>Turning in records of diet and exercise</td>
<td>Losing 2 lbs</td>
</tr>
<tr>
<td>Weekly reward available</td>
<td>$24</td>
<td>$16</td>
</tr>
<tr>
<td>Payment frequency</td>
<td>Weekly</td>
<td>Monthly</td>
</tr>
<tr>
<td>Payment form</td>
<td>Pre-paid gym pass</td>
<td>Debit card</td>
</tr>
<tr>
<td>Total reward available in program</td>
<td>$24 \times 24 wks = $576</td>
<td>$16 \times 24 wks = $384</td>
</tr>
</tbody>
</table>

Which weight control program would you choose?

1. Program A
2. Program B
3. I would not choose either program.

2nd: DCE – Example Choice Question

Weight Control Survey

brought to you by CARILIONCLINIC
### 2nd: DCE – Survey Implementation

<table>
<thead>
<tr>
<th>Initial Letter</th>
<th>• 7,554 overweight/obese and Medicaid eligible adults (identified via Carilion electronic patient database through 3 rounds of data draw)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Call</td>
<td>• 3,371 individuals were reached over the phone to ask for their willingness to participate in the mail survey</td>
</tr>
<tr>
<td>Mail Survey</td>
<td>• 2,737 mail surveys were sent out to individuals who agreed over the phone (82%) to the survey</td>
</tr>
<tr>
<td>Final Data</td>
<td>• 1,297 completed surveys were returned (47%)</td>
</tr>
</tbody>
</table>
## DCE Results – Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Sample</th>
<th>Virginia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 years and over</td>
<td>15.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>43.1%</td>
<td>50.9%</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>49.0%</td>
<td>71.3%</td>
</tr>
<tr>
<td>Black</td>
<td>41.1%</td>
<td>19.8%</td>
</tr>
<tr>
<td>Native American</td>
<td>0.48%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Asian</td>
<td>4.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino origin</td>
<td>7.1%</td>
<td>8.2%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate or higher, percent age 25+</td>
<td>87.0%</td>
<td>86.6%</td>
</tr>
<tr>
<td>Bachelor’s degree or higher, percent age 25+</td>
<td>27.1%</td>
<td>34.4%</td>
</tr>
<tr>
<td>Persons per household</td>
<td>2.8</td>
<td>2.6</td>
</tr>
</tbody>
</table>
### DCE Results – Random Parameter Logit

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Means</th>
<th>Standard deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASC:SQ</td>
<td>0.050</td>
<td>1.378***</td>
</tr>
<tr>
<td></td>
<td>(0.113)</td>
<td>(0.077)</td>
</tr>
<tr>
<td><strong>Reward amount</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(Mag + 1)</td>
<td>0.362***</td>
<td>0.453***</td>
</tr>
<tr>
<td></td>
<td>(0.042)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>Mag.0</td>
<td>0.184</td>
<td>0.862***</td>
</tr>
<tr>
<td></td>
<td>(0.131)</td>
<td>(0.130)</td>
</tr>
<tr>
<td><strong>Program location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workplace/Clinic</td>
<td>-0.244***</td>
<td>-0.433***</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.099)</td>
</tr>
<tr>
<td>Community center/Clinic</td>
<td>0.174***</td>
<td>0.120</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.116)</td>
</tr>
<tr>
<td>Church/Clinic</td>
<td>-0.180***</td>
<td>0.361***</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.104)</td>
</tr>
<tr>
<td><strong>Payment form</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gym/cash</td>
<td>-0.129*</td>
<td>0.497***</td>
</tr>
<tr>
<td></td>
<td>(0.052)</td>
<td>(0.115)</td>
</tr>
<tr>
<td>medical/cash</td>
<td>-0.182***</td>
<td>0.312**</td>
</tr>
<tr>
<td></td>
<td>(0.049)</td>
<td>(0.113)</td>
</tr>
<tr>
<td>debit/cash</td>
<td>0.167***</td>
<td>-0.064</td>
</tr>
<tr>
<td></td>
<td>(0.049)</td>
<td>(0.135)</td>
</tr>
<tr>
<td><strong>Reward condition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight/attendance</td>
<td>0.098</td>
<td>0.295*</td>
</tr>
<tr>
<td></td>
<td>(0.053)</td>
<td>(0.120)</td>
</tr>
<tr>
<td>compliance/attendance</td>
<td>-0.064</td>
<td>-0.183</td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
<td>(0.123)</td>
</tr>
<tr>
<td>att.comp/attendance</td>
<td>-0.131**</td>
<td>0.203</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.114)</td>
</tr>
<tr>
<td><strong>Payment frequency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weekly/once</td>
<td>0.136*</td>
<td>0.215</td>
</tr>
<tr>
<td></td>
<td>(0.054)</td>
<td>(0.128)</td>
</tr>
<tr>
<td>monthly/once</td>
<td>-0.020</td>
<td>0.097</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.124)</td>
</tr>
<tr>
<td>quarterly/once</td>
<td>0.048</td>
<td>0.289*</td>
</tr>
<tr>
<td></td>
<td>(0.049)</td>
<td>(0.114)</td>
</tr>
</tbody>
</table>

Log-likelihood

N = 4372.206

4994
DCE Results – Average Preference Ranking

- Reward amount
- Program location
- Payment form
- Reward condition
- Payment frequency

<table>
<thead>
<tr>
<th>Reward amount</th>
<th>Program location</th>
<th>Payment form</th>
<th>Reward condition</th>
<th>Payment frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full sample (100%)</td>
<td>Obese (54%)</td>
<td>Blacks (40%)</td>
<td>Low-income women (30%)</td>
<td>Males (58%)</td>
</tr>
<tr>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Relative importance</td>
<td>Relative importance</td>
<td>Relative importance</td>
<td>Relative importance</td>
<td>Relative importance</td>
</tr>
</tbody>
</table>
Policy-Implication: Synthetic Subgroups

Sample weights come from NHANES (2009-2010)
Policy-Implication: Is $ More Better?

- National (100%)
- Obese (32%)
- Blacks (11%)
- Low-income women (17%)
- Males (49%)
- Females (51%)

Reward amount (total over 6 months)

Participation probability
Policy-Implication: Form of Payment?

Proportion of ranking within subpopulation (darker is better)

Payment form

National (100%)
- Debit card
- Gym pass
- Cash
- Medical card

Obese (32%)
- Debit card
- Gym pass
- Cash
- Medical card

Blacks (11%)
- Debit card
- Gym pass
- Cash
- Medical card

Low-income women (17%)
- Debit card
- Gym pass
- Cash
- Medical card

Males (49%)
- Debit card
- Gym pass
- Cash
- Medical card

Females (51%)
- Debit card
- Gym pass
- Cash
- Medical card
Policy-Implication: More Choices

$48\ ($2/\text{wk})$
Policy-Implication: More Choices

$576 ($24/wk)
Policy-Implication: One Choice

Pay More Or Not?

Participation probability at $48

Participation probability at $576

Subpopulation
- National
- Obese
- African Americans
- Low-income women
- Males
- Females
Policy-Implication: Two Choices

- Participation probability at $48

Subpopulation:
- National
- Obese
- African Americans
- Low-income women
- Males
- Females

Pay More Or Not?

One design $\times$ 2 program locations $\times$ 2 payment forms $\times$ 2 reward conditions $\times$ 2 payment frequencies
Conclusion

- Population reach is important for closing disparity gap and improving cost-effectiveness
- Preference heterogeneity towards incentives is significant across subgroups
- Offering more than one incentive option will not only increase population reach but also reach more vulnerable subgroups
- Two carefully subgroup-targeted options can achieve the largest gain in reach
- Offering more options is better than paying more
THANK YOU!
wenyou@virginia.edu