Applying Behavioral Economics to Public Health Policy

Illustrative Examples and Promising Directions

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Behavioral economics provides an empirically informed perspective on how individuals make decisions, including the important realization that even subtle features of the environment can have meaningful impacts on behavior. This commentary provides examples from the literature and recent government initiatives that incorporate concepts from behavioral economics in order to improve health, decision making, and government efficiency. The examples highlight the potential for behavioral economics to improve the effectiveness of public health policy at low cost. Although incorporating insights from behavioral economics into public health policy has the potential to improve population health, its integration into government public health programs and policies requires careful design and continual evaluation of such interventions. Limitations and drawbacks of the approach are discussed.

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Introduction

The assumption in neoclassical or mainstream economics that individuals act to maximize their long-term best interest, have stable preferences, and are consistent rational actors has served as a useful benchmark for predicting behavior. This model of human behavior has influenced the design of public health policy, including providing information about risks, taxing harmful substances such as tobacco and alcohol, and subsidizing preventive care such as vaccinations.

Yet, these traditional economic incentives sometimes prove ineffective. The field of behavioral economics differs from neoclassical economics in that it focuses on the ways in which rationality may be limited or bounded, and influenced by factors such as impulsiveness, limited willpower, social norms, and the context in which choices are made. The behavioral economics approach is heavily based on and informed by related literature in fields like psychology and neuroscience.[1–4] It should be noted that this commentary uses the term "behavioral economics" for the sake of brevity, but draws upon the broad, multidisciplinary literature when discussing its applications to public health policy. The focus of the behavioral economics approach is to better predict and understand people's actions, with the goal of devising more effective public policy.

This commentary provides a broad overview of key findings from behavioral economics and describes its potential to meaningfully inform public health and prevention policy. It provides examples of its successful application to public health and prevention, illustrating its ability to improve both the effectiveness and efficiency of policies through well-designed interventions. However, the approach is not a silver bullet; limitations of the approach and obstacles to its more widespread use are also described.

Recent Efforts to Integrate Behavioral Economics Into Policymaking

Governments worldwide are increasingly incorporating the behavioral economics approach into policymaking. In 2010, the U.K. Cabinet Office created the

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Behavioural Insights Team (BIT) dedicated explicitly to such work.[3–5] In 2014, the U.S. government created the White House Social and Behavioral Science Team.[6] Both of these organizations have been referred to as "nudge" units; nudge was defined by Richard Thaler and Cass Sunstein[7(p6)] in their book of the same name as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives." The use of behavioral economics is spreading beyond these individual units and influencing policy throughout government. The U.S. Office of Management and Budget has directed agencies to experiment with interventions that have low cost but the potential to increase efficacy and efficiency of federal policy and programs[8]; interventions derived from behavioral economics are often prime candidates. Furthermore, the Obama Administration recently issued an Executive Order encouraging federal agencies to incorporate insights from the behavioral and social sciences in order to better serve the American people. Other nudge units have been created in Australia, Denmark, and by the World Bank.

The Behavioral Economics Approach

Table 1 lists key behavioral economics concepts that are the most relevant for public health policy. They include time-inconsistent preferences, bounded rationality, status quo bias, framing effects, availability heuristic, and social norms.[19–22] The Table explains each concept, and for each provides an example of how it informs public health policy.

For example, neoclassical economics assumes that people are not affected by the superficial framing of probabilistic information. A decision maker should, for example, respond similarly to a description of alternatives to address an outbreak of a new disease expected to affect 600 people whether it is stated as 200 people saved or 400 people die—the objective risk is identical in both descriptions. Yet, behavioral economics has found that the framing of risks and probabilities matters; people may react differently to positive frames (such as the

Table 1. A Sample of Key Departures From Rationality and Their Related Behavioral Economics Applications

Deviation from rationality	Possible behavioral economics application(s)
Time inconsistent preferences (e.g., hyperbolic discounting) People tend to prefer more immediate gratification, even at the expense of longer-run well-being. This may lead to preference reversals, such as people repeatedly quitting and then resuming risky health behaviors, and dietary cycles of binging and purging.	Offer pre-commitment devices that allow people to restrict the choices of their future selves in order to increase the probability of adhering to the healthy behavior. Research suggests that people are more successful in quitting smoking and losing weight when at the outset they post a monetary bond that would be forfeited in the future should they fail.[7,9–11]
Bounded rationality Rationality in decision making is curtailed by a lack of information, cognitive limitations, and a finite amount of time to make a decision. People may also have finite amounts of willpower and experience decision fatigue.	Simplify how information is presented in order to make it easy for people to use. Simple checklists for important multistep procedures may be useful in preventing surgical errors and airline crashes.[12]
Status quo bias People exhibit inertia, and tend not to deviate from the default option or reverse their earlier decisions. For example, many people stick with default options for organ donation, retirement savings, and health insurance plans.	Make the healthy option a default option, such as including sliced apples rather than french fries as a side in children's meals.[13] Limit portion sizes.
Framing effects People react to the same tradeoff in different ways depending on whether the possible outcomes are presented as losses or gains. Some people respond differently to risk presented as 80% chance of survival versus 20% chance of death.	Uptake may be improved by using gains-framed messages and incentives for encouraging healthy behaviors and loss-framed messages for encouraging use of health screenings.[14–18]
Availability heuristic People judge the odds of a given event occurring based on how readily an example comes to mind. Diseases or conditions faced by a friend or which are the topic news coverage and advertising tend to increase individual's perception of their personal risk of the disease.	Prime a behavior by providing examples relevant for that population. For example, youth may be more responsive to a drug prevention program after the death of a celebrity from drug overdose.
(Mis)perceptions of social norms People want to conform to social norms but often misperceive the norms/behaviors of others. For example, many college students overestimate how much alcohol their peers drink.	Avoid conveying the message that large fractions of the population are engaged in risky health behaviors (especially to teenagers and others who may be easily influenced by bandwagon or peer effects).

Note: See also Samson[19] and Pinto et al.[20]

chance of living) than to negative frames (such as the chance of dying).[1] In one study that involved a hypothetical scenario involving cancer, patients, graduate students, and physicians were all more likely to elect surgery over irradiation if the consequences were framed in terms of the probability of living rather than the probability of dying.[23]

The U.K.'s BIT succinctly describes some of the key lessons of their approach with the acronym MINDSPACE (Table 2).[3] Some of the concepts overlap with those in Table 1 (e.g., time-inconsistent preferences, loss aversion, and social norms), but other concepts are new, such as the importance of the messenger. The BIT argues that simple policy interventions based on these principles have the potential to achieve significant impact at low cost.[3] For example, organ donation rates have been low in countries that require donors to opt in (i.e., take action to be listed as a potential donor). Historically, these low consent rates were interpreted as unwillingness to serve as a donor, but behavioral scientists perceived that it might be the result of inertia or the influence of the default assumption that people do not want to be donors. When an online experiment changed the default, and made default donor status opt-out rather than opt-in, organ donation rates nearly doubled (from 42% to 82%), and a follow-up survey indicated that it raised willingness to serve as a donor (i.e., making it opt-out did not simply force unaware people onto the donor rolls).[24]

Table 2. MINDSPACE: Key Lessons of the Behavioral Insight Team Approach

Acronym	Stands for	Explanation
M	Messenger	We are heavily influenced by who conveys the information
I	Incentives	People respond to incentives, and in particular they exhibit loss aversion
N	Norms	People are influenced by their perception of what others do
D	Defaults	People are heavily influenced by default options
S	Salience	People are particularly influenced by incentives that are visible and new
P	Priming	People can be influenced by subconscious cues
A	Affect	Emotions shape decisions
C	Commitment	People with time-inconsistent preferences may seek pre-commitment devices
E	Ego	People prefer to act in ways that make them feel better about themselves

Source: U.K.'s Behavioral Insights Team.[3–5]

The Role of Behavioral Economics in Improving Public Health Policy

From the beginning, health has been recognized as a fertile area for applying nudges. The subtitle of the book *Nudge*[7] is *Improving Decisions about Health, Wealth, and Happiness*. In their discussion of health behaviors, Thaler and Sunstein propose new nudges in health, such as simplifying decision making in Medicare. In fact, section 1511 of the Affordable Care Act requires large employers to automatically enroll workers into health insurance; similar to the previous example on organ donation, this switched from an opt-in to an opt-out system in order to harness the power of defaults. We will provide examples in which concepts from behavioral economics were applied to public health policy and led to improvements in health attitudes and behaviors. A summary of these applications is provided in Table 1.

Nudges can be effective because people are influenced by stimuli that are visible and new; thus, at least in theory, small changes can lead to behavior modification. Several studies have found that simply prompting (nudging) individuals to make a plan increases the probability of the subject eventually engaging in the prompted health behavior, such as immunizations, healthy eating, and cancer screening.[25] For example, one study found that e-mailing patients appointment times and locations for their next influenza vaccination increased vaccination rates by 36%.[26] Another intervention was even simpler. Rather than assigning a date and time for the patient to be vaccinated, patients were simply mailed a card that asked the patient to write down the day or day and time they planned to get the influenza vaccine (they were also sent the day and time of the free influenza vaccine clinics).[27] Relative to a control condition (people who only received the information about the day and time of the clinics), those prompted to write down the day and time they planned to get the influenza vaccine were 4.2 percentage points (12.7%) more likely to receive the vaccine at those clinics. Those prompted to write down the date but not the time were not significantly more likely to be vaccinated at the clinics. Decision heuristics, such as highlighting consensus, may also help. Highlighting descriptive norms among a group of trusted experts, or priming (e.g., that 90% of doctors agree that vaccines are safe) can significantly reduce public concern about (childhood) vaccines and promote intentions to vaccinate.[28]

The significant influence of framing[14] has been demonstrated in many public health domains, such as messaging about blood transfusion,[15] smoking cessation,[16] sunscreen use,[17] and mammography utilization.[18] In particular, gains-

framed messages (i.e., emphasizing the health gains of a behavior or treatment) were more likely to have a positive impact on the attitudes toward activities targeting prevention (e.g., blood safety, sunscreen use, smoking cessation). Loss-based messages may be more effective at encouraging screening behaviors, such as mammography screening.[18] This points to the importance of testing messages for the uptake of preventive services among varying subgroups, many of which are now covered without cost-sharing as a result of the coverage of preventive services mandated in the Affordable Care Act.

Detailed Illustrative Examples

Self-management, including patient responsibility for adherence to prescription drugs, is a key component of prevention for many chronic diseases and conditions. Reflecting this, prescription drug coverage is one of the Essential Health Benefits specified in the Affordable Care Act. Some insurance plans take the neoclassical economic approach by reducing financial barriers and covering certain prescription drugs with little to no cost sharing for their beneficiaries. By reducing cost barriers to the drugs, the policy aims to increase the likelihood that individuals will obtain and take the covered drug, and subsequently prevent future adverse events. In this vein, an insurer in North Carolina eliminated generic medication copayments and reduced copayment for branded medications, and found that medication adherence improved by 1.5 percentage points for patients with hypertension.[29] However, despite the removal of cost barriers, some patients were still not adherent. Medication adherence requires a complex sequence of behaviors that must be maintained over time. Patients must maintain a valid prescription for the medication. They must fill their prescription at a pharmacy. Then, they must understand and adhere to the recommended dosage and timing. In the course of a busy life, there are many factors that can cause people to miss a dose or fail to refill their prescriptions.

Behavioral economics can inform the design of interventions to increase the utilization of a covered service that accounts for the complexity of human behavior. In the case of prescription drugs for chronic conditions, nudges (such as automated text messaging) can remind individuals to take their medication. An automatic refill of prescriptions is seen as a way to harness the power of defaults to increase medication adherence; automatic refills could be made the default for prescription medications for chronic conditions.

Numerous nudges have also sought to improve diet, physical activity, and obesity. The first example given in the book *Nudge* concerns changing the choice architecture (i.e., the environment in which choices are made) in school cafeterias to improve children's diets.[7] Subsequent research has found that minor alterations to school cafeterias to increase the convenience and appeal of healthier options can increase fruit and vegetable consumption of schoolchildren (e.g., changes as simple as giving interesting names to the vegetable options), although there is little information of the durability of these effects.[30] In addition, some restaurant chains have altered the default drinks and side dishes in children's meals to healthier options[31] (e.g., changing the default beverage from soda pop to water, or the default side from french fries to apple slices).

Thaler and Sunstein[7] also point to StickK.com, a website where people can post forfeitable bonds (or "deposit contracts") that help them adhere to a healthy lifestyle (e.g., lose weight or exercise). The problem that many consumers face is that they have time-inconsistent preferences; that is, they may want to adhere to a healthy lifestyle but frequently succumb to the temptation for immediate gratification (Table 1). One solution is to offer such people commitment devices—the ability to better influence or even restrict the choices of their future selves so that they adhere to a healthy lifestyle. The StickK.com website offers such commitment devices: In a moment of willpower people can post bonds that will be returned to them if they achieve their goals (such as weight loss or smoking cessation) but are forfeited otherwise. Because of the phenomenon of loss aversion—people are more motivated to avoid losing something than they are to win something—such bonds may be particularly influential in helping people stick to their resolutions. Research that experimentally manipulated the choice architecture of the StickK.com website found that people nudged to undertake a longer exercise commitment tended to choose longer exercise commitments and complete more weeks of exercise.[9] This is once again evidence of the power of status quo bias and default options (Tables 1 and 2). Research on the effectiveness of deposit contracts for weight loss (not involving StickK.com) has found mixed results; these programs may experience high attrition[10] and weight loss that ranges from modest[10] to more substantial.[11]

Commitment strategies have also been offered to help smokers quit. One program in the Philippines encouraged smokers to deposit funds into a savings account; if the smoker quit (which would be verified by urine test) the money would be returned, but if the smoker failed to quit then the money would be donated to charity.[32] Results were mixed; take-up of the commitment strategy was low (only 11%) and two thirds of those who voluntarily deposited money still failed to quit. However, those who were offered the commitment strategy were roughly one third more likely to have quit smoking 1 year later than the control group.

An important direction for research is to better study the optimal design of incentives, taking into account the phenomena of loss aversion, salience, framing, social norms, and the desire of people with time-inconsistent preferences for commitment devices (Tables 1 and 2). Increasing the amount of incentives can be expensive, but it may be possible to increase behavior change by altering the design of incentives without increasing their magnitude. Halpern et al.[33] tested whether financial incentives for smoking cessation were more influential if they were structured as rewards or deposit contracts; both were compared to usual care. They found in a randomized experiment that the reward option had higher uptake than the deposit option, but the deposit-based programs resulted in greater behavioral change than the reward option. Thus, reward programs may achieve greater participation (i.e., because of loss aversion, people tend to be reluctant to put their own money at risk), but deposit contracts can have bigger results, because once participants have "skin in the game," loss aversion helps motivate them to lose more weight. More research is needed to determine the optimal design of incentives for specific subgroups of interest (e.g., those of low SES).

Important Considerations in Applying Nudges to Public Health Policy

To design a behaviorally informed policy intervention, such as a nudge, it is necessary to first understand the decision-making process around the targeted behavior. Two guides to this audit process are the behavioral diagnosis and design process (part of the Administration for Children and Families' Behavioral Interventions to Advance Self-Sufficiency Project[34]) and the nudge development process.[35] Both encourage problem identification, using data to diagnose the problem, auditing people's decision-making process, and identifying any deviations from, or obstacles to, rational decision making. The identification of these limitations and obstacles then informs the design of the interventions.[36] In fact, Berg and Gigerenzer[36] suggest that policy could benefit from learning what factors drive behaviors and then designing nudges to change those behaviors. Furthermore, any nudge-like interventions—especially new ones or ones applied in new contexts or to new populations—should undergo rigorous testing. Experimentation, ideally an RCT, is required to evaluate whether the behavioral interventions work and to measure the benefits relative to the costs.[3]

Policymakers may have a role of not only developing nudges to encourage healthy behavior but to also preventing firms from nudging consumers toward unhealthy behavior.[37] Firms largely control the choice architecture at the point of sale; for example, supermarkets place candy and magazines—possible impulse buys—near their checkout counters, exploiting consumers' impulsiveness after their willpower has been depleted by a long shopping trip. Restaurants set defaults such as portion sizes and included side dishes that consumers may accept because of status quo bias. Menus may be designed to cause framing effects that profit the restaurant. Advertisements may influence consumers' perceptions of social norms. Regulation regarding consistent disclosure of terms and the standardization of products may be appropriate in markets such as that for health insurance in which choices are numerous, complex, and hard to compare and in which mistakes can cause considerable loss or harm to consumers.

Caveats

Behavioral economics has the potential to improve the effectiveness of public health policy, but the approach has limitations.[38] First, the definition of a nudge is somewhat vague and inconsistent.[39] Some interventions presented as nudges are perhaps better described as traditional economics approaches; for example, some simply provide information, or alter marginal costs or marginal benefits.[36] For example, the BIT's endorsement of lowering salt in food and alcohol through voluntary agreement with industry is simply an endorsement of a health guideline. The influence of defaults may simply reflect high time costs to acquiring information or switching between options, which is perfectly consistent with neoclassical economics. In general, behavioral economics is not a comprehensive alternative to neoclassical economics; it is more ad hoc.

Behavioral economics may also risk a slippery slope to paternalism, as it argues that it may be in people's own interest to have their choices restricted by government. By arguing that it can help people make better choices, it presupposes that policymakers know better than individuals what is in the individuals' own interest. Moreover, it can be hard to delineate when these interventions become coercive (i.e., when a nudge becomes a shove).

Because behavioral economics is a relatively new field, the research literature remains thin. Many studies involve relatively small samples, which in many cases are also idiosyncratic samples of convenience from which it is difficult to generalize. There has been a lack of replication of findings. As in all fields, there may be publication bias; studies finding that behavioral economics approaches are effective may be more likely to be published than those finding no effect. When nudges have been evaluated, they often have either small effects, short-lived effects, or both.[37,39] Small effect sizes can still be meaningful, especially if multiplied over many individuals, but these benefits must be compared to the costs; in general, there

is a lack of information about the cost effectiveness of these approaches.[39] There is also little information about long-run (as opposed to short-run) behavior changes in response to these policies. Nudges may only work when they are new and particularly salient (i.e., they may lose effectiveness over time), and they may need to be tailored to specific subpopulations.

For some important decisions, it may be considered unethical to influence individuals using behavioral economics techniques. For example, one randomized experiment found that defaults had a large impact on end-of-life care choices among terminally ill patients.[40] The percentage of patients choosing comfort-only care over life-extending care was 43% among those whose advance directive form had a default of life-extending care, 61% among those whose advance directive form had no default, and 77% among those whose form had a default of comfort-only care. The substantial impact of defaults on such an important issue as whether a terminally ill patient continues to receive curative care or not raises serious ethical issues.

Loewenstein and colleagues[41] caution that policy can sometimes get ahead of science. There is a risk of applying behavioral economics approaches before sufficiently understanding the context and effects of the application. Thus, as findings from behavioral economics are integrated into public health, it is important to keep a vigilant eye on the evidence. Some nudges may be implemented hastily and imperfectly. Applied behavioral scientists have consistently emphasized that interventions should be continually evaluated and refined.[35,42] Through such evaluations and evidence-based refinements, the goal of improving health for low monetary cost is more likely to be achieved.

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