

BEHAVIORAL ECONOMICS & PUBLIC HEALTH

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7 | Nudging Individuals Toward Healthier Food Choices with the 4 P's Framework for Behavior Change

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DESPITE MILLIONS OF DOLLARS BEING spent on nutritional and wellness education, people eat more and eat more fattening foods than they did 20 years ago, with rates of obesity skyrocketing as a result. In contrast to entreating people to marshal their limited energy toward self-control by providing them with more information, we present a framework that leverages principles of behavioral economics, psychology, and marketing to restructure the environment in ways that (1) maximize the benefits arising from sporadic efforts to achieve health goals and (2) minimize the willpower needed to make healthy choices. We propose the 4 P's Framework for Behavior Change, a comprehensive framework that integrates research findings to suggest ways of making desired behaviors like healthy eating less taxing. The framework can be applied by planners in any organizational context.

This chapter is structured as follows. First, we discuss five psychological barriers to making healthy choices. Next, we present the 4 P's Framework for Behavior Change: possibilities, process, persuasion, and person. Finally, we apply the framework in an organizational case study at Google.

Barriers to Change: How the Brain Short-Circuits Healthy Intentions

Although most people are familiar with the adverse health effects of smoking, weight gain, lack of exercise, and poor diet, people continue

to engage in these behaviors at alarming rates. Most people are fully aware of what actions they need to take to improve their health, and many want to live healthier lives. Yet, despite good intentions, change is hard to achieve—most intentions to change behavior end in failure (Sheeran, Webb, & Gollwitzer, 2005).

When identifying the personal barriers to healthy change, many people point to insufficient time, financial resources, or motivation. Undoubtedly, these are among the reasons for the failure of our best-laid plans. However, there are additional processes operating outside our awareness that account for many of the difficulties we face in making optimal health decisions.

There are five major factors that often determine whether or not a desire to change actually leads to action.

We Are Wired to Favor Impulsive Choices

Behavioral economists describe decision making as a dual process, with two systems working together. The intuitive system, or “System 1,” is emotional, automatic, and rapid. The deliberate system, “System 2,” on the other hand, is conscious and takes effort to engage (Kahneman & Frederick, 2002; Stanovich & West, 2000). When you see a doughnut, the automatic urge to grab it is generated by the intuitive system, whereas considering the amount of fat and calories vis-à-vis the predicted enjoyment of the doughnut requires engaging the deliberate system. Choices emerge as an interplay of the two systems. The intuitive system has the first say because it comes online rapidly, responding to salient emotional stimuli. And unfortunately, healthy choices such as broccoli and jogging are less intuitively appealing than alternatives such as doughnuts and video games. So System 1 tends to favor unhealthy choices. System 2 tends to favor healthy choices that benefit us in the long run; however, since engaging a System 2 override is effortful, we often fail to engage System 2—particularly in small, everyday decisions such as food choices. Thus, System 1 has the advantage, and it leads us into temptation.

We’re Too Busy to Make Clear-Headed Choices

Engaging System 2 requires both ability and motivation. However, when people are multitasking or otherwise distracted, extraneous thoughts compete for attention and siphon away the brain’s limited conscious processing

power, inducing “cognitive load.” Cognitive load hampers System 2, reducing the ability to resist temptation. In a classic study involving food choices, people were asked to choose between fruit salad and cake. Those in the “cognitive load” condition were challenged to remember a seven-digit number while making the food selection, and they were 50% more likely to choose cake than those in the control group (Shiv & Fedorikhin, 1999). When individuals are busy or stressed, they have fewer cognitive resources for System 2 processing, leaving them especially likely to make indulgent System 1 choices without considering the long-term consequences.

We Have Limited Willpower

In a modern society with abundant opportunities to consume, willpower is tested all day, every day. And studies find resisting one impulse diminishes our ability to resist the next; that is, self-control is a limited resource (Baumeister, Bratslavsky, Muraven, & Tice, 1998; reviewed in Baumeister & Tierney, 2011). After a series of choices resulting in pain or self-denial, willpower reserves become depleted. In a field study of desire in which participants wore beepers for 1 week and were periodically asked whether they were experiencing a desire at that moment (System 1) and also whether they were resisting it (System 2), people reported spending a quarter of their waking hours using willpower to resist desires (Hofmann, Baumeister, Förster, & Vohs, 2012). Because people make so many food choices when already depleted by hunger, this is an area in which desire easily overwhelms attempts at self-control. Resistance is, too often, futile.

We Live for Today

Our thinking is biased toward the present: We heavily discount the future and privilege the here and now. Behavioral economists call this tendency “hyperbolic discounting” (see Chapter 2 by White and Dow). Awareness of hyperbolic discounting is important because so many of the potential benefits of our health decisions accrue in the distant future, while the costs tend to be borne in the present. And the ties between the costs and benefits are indirect. For example, spending a few moments to floss is costly now, and the potential benefit (avoiding a painful dentist visit) lies months or years in the future. The pleasure of smoking is immediate (at least for the smoker), while the potential cost (developing a tobacco-related disease) is in the future. Furthermore, we expect that in the future, we will make better

decisions . . . but when the future comes, it is once again our present-biased self making the decision. In one study, employees who had just eaten lunch were asked to choose which snack they wanted to receive the following week—either junk food or fruit. Most chose the fruit. However, when the snacks were delivered, the record of the planned choices was “lost,” and the employees were asked to choose again the snack they wanted right then. The result: Only 20% stuck with fruit. The vast majority opted for the tempting treats (Read & van Leeuwen, 1998). The delayed impact of many short-term decisions can fool us into making the same bad choices again and again.

We Often Act Without Thinking

Contextual influences can stimulate automatic responses even without conscious attention. For example, when food is consumed from larger dishes, or in the company of others, people tend to eat more of it (Wansink, 2006). Over time, repeated cues can trigger consistent behaviors that solidify into habits that can be hard to break. In one study, moviegoers who habitually eat popcorn at the theater ate just as much popcorn when it was stale, despite complaining about it (Wansink & Kim, 2005). In much the same way we can drive home from work on autopilot, without making many conscious decisions at all, we mindlessly repeat other behaviors like finishing the food on our plate, buying popcorn at a movie theater, or reaching for a snack during a commercial break. Mindless eating is a particular risk when a person is under cognitive load from another activity, like watching television, driving, or working (see Chapter 9 by Wansink).

In the quest to improve health behaviors and choices, education, knowledge, and willpower are not enough. We have described five reasons the best intentions of System 2 are so often short-circuited by the automatic impulses of System 1. Because System 2 requires conscious attention and resources (cognitive capacity and willpower) that are in short supply, any interventions relying on System 2 for success will face tremendous challenges. We must search for ways to influence health choices that rely less on willpower and conscious determination. Fortunately, behavioral economics provides many inspirations. Research in behavioral economics has revealed a multitude of situations in which human behavior is seemingly irrational or counter to the individual’s long-term self-interest—but is nonetheless predictable. The promise of behavioral economics is that

these anomalies can be exploited opportunistically to nudge people in the direction of making healthier choices.

The 4 P's Framework for Behavior Change

To help practitioners apply some of the disparate insights from research in behavioral economics, psychology, and marketing, we have developed a framework called the 4 P's Framework for Behavior Change. The framework is consistent with Richard Thaler and Cass Sunstein's ideal of "libertarian paternalism"—nudging people in directions that align their behaviors with their long-term self-interest, without curtailing their ultimate freedom to choose (Thaler & Sunstein, 2003). Focusing on actionable, high-impact levers of change, it combines common sense with novel ways to make desirable behavior the path of least resistance. Although we focus on health and food choices here, the framework can be applied to any domain. The 4 P's are: possibilities (what choices are offered), process (how choices are made), persuasion (how choices are communicated), and person (how intentions are reinforced). (See Box 7.1 for a summary of the framework.) These four levers of change provide different paths to reduce resistance and nudge individuals toward healthy choices. Each component of the framework offers ways to make System 1 intuitive choices *healthier* or System 2 rational choices *easier*. Together, the 4 P's framework provides comprehensive suggestions for engineering the environment to make the healthy choice the easy choice. Any aspects of the 4 P's framework can be used together; it is not necessary to use all of them.

BOX 7.1 4 P'S FRAMEWORK FOR BEHAVIOR CHANGE

Possibilities

What choices are offered?

- Assortment
- Amount

Persuasion

How are choices communicated?

- Vividness
- Comparisons
- Moments of truth

Process

How are choices made?

- Accessibility
- Order
- Defaults

Person

How are intentions reinforced?

- Goals
- Habits
- Precommitment

In the following section of the paper, we describe the framework. Subsequently, we present a case study in which Google used many elements of the 4 P's framework, to provide ideas for how other planners might apply it in their own organizations.

Possibilities: What Choices Are Offered?

The first tool in the box is the simplest: Before strategizing how to steer people's choices, improve the options. While it may in rare cases be effective to ban undesirable behavior (such as smoking in restaurants) or to legislate desirable behavior (such as wearing seatbelts), the negative reactions against paternalism can often outweigh its benefits. Therefore, we advocate a gentler approach, maintaining freedom of choice while improving the options. When designing a choice set to facilitate healthy choices, the goals should be to make options healthier and to make healthy options more attractive (or make unhealthy options less attractive). The planning decisions around possibilities regard the assortment and the amount.

Assortment

The first decision a planner must make is what choices to offer: What will the assortment be? Availability has a strong impact on consumption: People tend to eat whatever is in front of them. Sometimes the existing options can be made healthier, either by modifying components (e.g., white to whole-grain pasta) or by switching the mode of delivery (e.g., salt shakers that dispense less salt per shake). Some manufacturers are engineering health creatively. PepsiCo has engineered "designer salt" with greater surface area, yielding more flavor per crystal and decreasing the amount of sodium required for a salty taste (McKay, 2010). Pharmaceutical companies promote safety through product design, with child safety caps on medicine bottles preventing fatal mistakes. In organizations, the addition of healthy choices will rarely face opposition if other options are retained. One study found people were more likely to choose a healthy option (fruit over a cookie) from a larger assortment than a smaller one (Sela, Berger, & Liu, 2009). Healthy menu options can be added to the list, and fun fitness activities and games can be made available. Vending machines might be upgraded to refrigerated machines, and fruit bowls might be stocked in conference rooms.

Relative appeal can be manipulated either by making healthy options more appealing or by making unhealthy items less so. In the Healthy Lunchrooms

Initiative, Wansink found that placing fruit in a nice bowl or under a light increased fruit sales by more than 100% (“Nutrition advice . . .,” 2014). Stairwells, too, could be made more aesthetically appealing to encourage their use, perhaps being decorated with art, carpeted, and well-lit.

Less-healthy options can be made less attractive, relative to the healthier alternatives. For example, elevator speed could be decreased to make the option of taking the stairs more appealing than taking a slow elevator, or an outdoor smoking area might be left unprotected from rain and snow. The city of London decided not to synchronize traffic lights, making driving there a slow and unpleasant experience, in order to encourage the use of public transportation.

Variety is a powerful stimulant of consumption. Generally, when consuming more than one thing is possible, more options means more consumption. This is true even when variation is more perceived than real. For example, people ate more M&Ms from a bowl containing more colors of M&Ms, even though the total quantity and flavors were identical to a bowl with fewer colors (Kahn & Wansink, 2004). Planners should consider the proportion of healthy to unhealthy options and decide whether to shift the balance in favor of healthy ones. This shift could be accomplished either by reducing the tempting options (risking backlash) or increasing the number of desirable options (risking an increase in overall consumption, if food is free).

Mindful attention to variety rotation cycles can nudge behavior as well. While we acknowledge that individuals often react strongly against the restriction of choice, we expect reactance to be tempered when choice is restricted only at certain times. Healthy or desirable options could be switched more frequently, to encourage sampling or consumption, while unhealthy or undesirable options could be switched less frequently, to encourage satiation. An advantage of selective restriction is that it helps to bolster self-control, while minimizing potential backlash from individuals who want to indulge periodically. Additionally, healthy options might be made available more often than they are currently. In fact, in a study of children’s eating habits, availability was the number-one driver of consumption of fresh fruits and vegetables (Cullen et al., 2003). In an organization, this might translate to keeping the salad bar open all day. In other situations, making healthy options scarce could spur healthy purchase decisions—perhaps discounted gym memberships could be made available for only a short time.

Additionally, healthy options might be strategically bundled with other healthy options, or with less healthy options. For example, popular entrées

might be paired with a side of salad or fruit. Or “lesser evils” might be paired with “greater goods” to increase the appeal of the desirable option. In a clever field experiment, Milkman, Minson, and Volpp (2014) paired addictive audiobooks with gym workouts to encourage exercise.

Amount

After the menu of options has been decided, the next question to answer about each item is, how much? What quantity and what price? Price changes have been found to be more effective than nutritional labeling in stimulating healthy behaviors (Horgen & Brownell, 2002), and one study found a 10% increase in fast-food prices led to a 0.7% decrease in obesity rate (Chou, Grossman, & Saffer, 2004). When prices of goods are set by an organization, for example, for cafeteria items and insurance plans, low prices or “sin taxes” can move behavior toward desired outcomes. Quantity discounts (supersized pricing) on healthy foods can increase the amount consumed (Haws & Winterich, 2013), due to a “unit bias” (Geier, Rozin, & Doros, 2006): People tend to believe the appropriate amount to eat is an entire portion (e.g., plate, bowl, or package). As a result, they serve themselves more and eat more when dishes or utensils are large. In one experiment, nutrition academics at an ice cream social served themselves 31% more ice cream when given larger bowls and 57% more when given both larger bowls and larger serving spoons (Wansink, van Ittersum, & Painter, 2006). People also pour and drink more from short, wide glasses than tall, thin ones: Children poured 70% more juice, and experienced bartenders poured 37% more alcohol into a short, wide glass of the same volume as a tall, thin one (Wansink & van Ittersum, 2003). Ice cream in a small cone is perceived to be more ice cream, and more satisfying, than the same amount in a large cone (Hsee, 1998). A small, full container conveys abundance, which leads to satisfaction.

Upgrading the possibilities through strategic influence on the assortment and the amount can improve the menu options either by making the options healthier or by making the healthy options more desirable. Next, we consider how the process can nudge individuals toward these healthy options.

Process: How Are Choices Made?

One of the major contributions of behavioral economics to behavior change lies in the application of small nudges in the “choice architecture” of the decision process that do not affect the number or type of options provided.

Small changes can be applied to the configuration of the different options or to the way that relevant information is presented. Firms can influence the architecture of the decision-making process through modifying either logistics (here, process) or information (here, persuasion).

One means of privileging healthy options is by modifying the structure or context of a choice. This can be accomplished through accessibility, order, and defaults.

Accessibility

Accessibility, actual or perceived, has a powerful effect on choices. Often, undesirable options are too accessible; for example, when fast-food restaurants offer free refills on sodas, they encourage consumption of empty calories not merely through the price discount but also by eliminating the need to wait in line again and pay at the counter.

Indeed, proximity of fast-food and full-service restaurants is the number-one predictor of local obesity trends (Chou et al., 2004). The goal of “choice architecture” interventions is to make a healthy choice the easy choice. Organizations might make healthy options more accessible by, for example, opening a health express line in the cafeteria to decrease waiting and provide a meaningful incentive to eat healthfully, at no cost. Many employers provide refrigerators and microwaves; food preparation (and cleanup) supplies could be increased, further encouraging employees to bring their lunch to work, saving them both money and calories. Unhealthy options might be made less accessible, for example, by moving junk foods and desserts to places harder to see and reach. Unhealthy vending machines might be relegated to the basement.

Just as subjective perceptions determine how quantity affects behavior, subjective perceptions also determine how accessibility affects behavior. For example, moving healthy foods to eye level increases their consumption (Thorndike, Sonnenberg, Riis, Barraclough, & Levy, 2012), even though they were already visible before. Visual cues might also make healthy options easier to identify; for example, healthy foods could be served on green plates.

Order

Order has a strong impact on preferences and choices between options. In a classic study, researchers found that when people touched and evaluated four pairs of stockings, they were four times as likely to choose the pair on the right as the one on the left—yet they had no

awareness of the effect of order on their judgments (Nisbett & Wilson, 1977). More meaningfully, a political candidate whose name is listed first gains 3.5 percentage points in an election (Koppell & Steen, 2004). And sometimes the middle option can have an advantage, too—“extremeness aversion” leads many consumers to avoid, for example, the largest or smallest drink sizes (Sharpe, Staelin, & Huber, 2008). There are some conflicting findings in the research on order effects, but in general:

- In a pair, the first item has an advantage.
- In a set of three, the middle item has an advantage.
- In a larger group, both the first and last items have an advantage, with the last taking precedence if the items are experienced sequentially before the choice is made (touched, heard, tasted, etc., rather than seen all at one time).

These biases can serve health goals, if healthy options are offered in the advantaged positions in comparative choices.

Defaults

Much of the behavioral economics research on health has explored the effects of defaults and incentives. In many situations, multiple options are available, but one option has the privilege of being the default choice. Due to the power of the status quo bias, defaults have proven extremely effective in guiding choices, even in domains as weighty as organ donations (Johnson & Goldstein, 2003) and retirement savings (Thaler & Benartzi, 2004). Often people—including planners—are not even aware of any alternative to the default. For example, in one study at a Chinese takeout restaurant, patrons were asked if they would prefer a half-serving of rice (without any price discount). Many of them chose this option, which had always been available but had not occurred to them when the full-sized entrée was offered as the default (Schwartz, Riis, Elbel, & Ariely, 2012). Food planners could increase choices of healthy options by offering as the default: water as the beverage, vegetables or fruit as the side dish, small portion sizes, and low-fat and low-salt condiments as the default. Less healthy substitutes could be available upon request.

Strategic planning of the possibilities and process can gently shift behavior toward healthy choices without restricting the freedom to choose unhealthy alternatives; however, these levers can sometimes be costly,

requiring major changes. Therefore, it is also advisable to implement nearly costless interventions to complement them or to substitute, when necessary, by focusing on persuasion.

Persuasion: How Are Choices Communicated?

To succeed in persuasive communication, planners should try to seize the moment and communicate the right message, the right way, at the time when the individual will be most receptive to it. Persuasion depends on vividness, comparisons, and moments of truth.

Vividness

Most communication by organizations is informative, addressing thoughtful, deliberate System 2. Planners can achieve better results by making sure their messages address intuitive, emotional System 1 as well. One way of tapping into the emotional response is to make the message more vivid. Vividness can be achieved with words or with a visual or tactile experience.

Names play an important role in expectations and evaluations. Understanding this, marketers have recently been changing the names of some popular products. To avoid the vivid and negative images of oiliness, Kentucky Fried Chicken has been officially shortened to KFC®, and Oil of Olay has been shortened to Olay®. To escape the vivid and visceral connection with constipation, prunes have become “dried plums.” Healthy choices can be assisted by vivid names as well. Researchers found that adding adjectives like “succulent” or “homemade” made food not only more appealing but also tastier and more filling (Wansink, van Ittersum, & Painter, 2005). The Healthy Lunchroom initiative found that the simple intervention of naming fruit with vivid descriptors like “fresh Florida oranges” increased fruit consumption by up to 26% (Wansink, 2006). However, food descriptions can drive overconsumption too: Dieters thought a “salad special” was healthier and thus ate more of it than an identical “pasta special” (Irmak, Vallen, & Robinson, 2011). And people eat more when portions are called “small” or “medium,” while believing they have eaten less (Aydinoglu, Krishna, & Wansink, 2009).

Using pictures or objects is another vivid way to engage the emotions, which can encourage persistence in healthy behaviors. For example, looking at bacteria cultured from their own hands led doctors to wash more often. And seeing a vial of fat from a gallon of whole milk caused many milk drinkers to switch to skim (Heath & Heath, 2010). Visuals can also

simplify the decision process. In one cafeteria intervention, implementing a simple green/yellow/red color-coding system improved sales of healthy items (green) and reduced sales of unhealthy items (red).

Comparisons

The right message depends on relevant trade-offs and comparisons. For example, when a person is in a future-oriented mindset, thinking about an activity in the distant future, the more abstract properties of the activity, such as its purpose, take precedence. However, when the activity is in the near future, its more concrete properties, such as its process, gain importance (Trope & Liberman, 2003, 2010). When considering going for a run today, individuals tend to focus on concrete details such as the momentary pleasure or pain they expect, what they will wear, and where and for how long they will run. However, when considering a run next month, they are more likely to focus on abstract aspects such as what it means to be runner, what the long-term effects of exercise may be, and why they have decided to run. This variation in mindset brings substantial variation in preferences and in willingness to attend to certain types of information. Trade-offs between momentary pleasure and long-term health will be made very differently when in a concrete mindset, with momentary pleasure being heavily weighted, than when in an abstract mindset, with long-term health receiving more attention. Like timing, the content of the message should match the goals.

Messages can also quantify the effects of a behavior, apply standards, or frame the outcome as a loss or gain. A quantifying message might say, "Taking the stairs for 5 minutes a day 5 days a week burns off 2.5 lb of fat in a year" or "1 Snickers bar = 20-minute run." Standards can increase goal compliance by making progress measurable. Using a pedometer with a stated goal (e.g., 10,000 steps) increases physical activity (Bravata et al., 2007); and 8 glasses of water or 5 fruits and vegetables per day provide helpful benchmarks for measuring desired health behaviors. Sometimes the comparison is implied, framed as loss or a gain. Although there are subtle qualifications, people are generally more sensitive to losses than gains, and more motivated by fear than pleasure (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Kahneman & Tversky, 1979). Perneger and Agoritsas (2011) surveyed more than 1,000 physicians to find that their beliefs about the effectiveness of a new drug depended on whether its outcomes were framed as a loss (the mortality rate) or a gain (the survival rate). Clearly, this has worrisome implications for public health. The planner, however, can

leverage the strength of message framing and test multiple messages to find the one most effective in that situation.

Moments of Truth

An individual's evaluation of her choice alternatives depends on her underlying goals. While she pursues many goals, only a small number are active in any particular moment. One result is that decision processes are quite sensitive to timing—and for some marketing campaigns, timing is everything. People will be most receptive to persuasion when they are already thinking about the goal. Two creative campaigns illustrate the power of seizing the “moment of truth.” In Beirut, Procter & Gamble's laundry detergent marketing team wanted to reach consumers when the goal of having clean clothes was already activated. This particular goal is rarely top-of-mind for most people, but the marketing team discovered the perfect opportunity. Because most Beirut residents live in tall apartment buildings and hang their laundry on balconies to dry, they see the street traffic below while thinking about clean clothes. Seizing the moment, Procter & Gamble bought advertising space on the tops of buses. Another creative marketing team was tasked with encouraging Americans to buy Campbell's soup. However, American families already had many cans of soup in their pantries. So Campbell's needed to first encourage people to eat soup, so that they would then consider buying more. Given that soup satisfies the goal of eating comfort food, Campbell's purchased local “storm spot” television advertising. They produced special commercials that would air only during a storm, when Americans would be most likely to desire to eat something warm and comforting.

Planners of behavioral change can take a page from the marketing playbook by asking themselves when the goal relevant to the desired behavior will be most salient. For example, in an office building, signs reminding employees to take the stairs can be placed next to or on the elevators, when people are thinking about their goal of getting upstairs. In the right locations, stair prompts with messages such as “Burn calories, not electricity” have been found to be highly effective, increasing stair use by as much as 40%, even 9 months later (Lee et al., 2012). Similarly, information or a hotline number for quitting smoking could be placed in the physical location where people go to smoke. And messages encouraging water consumption could be placed on tables where food is eaten, or at the top of the stairs, where thirsty stair climbers will see them. Sometimes the goals planners need to keep in mind are the goals that go *against* the desired

behavior. For example, knowing that by lunchtime, the goal of getting full on a tasty meal may trump the goal of long-term health, planners can offer choosers the opportunity to decide their meals ahead of time, before the goal of assuaging hunger kicks in.

To leverage the power of persuasion, the right message needs to be delivered in the right place at the right time. Identifying moments of truth in which the relevant goal is most salient, communicating vividly, and choosing the right standards of comparison are three powerful ways to influence behavior. And persuasion is the least invasive and lowest cost way to nudge people toward better choices. Despite these strengths, even the best communication at the moment of truth will have only a limited influence on behavior in other situations. A planner's only hope of changing behavior across contexts is to focus on influencing the person.

Person: How Are Intentions Reinforced?

Most behavior change initiatives already focus on the individual person, attempting to influence his or her choices in general. Planners hope that exposure to the truth will improve behavior in every situation—at work, at home, on vacation, and so on. However, because of the barriers to change described in the opening section (impulsivity, cognitive load, bounded willpower, hyperbolic discounting, and automaticity), behavior change does not always follow a change in attitudes. Unfortunately, influencing the person can be much more challenging than influencing through possibilities, process, and persuasion. We can, however, provide some suggestions for influencing a person through goal setting and skill building in order to reinforce healthy intentions. The object of these interventions is to maintain healthy behaviors over time, eventually making them habitual and automatic.

Goals

An important component of self-improvement strategies is setting and tracking goals. To improve performance, a goal should be both motivational and measurable; therefore, it must be challenging, specific, and concrete (Locke & Latham, 1990). A goal to “lose weight” is merely a wish, whereas a goal to “run 3 miles 3 times a week until the wedding” entails both a reasonable challenge and a means of measuring success—and is therefore more likely to yield the desired outcome (Strecher et al., 1995).

Goals also become more manageable when broken into smaller steps. Like paying for a new car in monthly payments, a goal of losing 4 lbs or pounds per month becomes easier than losing 50 lbs or pounds in a year. And another important benefit of setting intermediate goals is building momentum by tracking small wins along the way—perception of progress toward a goal can itself be motivating (Kivetz, Urmisky, & Zheng, 2006). Planners might offer advice about goals, such as cutting them into “bite-size” pieces (skipping dessert for a week, rather than permanently cutting out sugar), or celebrating the small wins. Self-reinforcement gives people something to look forward to (a pedicure, a bubble bath, a new magazine) and creates a sense of progress along the way. The key to the long-term success of goal setting and measurement of health behaviors lies in making those new behaviors habitual.

Habits

Although people experience their own behavior as conscious and intentional, the majority of all actions are automatic, bypassing the conscious decision-making process entirely (Bargh & Chartrand, 1999). Because habits are enacted automatically, without requiring willpower or conscious effort, turning healthy behaviors into habits is the ideal way to sustain them. Habits should be shaped one at a time, and any positive reinforcement should take place during or immediately following the behavior (Pryor, 2002). To further reinforce the behavior, individuals can leverage contextual cues (Sutherland, 2008). Implementation intentions use cues to serve as reminders for triggering a desired behavior, and they can help to develop the behavior into a habit. Research has shown implementation intentions to be effective in developing healthy habits such as performing breast self-exams (Prestwich et al., 2005), exercising (Luszczynska, Sobczyk, & Abraham, 2007), and eating vegetables (Chapman, Armitage, & Norman, 2009)—simply by asking study participants to decide where, when, and how they plan to take action. Habits are more easily formed and broken in new environments, because they lack the contextual cues that triggered old habits (Wood, Tam, & Guerrero Witt, 2005). Therefore, behavior change efforts launched in coincidence with other changes such as moves, promotions, reorganizations, new relationships, new jobs, or even seasonal changes have a greater chance of success (Verplanken & Wood, 2006). Even in familiar environments, contextual cues can facilitate habit formation—laying out exercise clothes the night before can prompt a morning jog, or setting

twice-a-day medications next to the toothbrush can improve medication compliance.

Precommitment

Even with the right goals, the right management, and the right reinforcement of habits, there will be times in which the desired behavior is particularly difficult or temptation is particularly strong. It has recently and repeatedly been confirmed that willpower is a depletable mental resource, and that when people are tired, hungry, stressed, or focused on something else, or have just expended willpower in another situation, they are less likely to perform actions requiring willpower (Baumeister & Tierney, 2011). And this effect is more than psychological—in fact, willpower seems to be impaired by low blood sugar (Gailliot et al., 2007). The good news is that willpower, like a muscle, can be developed over time (Mischel, 1996); and it can also be temporarily improved by eating or drinking—yet another reason that eating more small, healthy meals throughout the day may be beneficial (Katz & Gonzáles, 2004). Knowing that their willpower may falter, individuals can preplan when possible or create their own “commitment devices.”

Preplanning allows System 2 to make a reasoned decision ahead of time, thus preventing the impulses of System 1 from resulting in rash and regrettable actions. Researchers have found that when people make decisions for the distant future, they save more money (Thaler & Benartzi, 2004) and choose healthier food (Milkman, Rogers, & Bazerman, 2010; Read & van Leeuwen, 1998).

Commitment devices increase the cost or difficulty of engaging in undesirable behaviors, thus reducing reliance on willpower. Many field experiments have asked participants to put their own money at risk as an incentive for following through on their intended behaviors, for example losing weight (John et al., 2011) and quitting smoking (Giné, Karlan, & Zinman, 2010). Observing the power of such interventions, behavioral economists Dean Karlan and Ian Ayres founded a Web site, <http://www.Stickk.com>, that helps users create their own commitment devices, staking their money or reputation on following through on their good intentions.

We have described many possible ways in which the well-meaning planner can support the healthy intentions of others, and we have provided some suggestions for reinforcing one's own healthy intentions as well. Given the many forces at work in every context, the only way to predict the precise impact of an intervention or “tweak” is to try it out in a small-scale experiment. And when possible, this is what the authors do.

Next, we shall describe how one team of people at one firm—the food team at Google—has put the 4 P’s framework into action, testing many of these recommendations along the way.

Case Study: Google

In 2007 and the next 7 years, Google was rated by its employees (“Googlers”) as one of the top five US companies to work for (“100 best companies . . .”, 2014). And in all those years, Googlers mentioned the free, homemade food as one of the keys to their satisfaction. The biggest challenge for the food team was figuring out how to help Googlers stay simultaneously healthy and satisfied: failing on either dimension would mean loss of productivity and morale, which could hurt business outcomes and employee retention. And inducing satisfaction meant not just providing a variety of foods (including some less healthy ones), but treating employees as adults capable of making their own decisions about their bodies and their health. Therefore, gentle nudges that did not restrict choices were appealing to the food team.

When the Google food team engaged Yale University to help them apply the 4 P’s framework, they had already been using many “tweaks” inspired by behavioral economists that were consistent with the framework. In fact, they were on the vanguard of applying behavioral economics to the food environment. Here, we describe how the framework is being applied at Google, with results of some pilot studies and a few suggestions for possible future interventions. We do not include the person section of the framework in the case study; our joint endeavor has focused thus far on the low-hanging fruit of the first three areas, possibilities, process, and persuasion. Our hope is that describing how the framework can be applied to one challenge (serve food that keeps people healthy and satisfied) in one type of location (Google offices) will inspire ideas for applying the framework to other challenges and locations.

Possibilities: What Choices Are Offered?

Assortment

In the quest to help Googlers make healthy food choices that would satisfy them, the obvious first step was to try to serve an assortment of foods that were both delicious and nutritious. While each chef had considerable leeway for creativity, all served a variety of healthy foods on

the menu each day. Kale quinoa salad, butternut squash soup, and fresh seasonal fruits were typical of the rotating healthy fare. Some food team members organized special programs at their locations; for example, one office held a 30-day juice challenge, offering fresh-pressed vegetable juices as an afternoon snack. Another office offered do-it-yourself dinners assembled at work and brought home, to help employees eat better outside the office. And in most locations, fresh fruits and vegetables were offered throughout the day in the many break areas known as “microkitchens.”

As the food team shifted menus to accommodate more healthy foods, they also shifted recipes to make foods healthier. Chefs decreased salt, sugar, and cream in their dishes, and they modified their recipes to offer daily specials such as a rotating specialty sandwich with 500 calories or fewer. In some cases, healthy items were simply made more appealing; for example, tap water was upgraded to “spa water,” with fruit-, herb-, or cucumber-infused water served from a water bar. Also, chefs bundled healthy items together in another daily special, the 600-calorie plate.

Since Google’s cafes and microkitchens offered hundreds of delicious options daily, variety was a blessing and a curse. While the food team could have cut back on variety, taking back anything employees have come to count on is a risky proposition. Therefore, they would probably be better off focusing on the cycles of variety over time and on perceived variety. Rather than limiting unhealthy options, they could increase the perceived variety of healthy options through redundancy in multiple locations. For example, healthy dishes served in other parts of the café could be repeated in a colorful “eating well” or “super charge” station. The food team could lower the perceived variety of less healthy dishes by serving foods of the same color on the same day, side by side. When planning variety within each station, healthier items could be displayed in the privileged first position, where they would be more likely to be chosen, leaving less room on the plate for unhealthy alternatives.

Restricting choice is a sensitive matter, and its success depends on how the restriction is framed. An example of a success is one café’s Pizza Wednesday. With this positive framing, many Googlers saw Wednesday as a day to look forward to, with pizza as an indulgent special treat. While actually restricting pizza during every day but one, Pizza Wednesday was successful because it framed the indulgence as gain rather than a loss. (We expect “Pizza-less Wednesday” would have been poorly received, despite entailing more frequent availability of pizza.)

In the future, Google chefs could further support health without taking choices away through careful planning of variety over time. Thus, healthier menu options could be rotated more frequently while indulgent items could be rotated less frequently, without shifting the balance of healthy versus indulgent items on any particular day. For example, prepared salads could change daily, with desserts changing weekly. The longer cycles for indulgent items would leverage satiation to decrease consumption, and the shorter cycles for healthy items would leverage variety seeking.

Amount

The Google food team was committed to not charging Googlers for meals or snacks, so the question of “how much” was limited to quantity in this case. Although Googlers were permitted to serve themselves unlimited helpings, in practice, seconds and thirds were rare. Therefore, serving size provided a strong anchor for the quantity of each food consumed. To reduce consumption of caloric beverages, the food team switched 22-oz cups to 16-oz cups. And in some locations, they offered smaller to-go boxes to help Googlers control their own food portions when bringing food back to their desks. Desserts in all cafés were plated or cut in small quantities. In microkitchens where bulk snacks were served, serving scoops were intentionally small.

While consumption frequency is affected by where and when a food is served, serving size is more affected by what the food is served in. For example, numerous studies (reviewed in Wansink, 2006; Wansink, van Ittersum, & Painter, 2006) have shown smaller plates and bowls to be effective in reducing consumption. When the food team surveyed Googlers about the idea of offering smaller plates, they found most Googlers (65%) supported the introduction of small plates, but most (75%) were also against the removal of large ones. Googlers did not want their choices restricted. When small plates were experimentally introduced, 30% of Googlers chose them over the large plates (Kang 2013).

Additionally, we conducted a field study to test the effect of switching out bulk candies for small packages. Most Google microkitchen snacks were served from bulk containers with 4-oz cups provided for convenience, and we had noticed that most snackers seemed to be filling the 4-oz cups. After taking baseline measures of individual consumption in two microkitchens, in one of those microkitchens, we replaced loose M&Ms (the most popular snack) with small individually wrapped packages. During the baseline period, the average serving size was identical between the

two microkitchens, but the small packages treatment reduced the average serving size by 58%—from 308 calories to 130 calories.

Process

Accessibility

Whenever possible, healthy items were made easier to reach, and unhealthy items were made more difficult to reach. Accessibility stimulates mindless consumption—and sometimes this can be beneficial. For example, in a pilot study at Google, stocking water bottles in coolers at eye level behind glass, while moving sugary beverages to the bottom shelves behind frosted glass, increased water consumption 47%, while decreasing calories consumed in sugary beverages 6% (Kang, 2013). This manipulation impacted real accessibility, and also perceived accessibility. In many cafés, salad bars were set up near the café entrances, where everyone walked by, and desserts were relegated to a corner, where they were visible but not immediately accessible. The intent was to make a salad a mindless choice, and a dessert a conscious one. Accessibility can be harmful as well, of course, when it makes unhealthy foods mindless choices or leads to overconsumption. We conducted an observational field study to test the effect of accessibility on snacking.

This study was run at a large and busy microkitchen containing two beverage stations: a close one 6½ feet from the snack bar and a far one 17½ feet from the snack bar. Both beverage stations had a refrigerator containing bottled beverages and a brewing station for hot drinks. The snack bar contained a variety of nonperishable snacks such as nuts, crackers, candies, dried fruit, and cookies. For every Googler who took a drink during a 7-day observation period, we recorded which beverage station they used and whether they also took a snack. The results were dramatic: Drinkers at the close beverage station were 50% more likely to take a snack than those at the far beverage station. We found that for men, who showed a greater difference than women, the estimated “penalty” for using the close beverage station was equivalent to approximately 1 lbs or pounds of fat per year for each daily cup of coffee.¹

Persuasion

Vividness

Visual labels had been used in Google cafés and microkitchens with varying success. Like Thorndike et al.’s (2012) hospital cafeteria field

study, Google used stoplight labels, with green for the healthiest items, red for the least healthy items, and yellow for those in between. Many Googlers reported that the colored labels helped them make healthy choices. They also reported relying on the visual icons for vegetarian, gluten-free, and so on, to help them easily avoid foods conflicting with their dietary restrictions.

We experimented with showing visual serving sizes for snacks in a microkitchen, for example, showing how far to fill the snack cup for a proper serving; however, this intervention had no impact on consumption. Any kind of serving size suggestion requires multistage processing: seeing the suggestion, attending to it, deciding to what degree to follow the suggestion, and then acting on that decision. While serving size suggestions are undoubtedly useful in some situations for some people, we recommend portioning (as in the fun packs study) or relying on nudges such as the size of the dish or serving utensil whenever possible.

Comparisons

An additional persuasive and informative tool Google could make more use of in the future would be café menus, whether publicly displayed in high-traffic areas like microkitchens, or digital and customizable online. Even the simplest menu impacts choices through the order in which items are listed (privileging items at the top of the list) and by how the foods are named and described. There are many ways a menu can nudge people toward healthy choices.

First, healthy choices can be featured menu items, like chefs' specials at restaurants. Google chefs could star their recommendations, or recommendations might be treated like a featured online classified ad, for example, moved to the top of the list, boxed, bolded, shaded, accompanied by an attractive photograph, and so on. Second, menus would not need to be comprehensive; they could provide a subset of the day's dishes, highlighting healthy options and avoiding some of the unhealthy ones. Third, employees could be empowered to create their own menu filters. At Google, and in any work environment in which most employees work on computers, there would be an opportunity to allow employees to customize menus according to their own preferences. Besides allowing employees to easily view foods they would be likely to enjoy and to make a decision about where to eat lunch, individually customizable menus provide the benefit of allowing employees to take action when their willpower is strong that would provide benefits when their willpower is weak. For example, one could make the decision to permanently hide all desserts

from the menu list, thereby avoiding that temptation in the future. A final benefit that a digital menu might provide would be links to healthy recipes, so that Googlers could reproduce some of their favorites at home.

Moments of Truth

When we ran a field study to test whether promotions could increase uptake of some widely disliked vegetables, we promoted the vegetables at the “moment of truth,” right at the point of choice.

Five target vegetables were selected, based on being commonly disliked and seasonally available: brussels sprouts, parsnips, beets, cauliflower, and squash. For each of the target vegetables, Google chefs selected a recipe for a hot dish and a recipe for a cold salad containing that vegetable as the dominant ingredient. During a baseline period of five Mondays, chefs made a hot dish and a salad with the same main vegetable each week in both of two high-traffic cafés. During the following five Mondays, the same dishes were served again in both cafés and were advertised in only the treatment café with large colorful “Vegetable of the Day!” posters displaying an elegant picture of the raw vegetable and an uninformative bit of trivia, as well as flyers next to each dish. The moment-of-truth vegetable promotions increased the number of employees trying the hot dishes at the treatment café by 74%, even as the proportion decreased in the control café. Promotions also increased the average serving size of the hot dish at the treatment café by 64%. Although the effect was smaller for the salad, which had lower uptake and was served in a lower-traffic location, overall consumption of the promoted vegetables increased at the treatment café by 48%.

We have described many ways in which the 4 P’s framework has nudged Googlers toward healthy choices and we have suggested other ways in which it might do so; however, we must emphasize that each intervention should be tested for efficacy in the relevant context. For example, persuasive signs at Google have shown mixed results. After fast-food consumption at many New York City fast-food restaurants decreased following mandated calorie labeling in 2008 (Dumanovsky et al., 2011), signs with warnings about calories in Coke were tested in a Seattle microkitchen. In that case, consumption of Coke and other sugary beverages did not change. On the other hand, the Vegetable of the Day experiment showed promising results. We have tried to provide as much guidance as possible to suggest types of interventions likely to succeed in nudging people toward healthy behaviors, but each situation and population is unique enough that the only way for planners to ensure success is to run small experiments, as the Google food team does.

Conclusion

We have suggested many potential ways a planner might help other people improve their health choices with as little effort as possible—reducing the burden of System 2—through the application of research findings from behavioral economics and psychology. These findings offer a toolbox of interventions leveraging a contextual approach aimed at influencing specific decisions via (1) the combination of choices people are exposed to, (2) the choice environment, and (3) the communication about the choices. Additionally, we have offered advice on supporting the individual in the development of healthy habits, to make healthier choices in any time or place. There is great potential in the contextual spheres of influence outlined here that will enable planners to make healthy choices easy choices.

Note

1. Assuming 150-calorie snacks.

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