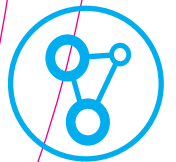
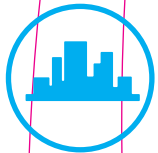
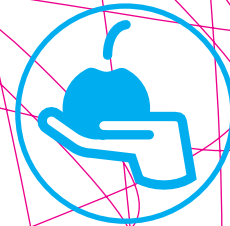
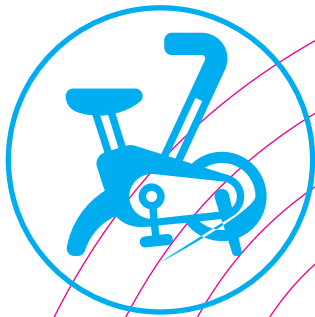


TRANSFORMING BODIES AND LIFESTYLES

Insights into Inspiring Behavior Change



INSTITUTE FOR THE FUTURE

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about the ...

Institute for the Future

The Institute for the Future is an independent, nonprofit strategic research group with more than 40 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is located in Palo Alto, California.

Health Horizons Program

The Health Horizons Program combines a deep understanding of the global health economy, user behavior, health and medical technologies, health care delivery system, and societal forces to identify and evaluate emerging trends, discontinuities, and innovations in the next three to ten years. We help organizations work with foresights to develop insights and strategic tools to better position themselves in the marketplace.

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TABLE OF CONTENTS

Introduction: The Challenge of Transforming Bodies and Lifestyles1



Personal Health Ecologies: Understanding Health Behaviors in Context.....3



Emerging Technologies: Employing New Tools for Contextual Targeting5



Motivation: Identifying Opportunities to Encourage Behavior Change.....11



Building Capacity: Supporting Healthy Behavior Over Time.....15



Environments: Using Nudges and Mindful Design to Promote Health.....19

Behavior Change: From Insight to Action23

Endnotes:25





INTRODUCTION

The Challenge of Transforming Bodies and Lifestyles

The challenges—skyrocketing health care costs, soaring illness rates—are familiar yet grim. In the United States alone, more than 130 million people suffer from chronic illnesses. Globally, more than 1 billion people are now overweight or obese—a number that has been increasing steadily for decades. Confronting these challenges will take creative efforts and collaboration from a variety of stakeholders; perhaps most important among these will be people seeking to make change in their own lives.

As individuals, we will need to make seemingly small but critical daily changes to what we eat and how much we exercise, along with a variety of other behavioral changes, to navigate health risks and build capacities for well-being. Whether we can stay motivated to make these changes to our everyday lives will play a central role in shaping the long-term future of health and health care.

In our 2009 research, Health Horizons referred to this challenge of enabling behavior change as the challenge of transforming our bodies and lifestyles—a long-term challenge we’ve continued to explore in our 2010 map, *The Future of Science, Technology, and Well-Being*. In this scan, we highlight key strategic opportunities—places where you and your organization can take advantage of today’s technologies and understandings to develop and enhance your long-term behavior change initiatives.

This environmental scan identifies key strategies that stakeholders throughout the global health economy can use to help people make lasting changes that promote long-term health. It takes a broad look at emerging theories of motivation to identify key insights in the form of opportunities to intervene to change unhealthy behaviors and enable people to build capacities to create health and well-being in their own lives. It also identifies critical emerging technologies that will shape our everyday health experiences. Combining insights from the social sciences and technology is creating new opportunities to deliver more persuasive, personalized, and meaningful messages to promote healthier behaviors. The scan concludes with a discussion of environmental triggers—subtle ways that social and physical environments shape our behaviors—and highlights opportunities to integrate conscious environmental design as part of robust initiatives to improve health.

Behavior change is ...
the “Holy Grail” of health.

The challenge of behavior change is daunting—what one venture capitalist we spoke with described as the “Holy Grail” of health. But as this scan highlights, the promise of new technologies and emerging understandings of behavior and motivation are creating unprecedented opportunities to help people make better everyday decisions in order to build long-term capacities for well-being.



PERSONAL HEALTH ECOLOGIES

Understanding Health Behaviors in Context

Individuals today are facing increasingly large burdens to manage their own health, even as demands for managing other aspects of work, life, and home continue to grow. The challenge for organizations looking to promote healthy behavior change is to find ways to give people the right health resources at the right time in the right context. These resource and contextual needs are constantly shifting, based on what an individual is doing over the course of a day.

Looking at behavior change through this lens points toward one of its most challenging aspects: giving someone general health information, or even personalized information outside of an actionable context, is not enough. For behavior change to be successful, information needs to be targeted to individuals based on their contextual needs. This section lays a foundation for how our health needs change over time, while subsequent sections highlight how new uses of technology and understandings from behavioral sciences are enabling innovations to meet these constantly shifting needs.

‘Personal health ecology’ ... an individual’s ecosystem of resources and practices to manage their health.

Personal health ecologies point toward diverse health needs.

Each of us defines health and participates in activities related to health in a unique way. That personal perspective must be considered to create solutions that work for individuals and populations. The Institute for the Future has defined “personal health ecology” (PHE) as an individual’s ecosystem of resources and practices to manage their health and the health of their family.¹ PHEs include a wide variety of activities, practices, and resources used to pursue health, make decisions, and interact with health care providers—including exercise, nutrition, health information, clinicians, alternative providers, over-the-counter products, and family, friends, and colleagues.

The PHE is essentially a responsive network of resources that continuously transforms to meet changing health needs over time. We all have our own definition of what contributes to or harms our health; the ecosystem we construct around us helps reinforce that definition. Some individuals invest in and associate their health strongly with the biomedical model. Others may not be engaged in the biomedical model, or may even avoid it, but are still very much engaged in their health through other means such as diet, exercise, and yoga.

Multiple mindsets complicate behavioral targeting.

The health behaviors individuals exhibit and the resources they tap into in their PHE vary based on the specific situation in which they find themselves and the role they are playing. How people think of themselves in relationship to health strongly impacts the way they interact with the health care system and approach behavior change. We inhabit multiple mindsets every day.

For example, early in the morning, a woman may inhabit the identity of mother, or chief wellness officer for her family, ensuring her children have the most nutritious breakfast possible and are prepared for a day of school. Then, later on, she transitions to the role of hard-nosed manager of a business, ensuring she meets the bottom-line goals, which might mean skipping a workout she knows she should do but can’t squeeze in. As she shifts from activity to activity, her goals, responsibilities, and capabilities are constantly changing—and information that might be well targeted at breakfast, such as nutritional information, does little to help just a couple of hours later.

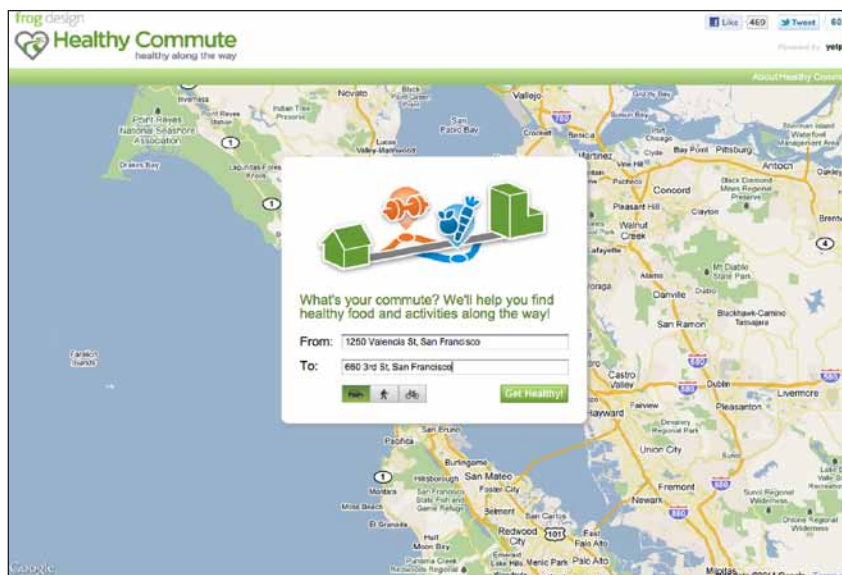
These shifting mindsets and needs have been persistent challenges in health behavior change initiatives. As the next section highlights, advances in technology and media are allowing for the design of behavior change initiatives aimed at moving toward more contextually relevant and meaningful feedback to improve behaviors.



EMERGING TECHNOLOGIES Employing New Tools for Contextual Targeting

Over the past decade, our media and technology landscape has undergone a shift—from mass communication to increasingly social and personalized media, where information consumption habits vary not just by person but also by device and context. In contrast, many efforts to communicate health information and enable people to change their health behaviors remain broadly targeted.

This is beginning to change. Advances in technology have been creating unprecedented opportunities to move from generalized health advice toward a world where individuals can receive targeted, contextually relevant feedback that connects them to relevant resources in their PHE. In other words, technological advances will enable targeting behavior change not just by person but also by personal health ecology. In this section we highlight a set of emerging technologies that are enabling the kind of contextual targeting that will enhance behavior change initiatives in the coming years.



Contextual Targeting: The “Healthy Commute” app plots a person’s route between two addresses (e.g., work and home), and displays simple changes to the route that lead to the locations of healthy choices in food and activities.

Source: Frog Design

Avatars engaging in positive behavior may create echoes of that behavior in the physical world ...

Data mining enables personalized understandings of health.

Electronic health records (EHRs) are designed to be interoperable among different systems and different hospitals, doctors, and other providers. But these records, as critical as they are, form only one source of data in our personal health ecologies. We generate a variety of other health data that permeates our PHEs, including real-world data about our diet and fitness regimens along with other daily health choices. Increasingly, social information from health communities such as PatientsLikeMe—a social networking site where members connect with others who share their health conditions, to share information and support each other—will allow the PHE to include communities of other patients sharing their data.

Seamlessly combining these data streams represents the future of our digital health identities and will offer enormous opportunities to improve medical care and self-care through large-scale data harvesting. Doctors and other medical practitioners will not simply enjoy access to the latest health sciences, but will also be able to receive increasingly relevant information customized to the needs of their patients. Real-time flows of the most relevant evidence-based diagnostic and treatment options will be available in open, novel ways from online medical libraries to linked scientific data repositories.

Data will be used to target the right treatment to the right person at the right time and in accordance with that person's preferred way of engaging. Massing data in this way will create a strategic asset for traditional data and clinical research "owners," such as academic medical centers and government institutions. Patients will be co-creating value and advocating based on their data, and they will become powerful players in the health world. Abundant data will also provide the foundation for the other technological changes outlined here.

The Stanford Virtual Human Interaction Lab, for example, had individuals play a virtual reality game in which they were told to cut down sequoia trees with a chainsaw. After playing this game, their actual real-world paper use declined. Avatars—the name for the virtual representation of oneself—have also been used to show individuals what their lives would be like in the future with various levels of income, as a way to increase savings and improve financial management. Avatars engaging in positive behavior may create echoes of that behavior in the physical world; visualizing a "future you" may make it easier for you to identify with yourself in the future, thus enabling everything from better fiscal responsibility to losing weight.

Mobile connectivity creates just-in-time access to information and support networks.

Smartphones—which Tim O'Reilly calls "a physical manifestation of a network we can't see"—are rapidly gaining in popularity and are already being used to promote and support anytime, anyplace health care.² According to July 2011 data from Nielsen, 40 percent of mobile phone users over age 18 in the United States now have smartphones.³ The economies of scale resulting from rapid adoption of these devices is driving prices down to the point where almost

everyone will be able to afford to carry a mobile computer, with standard features that include massive local data storage, robust input/output for peripheral sensor networks, basic capabilities for Web and data communications, full-motion video, high-fidelity audio, and location sensing.

Many of us already use our smartphones as personal data collection and network tools and use them to expand the kinds of practices and resources we use to manage our health. As a result, we are likely to see dramatic changes in the way we take care of ourselves, access health care and health care information, and interact and engage with providers.

In conjunction with the move from basic mobile phones to smartphones with enhanced data processing and connectivity, new health and wellness-related applications are appearing weekly. Device manufacturers, network operators, and third-party programmers are all experimenting with applications aimed at consumers interested in using technology to support their diet, fitness, and drug regimens. For example, the Noom Weight Loss Coach app from Worksmartlabs gives users a way to track weight loss goals, exercise, and food intake on their smartphones. This kind of on-demand access allows people to understand their health needs when that understanding can have significant benefits.

Blended reality and the Geospatial Web enable contextual, persuasive feedback.

We are creating a new kind of reality—a “blended reality” in which physical and digital environments, media, and interactions are woven together throughout our daily lives. In this world, the virtual and the physical are seamlessly integrated. Cyberspace is not a destination; rather, it is a data layer tightly integrated into the world around us. Smartphones, digital displays at various new locations in the physical environment, and maybe even augmented-reality glasses take the Internet from our desk at home and weave it into our surroundings wherever we go. We are beginning to see and feel the world through a new set of eyes and ears—things that were previously invisible become visible, and we see the familiar in a new way.

At the same time, the Geospatial Web—the technology employed in web-based applications such as Google Earth and Yelp’s Monocle—lets users fly over a detailed map of the world, zooming in and out, adding detail, or altering time. Information such as the names of roads, borders, and the locations of coffee shops or friends can be draped onto the view, which can then be panned, rotated, tilted, and zoomed with almost seamless continuity. These three-dimensional platforms have already revolutionized the production and consumption of media products. They not only reveal the geographic distribution of resources and services, they also bring together people with similar interests, people with similar browsing behavior, and people who are located near each other at a given time.

Blended reality and the Geospatial Web will make it possible for us to receive timely contextual feedback—information about the consequences of an action

Cyberspace is not a destination ... it is a data layer tightly integrated into the world around us.

Sensors on bodies could provide immediate feedback to influence health choices.

or phenomenon—that can help us make better health choices dynamically. For instance, a commuting game can be created in which players earn more points for taking healthier routes to the office, with the points acting as feedback to let players know how to adjust their behavior. And imagine today’s Centers for Disease Control (CDC) surveillance practices using the Geospatial Web. Dr. Leslie Lenert suggests this will help us develop an “information ecology” allowing individuals to be more empowered in their information gathering and large entities such as the CDC to be more efficient and efficacious in their interventions.⁴

Sensors and sensor networks facilitate seamless data gathering and allow for targeting behavior change by environment.

Sensors are devices that measure a physical quantity and convert it into a signal that can be read and responded to. Sensors are already used in a variety of everyday objects, such as thermostats and touch-sensitive elevator buttons, but researchers envision a day when ubiquitous sensors—wirelessly receiving signals, analyzing them, and transmitting them—will form the backbone of smart cities. Over the next decade, they will increasingly be used to design “nudges”—policy frameworks that seek to influence small decisions at the consumer or citizen level.

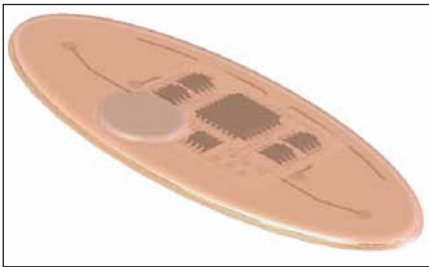
Currently, multiple systems are being developed by Bosch, Philips, Honeywell, Intel, GE, and other corporations that use sensors to monitor elderly patients in their homes and alert their caregivers when something is amiss. This allows care to be provided outside the traditional institutions and allows for the virtual delivery of care. An example of this is “boundary” sensors installed on the entrances of the residence of a person with Alzheimer’s so that a text message can be sent to caregivers notifying them when their loved one attempts to leave the house.⁵

Furthermore, sensors on bodies could provide immediate feedback to influence health choices. In 2009, a group of University of Southern California researchers developed a wearable body area network that can communicate seamlessly with cell phones, designed to track what sorts of activities a person has engaged in and if he or she has been inactive for extended periods of time. According to the Los Angeles Times, the hope is that this sort of sensor network will one day be used to help fight childhood obesity.⁶ Body area networks are also being developed to monitor people with chronic illness and at high risk of falls.

The Internet of Things embeds intelligence in everyday objects and turns them into tools for behavior change.

The Internet of Things—a world in which objects have their own IP addresses and can share data—promises to transform our experience of creating, accessing, and interacting with data and could allow us to program a healthier

Source: PhiloMetron



Body sensors: The PhiloMetron Patch is a wearable sensor currently in development that monitors the number of calories the user consumes and burns in a day, then sends the results to the user’s smartphone.

world for ourselves. Consistent with blended reality, with the advent of the Internet of Things, digital information won't feel like it exists in an alternate world that we go to, but rather as a layer atop our everyday reality. The late Mark Weiser, Chief Scientist at the XEROX Palo Alto Research Center, said, "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it."⁷ With the Internet of Things, smart objects will become part of the fabric of our lives and as data collection devices will provide transparency to the health choices we make every day.

Everything from tires to toothbrushes will be in communications range, thanks to new technologies such as RFID and smart computing. The Internet of Things will increasingly provide feedback and support to sustain behavior change for those who choose to engage with this world of embedded electronics. We're starting to program objects to, for instance, give reminders to take medications as directed. We're also seeing triggers that are more complex: for instance, the app Fooducate scans bar codes and provides a "health score" based on the nutritional information about the product.

Virtual reality improves health simulations and enables people to visualize future benefits of healthier decisions in the present.

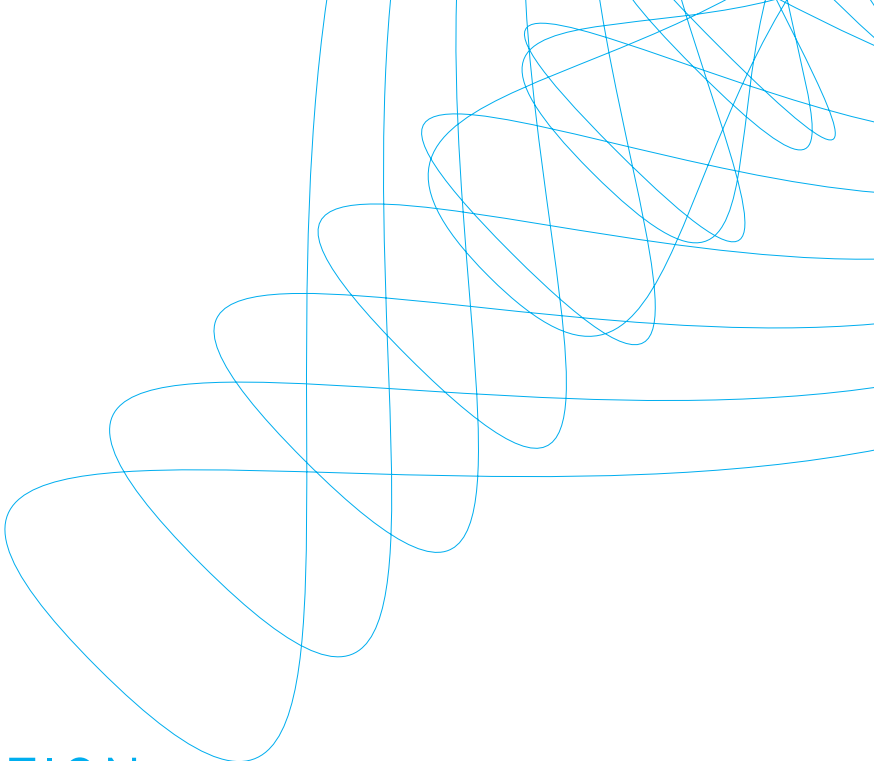
Improvements in the use of virtual reality are making it possible to more accurately render new virtual spaces and track individual movements within them. The brain distinguishes between real-world experiences and virtual ones based on sensory perception. Technological improvements will allow us to create more immersive environments that activate all five of our senses, making the experience seem more genuine to our brains. We can use this technology to create spaces in which we can safely engage in practices that will engender good habits. Practicing behaviors in these virtual environments will lead the brain to continually learn to fire the right neurons together, creating triggers to habit formation in the brain. This will translate into real-world behavior changes.

The Stanford Virtual Human Interaction Lab, for example, had individuals play a virtual reality game in which they were told to cut down sequoia trees with a chainsaw. After playing this game, their actual real-world paper use declined.⁸ These researchers have also shown that avatars—the name for the virtual representation of oneself—have also been used to show individuals what their lives would be like in the future with various levels of income, as a way to increase savings and improve financial management. Avatars engaging in positive behavior may create echoes of that behavior in the physical world; visualizing a "future you" may make it easier for you to identify with yourself in the future, thus enabling everything from being more fiscally responsible to losing weight.



Source: Stanford Virtual Human Interaction Lab

Visualizing consequences: The Stanford Virtual Human Interaction Lab created a game to help people visualize the consequences of paper consumption.



MOTIVATION

Identifying Opportunities to Encourage Behavior Change

Advances in technology are creating new tools to intervene with the right information at the right time to encourage and support behaviors that lead to better health. These tools are being augmented by improved understandings from the social sciences. These new understandings of people’s underlying motivations—what prompts them to make changes to their health behavior—are creating opportunities to make behavior change initiatives more personally relevant and persuasive.

Such new understandings call into question the idea that individuals can be motivated to change their health behavior by information alone. While information is important to building the capacity to make a change, to know what to do and how to do it, its utility varies by where someone already is on what researchers have identified as a motivation spectrum. As a venture capitalist we spoke to said, “If information was all it took, we’d all be skinny and healthy.”

Social science research also points out that our social networks—friends and family, colleagues, friends of friends, and other consumers who share similar health concerns, values, or PHEs—are key to our health behaviors because they shape our identities. Behavior change that is in line with an individual’s identity—that is, in line with that person’s values and, by extension, the values of her or his social network—is more likely to be lasting.

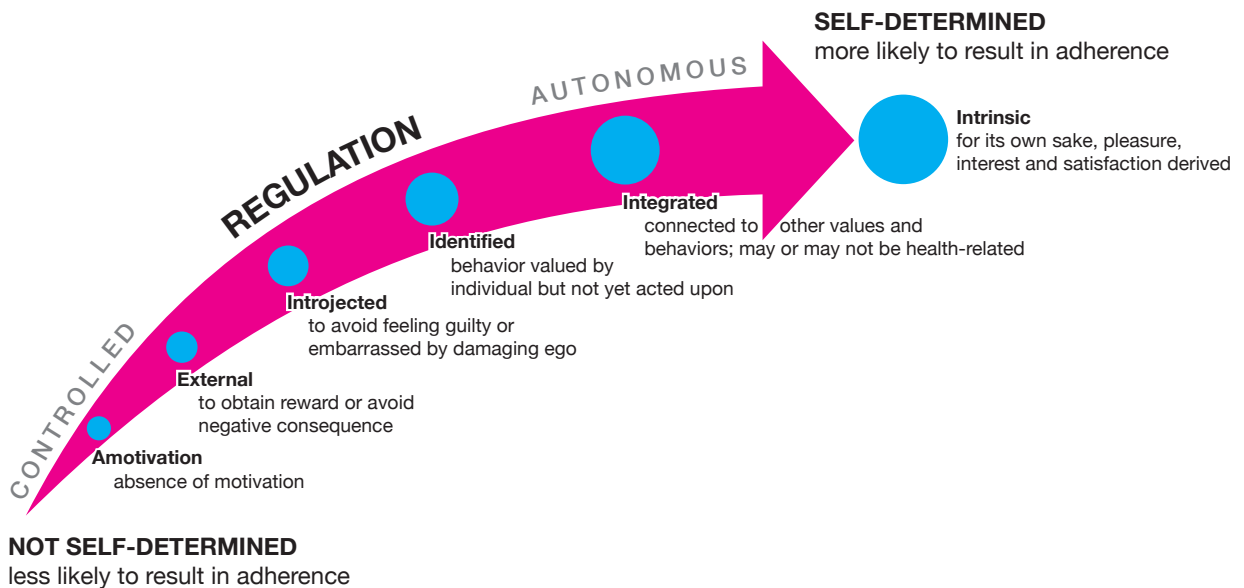
In this section, we highlight specific opportunities to tailor behavior change initiatives to people based on their motivations.

Because people vary in how motivated they are to make positive changes in their health behavior, behavior change initiatives can aim tactics at different places on the motivation spectrum to reach more people.

Aim tactics at different places on the motivation spectrum.

Motivation is the reason we do the things we do. There are two primary forms of motivation: extrinsic and intrinsic. Extrinsic motivation comes from outside the individual and involves external reward or punishment for a certain behavior, while intrinsic motivation occurs when an individual does something because she or he is interested in or enjoys the task itself. Self-determination theory says that different types of motivation underlying people’s behavior fall along a continuum of self-determination or autonomy from extrinsic to intrinsic or least to most self-determined. Successful behavior change is most often associated with a high degree of autonomous/self-determined motivation, but how to move someone along the spectrum from extrinsic to intrinsic and from less to more self-determined is not clear.⁹ Because people vary in how motivated they are to make positive changes in their health behavior, behavior change initiatives can aim tactics at different places on the motivation spectrum to reach more people.

Many behavior change programs and services target people who are already highly motivated. This approach to the market is exemplified by the 9,000 consumer health apps currently available for smartphones—forecast to grow to 13,000 during 2012.¹⁰ Consumer health apps fall into several categories, many of which mirror tactics that have been around for years, both offline and online, such as providing health education, answering specific health questions, and tracking vital signs such as blood pressure and heart rate. Others turn the smartphone into a sensor—an immediate data-collection and feedback device—and/or create reminder mechanisms. These kinds of apps are providing intrinsically motivated people tools to manage their health on-the-go.



Source: IFTF

By contrast, the most obvious example of using extrinsic motivation to drive behavior is the growth of points-based affinity and rewards systems. Collecting points for our behavior is now commonplace: from airline miles, to cash-back rewards, to points on Facebook games. In corporate wellness and health insurance programs, employers and health plans also use controlled extrinsic motivators, such as financial incentives (for example, cheaper benefits or gift cards), and more self-determined but still not autonomous incentives, like social influence-based programs (for example, interorganizational competitions and challenges), to try to entice people to participate. Their perspective is that incentives, at a minimum, create a spark of interest in people who will then begin to recognize the value of the change and sustain it.

Highlight lifestyle goals to enhance motivation.

Health can be problematic as both the end goal and source of motivation. Individuals may be more motivated or may aspire to achieve a particular lifestyle goal rather than an abstract health goal.

Ironically, talking explicitly about health can lead to bad health behaviors. The word *health* elicits a cortisol effect in us, which contributes to stress. According to terror management theory, when health is brought up as a topic of discussion, people can't help but think about their own mortality, which creates anxiety and a sense of loss of control.¹¹ Since people are motivated to do things to reinforce their own power and self-esteem, communicating about behavior change in terms of health goals can cause people to engage in bad behaviors such as overeating, consuming unhealthy foods, overspending, and smoking.¹²

In contrast, lifestyle goals, such as a goal to play with one's grandkids, can be far more motivating and ultimately lead to improved health. Behavior change initiatives can take advantage of this understanding to frame goals in terms that will encourage rather than discourage achievement.

Target social networks and affinity groups to inspire collective behavior change.

According to Nicholas Christakis and James Fowler, authors of *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*, individuals in a network influence each other's behavior. For instance, obese individuals are more likely to be linked to other obese individuals, not simply because obese individuals may find each other and join each other's network, but spread subconsciously. They argue that if an individual in the network gains five pounds, the effect ripples out through the network and persons within three degrees of that person in their network are likely to also gain weight. Data from the research behind *Connected*, which is still being studied and will be harvestable for behavior change strategies, is part of a large set of network studies that will greatly improve our understanding of network influence on individual behavior.

Social networks also influence our conscious understandings of health. People tap into their social networks when they are seeking reliable, trusted information on which to base health and health care decisions. In fact, the increasing use of social networks to gather health information can be seen in the proliferation of online affinity groups or communities. When we look at PHEs, we see that health communities that share some affinity (such as a cancer diagnosis or the goal of losing weight) are critical resources for information and practices for reducing the risk of health care decisions. But while social networks are trusted sources, reliance on opinions and information from social networks may also expose members to more risk if the shared information is wrong and leads to poor decisions. Going forward, behavior change initiatives can use the power of social networks as channels of information to promote healthy behaviors.

Many organizations are already using social networks to motivate behavior change. Religious organizations and twelve-step programs are expert at creating an affinity among those who attend their functions. A recent example of an influencer diffusing behavior change through a network is the massive change that members of the Saddleback Church in Lake Forest, California, have undergone in losing weight and increasing fitness through the Daniel Plan, a health plan that was created and extensively promoted as an important value for church members. Rick Warren, the leader of the church, lost more than 50 pounds between January and October 2011, and church members have collectively lost more than 250,000 pounds. This example points toward the critical role that collective efforts can play in improving health behaviors.¹³



BUILDING CAPACITY

Supporting Healthy Behavior Over Time

To change a behavior, a person has to know how to make a change and to feel capable of doing it—in other words, he or she has to have the capacity to make long-term change. As we refer to it here, capacity encompasses the physical, cognitive, and emotional ability to start and maintain the healthy behavior over time, perhaps even mastering the behavior and evolving it into a daily ritual or habit.

For most people, unfortunately, this is easier said than done. Making a big transformation, like committing to a new exercise regimen or diet, requires making lots of daily changes. Behavior designers are working on designing good behaviors as “habits” and promoting health by taking complex goals like eating well and breaking them down into smaller, more manageable steps so that people can build capacities over time. The strategies highlighted below offer key strategies that can help people understand and learn the health impacts of their behaviors in order to build capacities over time.

Feedback loops can give people the tools they need to ... learn how behaviors affect health.

Provide context-specific feedback to enable empowered decisions and learning.

Relevant feedback loops can help people respond to information in real-time, and also gain understanding of the influence of their behaviors over time. Feedback loops can provide context-specific information and guidance to help support behavior change over time. Using a thermometer to measure fever is an example of a feedback loop: when the measured temperature is significantly higher or lower than 98.6 degrees F, the patient is prompted to take action to bring the temperature back to normal. The more immediate and individualized the feedback loop, the higher the probability of the desired behavior. In the case of sensors in the home or body area networks, the feedback loop may be completed—that is, the adjustment may be made—by the technology itself (a reminder that shows up on the TV screen to take an overdue medicine) or by providing data to an outside source (a message to your doctor or caregiver that a medication dosage was missed).

Over time, these feedback loops can give people the tools they need to understand and learn how behaviors affect health. Feedback loops may help reduce unnecessary distraction and support mindfulness in the individual. Paying attention to oneself and reflecting on what's going on internally and how one reacts to specific impulses and cravings are tactics for building capacity and resilience.

Use games to help build skills and resilience.

Games allow people to experiment and play in a space with fewer, and less meaningful, consequences than there would be in real life, enabling people to learn the consequences of multiple behaviors and choices. In her book *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*, IFTF Director of Game Research and Development, Jane McGonigal, describes games as having four defining traits: a goal, a set of defined rules, a feedback system, and voluntary participation. She comments that games hold the secret to engagement, as games challenge people to overcome difficult obstacles, but do so in a fun way.

Many new companies and experts are evaluating the potential for game mechanics to be applied to health. Instead of the old adage “no pain, no gain,” they are thinking more along the lines of “no fun, no gain.” They are exploring how to use game mechanics and our innate social nature to make adopting the health behaviors that lead to long-term benefit fun and engaging. For example, “SuperBetter” is a game that helps people to recover from illness and injury and increase resilience. McGonigal created the game to help herself recover from a concussion and to try to make a difficult recovery process more fun. In it, players create missions for themselves, achieve goals, increase points and skill levels, and enlist allies. These elements are analogous to the ingredients of any successful behavior change—small, measurable goals that are easily visualized and accrue regularly; development of new skills; salience of social networks.

Employ personalized avatars to promote awareness of decision outcomes.

One strategy to increase learning and help people build capacities to improve long-term health is emerging from research at Stanford's Virtual Human Interaction Lab, which is one of several initiatives exploring how virtual reality can affect health.¹⁴ This impact, often called the Proteus Effect, suggests that when people see changes in personalized avatars, such as weight gain, they are inspired to want to avoid unhealthy influences and make healthier changes.

For example, one study had people watch their avatars get skinnier from eating carrots, and heavier from eating candy, which resulted in people eating differently based on their avatars. Similarly, avatars have helped motivate people to exercise more frequently. Virtual environments have also been used successfully to create behavior change related to phobia treatment and post-traumatic stress disorder, by allowing people to experience their fears in the safe and controlled setting of virtual reality and letting them visualize alternate future scenarios—ones in which behaviors have been modified and ones in which they haven't.

Increase resilience to cope with adversity and sustain behaviors.

The ability to persist and sustain a behavior over time is key to behavior change. To sustain a behavior an individual must be resilient and have self-efficacy, a belief in their ability to do what they intend to do. They must have the ability to cope with stress and adversity, in other words, all of the things that get in the way of doing the behavior. It's one thing to be able to perform in a controlled setting such as a lab, but in the real world, there are numerous challenges that surround us all the time. Resilience is being resourceful in stressful environments, surviving, and, if there's a failure to perform, bouncing back. Resilient people share a number of traits and resources: the ability to cope with stress effectively and in a healthy manner; good problem-solving skills; an ability to ask for help; the belief that there is something one can do to manage their feelings and cope; strong social support, including being connected with others, such as family or friends, and comfort with self-disclosure of trauma to loved ones; spirituality; an identity as a survivor as opposed to a victim; and the ability to help others and finding positive meaning in trauma.

Individuals will often develop these skills through self-reflection and by integrating advice and information into their daily habits. Filters and discriminatingly-used feedback loops may help reduce unnecessary distraction and support mindfulness in the individual. Resilient people pay attention to themselves, reflecting on what's going on internally and how they react to specific impulses and cravings.



ENVIRONMENTS Using Nudges and Mindful Design to Promote Health

Physical and social environments significantly impact behavior. They can support or undermine our ability to “do the right thing” through explicit mechanisms, such as reminders, rewards and punishment, and implicit mechanisms, such as the layout of a grocery store or use of certain colors in marketing and packaging techniques to persuade us to buy one product over another. Behavior change initiatives focused on health can incorporate environmental interventions in the form of nudges, healthy defaults, and mindful design to promote better choices.

Underlying the concept of environmental intervention are two main schools of thought—behavioral and cognitive psychology. These theoretical positions attempt to explain the role environment plays in generating behavior and are reflected in the two major types of environmental intervention: those that nudge and guide us subconsciously, and those that we design ourselves once we have become mindful of how our environment impacts our choices. Both types of environmental intervention offer opportunities to promote healthy behavior change.

Designing the cafeteria so that desserts are placed near the register ... results in greater consumption of desserts.

Engineer environments to nudge behavior in a healthy direction.

In behaviorist thought, environment causes all behavior, and changes in environment alone—not internal states of motivation, rational assessment, nor any other internal processes—account for behavior change. Our environment shapes the way our mental and cognitive processes function and nudges us in particular directions. This is the theory behind the notion that environments can be engineered to nudge people to make a healthy choice without a second thought.

Take a cafeteria, for instance. Designing the cafeteria so that desserts are placed near the register, where people linger longer in line, results in greater consumption of desserts.¹⁵ Research has shown that instead placing fruit at the end of the line increases fruit consumption without forcing anyone to choose the fruit or limiting people's ability to indulge in dessert. Research is ongoing about nudges in school cafeterias. In one project, the fast service lane offers only a healthy lunch choice, so that choosing healthy saves students time. In another project, participating school cafeterias in Houston, Texas, will market targeted healthy foods via messaging and presentations, and food service staff will encourage children's selection of the targeted foods as the children go through the serving line. Coordinated parent communications about the lunch menus and targeted foods will be made available via website, Facebook, and Twitter.¹⁶

The kinds of nudges that can be designed are limited only by the imagination. As we move to grander scales of environmental engineering, in which entire cities are constructed to collect and interpret vast sensor array data in order to nudge us in particular directions, there is the opportunity to move toward futures in which we become healthier and more productive with little or no cognitive work of our own.



Designing for health: The design of the built environment can be modified to suggest health decisions.

Source: Universidad de Navarra

Engineer environments to offer the healthy alternative as the default.

Similar to nudges and also grounded in behaviorist thought, defaults can help to structure our environments to positively shape our health choices. At every juncture where a decision needs to be made, the default choice—that is, the choice that is easiest to make—can be the one that is in the best interest of the individual’s health. For example, organ donation rates are dramatically higher in countries where donating is the default than in countries where people have to opt in to being organ donors.¹⁷ If a person does not know which choice is the best one, he or she will likely stay with the default and thus make a better, healthier choice.

Defaults can be a way of letting others make decisions for us when we do not understand the directions we should move in or are too stressed to make an intelligent, reasoned decision—as is often the case when people deal with financial planning and health management decisions. Default decisions can also be personalized to deal with individuals in particular situations such as deciding whether to enroll in a particular wellness or retirement program, what kind of program to enroll in, and how that program should change over time. Defaults, just like nudges, may be an effective way to help schoolchildren make healthy choices in the cafeteria line, and research is being done on this kind of environmental intervention.

Empower individuals to mindfully design their own environments to shape behavior in a healthy direction.

Mindful design is based in cognitive psychology. In contrast to the behaviorists, cognitivists believe that awareness and understanding are key to behavior change. They argue that individuals can build capacity to behave in more considered and self-fulfilling ways by understanding their own internal states and learning to recognize the effects of their behavior. Key for cognitivists is how people think about their experiences.

The real opportunity in environment is a “both and” approach. Behaviorists, again, believe that the end result is all that counts in terms of behavior: it doesn’t matter why you’re engaging in a positive behavior as long as you’re doing it. Environment and design fit well into this paradigm. It is possible for an individual to intentionally design their environment in such a way that they are nudged in particular directions or are limited to making positive choices. For example, research has shown that plate size can influence how much we eat—and as a result, many people have begun buying smaller plates to consciously nudge themselves to eat less.¹⁸ In this way, design strategies that enable people to consciously shape their own environments to improve health may offer a unique tool that simultaneously enables learning, but also limits many of the challenges that come from focusing solely on consciously trying to improve one’s health.

Another way that people can consciously design their environments to encourage healthy choices is through cognitive off-loading—unloading cognitive functions onto technological “assistants.” For example, we can set smartphone reminders to assist us with successfully completing tasks like taking a stretch break or taking medication. Setting up such systems can trigger positive, necessary actions that over time can become healthy habits.



BEHAVIOR CHANGE

From Insight to Action

Changing behaviors and helping people develop capacities to live healthier lives has been a notoriously difficult challenge—and for many people, maintaining and improving health will remain an ongoing, and oftentimes difficult, challenge in the coming decade. Despite this challenge, new understandings of motivation and capacity building and the technologies to reach people in the different contexts of their daily lives are creating unprecedented opportunities to respond to this challenge.

As you consider implementing behavior change initiatives, seeking out the intersections—where new technologies can combine effectively with motivational needs and help build capacity—will be critical to success. This combination of technology and understanding from the social sciences will enable initiatives that connect people to the information and resources they need to be healthier in a timely and contextually relevant way.

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