

Persistence: How Treatment Effects Persist After Interventions Stop

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Erin Frey¹ and Todd Rogers²

Abstract

Interventions intended to change people's behavior are ubiquitous in modern society. Some interventions produce changes in behavior that persist even after the interventions are discontinued, while other interventions generate only short-term behavior changes that disappear once the interventions stop. The framework presented here guides understanding of why and how behavior changes (treatment effects) persist after interventions (treatments) are discontinued. Four persistence pathways explain how persistent treatment effects may arise: building psychological habits, changing what and how people think, changing future costs, and harnessing external reinforcement. Each pathway is illustrated by describing how the pathway may have contributed to the persistent treatment effects produced by a widely used energy-efficiency intervention conducted by the energy-efficiency company OPOWER. Different conditions may make each pathway more or less likely to generate persistent treatment effects in the world. Finally, policymakers might develop more persistent interventions by leveraging each pathway.

Keywords

persistence, treatment effects, interventions, habit

Tweet

Treatment effects persist after interventions end when people change habits, beliefs, future costs, or how the world interacts with them.

Key Points

- Only some interventions show treatment effects that persist afterward.
- Persistence arises from building psychological habits, changing what and how people think, changing future costs, and harnessing external reinforcement.
- The energy-efficiency intervention produced by OPOWER illustrates persistent treatment effects.

Introduction

State and local governments, firms, physicians, educators, and activists spend billions of dollars each year trying to change people's behavior in lasting ways. Sometimes, these efforts successfully result in persistent behavior change. Other times, however, these efforts result in only fleeting behavior changes (if any at all), as people quickly revert back to their initial behaviors. Despite so many resources devoted to behavior change, behavioral scientists are just beginning to develop a comprehensive framework to explain when treatment effects will persist after treatment has been

discontinued, and when they will not (Rogers & Frey, 2014). This article describes such a framework: It outlines the psychological pathways that enable treatment effects to persist through time.

Concrete illustrations of each “persistence pathway” are discussed through the lens of an intervention produced by the energy-efficiency firm OPOWER. OPOWER mails customized home energy reports (HERs) to households that compare each household's energy consumption with that of their neighbors, providing feedback to each household about their relative energy consumption (Allcott & Rogers, 2014; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). OPOWER's treatment causes households to reduce their energy consumption; the size of the OPOWER effect is similar to the effect of raising short-term energy prices 19% to 31% (Allcott, 2011). In one representative experiment, OPOWER discontinued the HERs for some randomly selected households after 2 years. The effects of the OPOWER treatment continued to persist for several years after the reports were discontinued, decaying only 10% to

¹Harvard Business School, Boston, MA, USA

²Harvard Kennedy School, Cambridge, MA, USA

Corresponding Author:

Todd Rogers, Harvard Kennedy School, 15 Eliot Street, Cambridge, MA 02138, USA.

Email: Todd_Rogers@hks.harvard.edu

20% per year (Allcott & Rogers, 2014). In other words, households that received the treatment continued to use less energy than those that did not, even after they stopped receiving the treatment.

Such persistent treatment effects are not unique to OPOWER, or to the domain of energy efficiency. Rather, persistent treatment effects have been observed across a range of fields. For example, persistent treatment effects also emerged in a program designed to help people quit smoking (Volpp et al., 2009). Their initial treatment involved a financial incentive for 6 months, but after the incentive ended, those who had received the incentive continued to smoke at lower rates than those who had not, even 6 months after discontinuing the financial incentive. However, this finding is unusual among smoking-cessation research. A meta-analysis (quantitative summary) of the long-term effects of smoking-cessation programs (Cahill & Perera, 2008) determined,

There is no compelling evidence . . . that competitions or incentives improve long-term smoking cessation . . . Several studies identified higher early and medium-term quit rates for the intervention groups, but these encouraging signs generally did not survive into long-term abstinence. (p. 6)

In the domain of financial decision-making, one seminal study involved automatically enrolling new employees into 401(k) savings plans while allowing them to opt-out during their new employee on-boarding. This structure contrasted with the standard practice of not automatically enrolling new employees but allowing them to opt-in to the savings plan during their on-boarding (Madrian & Shea, 2001). Four years after this intervention, those who were automatically enrolled were several times more likely to be enrolled and saving money through the plan than those who were not. But similar to smoking-cessation studies, few personal finance interventions show such robust persistence after treatment ends. In fact, behavioral scientists studying the long-term effects of financial education programs have found quite the opposite. Despite the billions of dollars spent on financial literacy programs, a meta-analysis of 201 studies (Fernandes, Lynch, & Netemeyer, 2014) found that the “financial education interventions studied explained only about 0.1% of the variance in the financial behaviors studied, with even weaker average effects of interventions directed at low-income rather than general population samples” (p. 1).

This article presents a framework for understanding when and why treatment effects persist. Throughout, it discusses how each “persistence pathway” might contribute to the persistence of the OPOWER treatment effect. We choose OPOWER as the illustration because of the robustness of the research examining the HERs, the policy importance of the intervention, the scale of the intervention, and because the intervention’s persistence likely arises as a result of many different pathways.

OPOWER and Persistence

OPOWER is an energy-efficiency company that partners with utilities to provide customers with feedback about their energy usage. OPOWER sends personalized HERs that compare a given households’ energy use with that of their neighbors. Households receive these reports monthly or quarterly for an indefinite period of time. As of spring 2014, over 7 million households received OPOWER HERs. In April 2014, OPOWER had an initial public offering that valued it at nearly US\$1 billion.

OPOWER’s treatment is inspired by research showing that people conform to what they perceive to be the behavior of others (Cialdini, Reno, & Kallgren, 1990; Gerber & Rogers, 2009; Goldstein, Cialdini, & Griskevicius, 2008; Schultz et al., 2007). Three long-term randomized experiments conducted by OPOWER (Allcott & Rogers, 2014) have identical experimental designs: Beginning around 2008, 234,000 total households were randomly assigned to one of three conditions. Households in the *control group* did not receive HERs. Households in the *continued group* received regular HERs for 4 to 5 years. Households in the *dropped group* received the regular HERs for 2 years, and then treatment was discontinued, such that they no longer received HERs for the remaining years of the experiment. All three experiments show the same pattern. During the years when households in the *continued* and *dropped groups* received the HERs, households significantly reduce their energy consumption. After households in the *dropped group* stop receiving the HERs, the initial treatment effect persists for several years, decaying only 10% to 20% per year. Several years after the HERs treatment is discontinued, households in the *dropped group* still use less energy than those in the *control group*.

Persistent treatment effects are not unique to the OPOWER treatment, and other domains have occasionally produced them as well. For example, participants enrolled in an incentive-based exercise program continued to exercise after the incentives had been discontinued (Charness & Gneezy, 2009; see also Royer, Stehr, & Sydnor, 2012). Similarly, a brief intervention aimed at changing first-year minority students’ sense of belonging on a college campus increased college success many years later (Walton & Cohen, 2011). However, as noted, many other interventions appear to have no treatment-effect persistence at all.

These studies beg the following question: How do treatment effects persist after an intervention has discontinued? This article describes a four-pathway framework for persistence. *Treatment-effect persistence* exists when those who received a treatment continue to behave differently in relation to a target outcome after the treatment stops, as compared with those who never received the treatment at all. A *treatment* can be any program, procedure, or action administered to people that changes a target outcome. The HERs are OPOWER’s *treatment* and the fact that those in the *dropped*

Table 1. Four persistence pathways.

Pathway	Definition	Examples of How Pathway May Contribute to OPOWER Energy Savings Persistence
Habit	Treatment produces an automatic tendency to repeat a particular behavioral response, triggered by a stable context in which the behavior is performed	OPOWER HERs may make people consciously turn off the lights when they leave rooms; eventually the contextual cue (exiting the room) automatically triggers the behavior (turning off lights)
Changing How or What People Think	Treatment permanently changes an element of how or what people think (for example, beliefs, identities, interpretations) that is causally consequential for the target behavior	OPOWER HERs may make people realize they are not as energy efficient as they had believed, which prompts them to continuously look for conservation opportunities OPOWER HERs may change people's identities and make them come to see themselves as "energy efficient" people, which influences future energy conservation OPOWER HERs may make people interpret a warm house in the summer in a more positive way ("I'm saving energy"), thus reducing the intensity of their air conditioning use
Changing Future Costs	Treatment induces people to perform behaviors that change the costliness of a future target behavior; the treatment may decrease the cost of performing a target behavior, or increase the cost of failing to perform a target behavior	OPOWER HERs may make people purchase energy-efficient appliances; this makes saving energy in the future require less effort and thought because it happens automatically
External Reinforcement	Treatment induces people to perform a behavior that then exposes them to on-going external processes (including social processes) that they would not have been exposed to otherwise; these external processes cause the changed behavior to persist	OPOWER HERs may make people buy energy-efficient appliances with rebates, which cause people to be added to marketing lists for other energy efficiency products, which they may subsequently purchase and which regularly remind them of the need to conserve energy. OPOWER HERs may make people talk about energy efficiency with their friends and family. These friends and family may then continue to ask what the OPOWER customers are doing to conserve energy, which causes them to continue to reduce their energy use

Note. HER = home energy report.

group continue to use less energy than those in the *control group* reflects *treatment-effect persistence*.

The four persistence pathways described in this article are summarized in Table 1. Table 1 also explores how each pathway may have contributed to the persistence of HERs.

Habit

The OPOWER HERs may generate persistent treatment effects through the formation of psychological habits. For example, the HERs may initially make people pay more attention to their energy conservation behavior, like turning off lights when they leave a room. If the HERs make people consciously think about turning off the lights every time they leave their living rooms, then over time people may come to associate leaving their living rooms with turning off the light switch right next to the door. Once such an association has formed between a context (leaving their living rooms) and a behavior (turning off the lights), people might automatically perform the behavior every time they are in that context. In other words, these people develop a psychological habit of performing the behavior.

Psychological habits develop by repeatedly pairing a specific behavior to a specific environmental cue. This repeated pairing creates cognitive associations between the behavior and cue such that, when people encounter the environmental cue, they automatically perform the behavior (Neal, Wood, Labrecque, & Lally, 2012; Ouellette & Wood, 1998). These associations may cause the performance environment to automatically induce the performance of the target behavior without conscious awareness, or it may automatically induce conscious recall of the need to perform the target behavior. Both routes may lead to persistent behavior change after a treatment is discontinued.

This definition of habit suggests several predictions about the conditions under which habit formation can contribute to persistent treatment effects. First, for habits to form, the environment must be stable while the environment-behavior association forms and must remain stable after the association is set (Wood, Tam, & Witt, 2005). If a habit successfully forms, but the environment changes, then people may no longer experience the environmental cue that triggers the behavior, thus preventing the initiation of the habitual behavior. For example, if the location of a light switch in the living room changes after people have developed a habit of turning

off the lights when they leave the living room, they may no longer turn off the lights when they leave the room because the performance environment has changed in ways that affect their ability to execute their habit.

Second, behaviors separated in time from their environmental cues are unlikely to become persistent through the habits pathway. Because habits rely on a mental association between a cue and a behavior, events that interrupt that association will prevent the behavior. For example, if every time people leave their place of work on a warm day, they remind themselves to open up the windows at home (instead of using air conditioning), they will develop a mental association between experiencing a warm day and thinking about opening their windows. However, if they then have a long commute before they actually get home, they may not actually perform the behavior, as too many other mental distractions will have occurred in the interim. Therefore, the habit pathway is most likely to lead to persistent treatment effects when an environmental cue can trigger a near-term behavior.

Energy conservation is just one domain where habit formation may lead to persistent treatment effects. Policymakers who wish to induce persistent behavior through habit formation should recognize that habits will be more likely to arise when there is stability in the environments in which the target behaviors occur. Sometimes policymakers may accomplish this by making otherwise chaotic environments more stable. Alternatively, policymakers could direct interventions at people who perform target behaviors in particularly stable environments. Consider, for example, the domain of exercise. Imagine an intervention aimed at inducing people to climb stairs that are adjacent to an escalator (i.e., incentives, messaging, slowing the escalator, etc.). If an intervention induces people to climb the stairs repeatedly, they may come to automatically associate the environmental cue of approaching the escalator and adjacent stairs with choosing to climb the stairs; that is, climbing the stairs may become habitual. Now, consider the domain of personal finance. Imagine an intervention that induces people, whenever they cash a paycheck, to deposit some of it in a separate savings account (i.e., incentives, messaging, ATM/bank teller/payday lender prompts, etc.). If an intervention repeatedly induces people to deposit part of their paychecks into a savings account every time they use an ATM/bank teller/payday lender, they may come to automatically associate the act of cashing their paycheck with depositing money into their savings account.

Changing How or What People Think

The OPOWER HERs treatment may generate persistent treatment effects by changing people's beliefs, attitudes, or interpretations. For example, the HERs may have induced people to realize that they are not as energy efficient as they had believed they were. This, in turn, could have prompted them to regularly look for ways to reduce their energy

consumption. In other words, the OPOWER HERs may have changed a belief, which would then have led to persistent behavior change. When a belief causally affects a behavior, changing that belief may result in persistent behavior change.

Alternatively, the OPOWER treatment may have changed the beliefs that people have about themselves and their identities. For example, as people come to reduce their energy consumption over time and see that this reduction is reflected in their HERs, they may come to see themselves as "energy-efficient" people. That may prompt them to continue conserving energy, because that particular aspect of their identity becomes increasingly important to how they see themselves. This would therefore be a change in people's self-perception or identity.

Another possibility is that the HERs change how people interpret ambiguous information. For example, during the summer, people may normally interpret a warm house as unpleasant, and therefore turn on the air conditioning. However, the HERs may have led people to interpret a warm house in the summer through a more favorable lens ("This ambient temperature means I'm saving energy"), thus reducing the intensity of their air conditioning use. If they consistently interpret the warm temperature in this new way, then this change in construal may contribute to the persistence of the OPOWER treatment effects.

These three examples—changing a belief that influences behavior, changing self-perception or identity, and changing the way information is construed—all have a similar mechanism: They generate persistent behavior change by changing how or what people think. If aspects of how or what people think (beliefs, identities, interpretations) both causally influence a behavior and are malleable, then interventions that change how or what people think could produce behavior change. As long as the change in thinking is retained, the behavior change could persist. Interventions could target these three aspects of how or what people think, as follows:

Beliefs. Beliefs are one aspect of how or what people think. Beliefs can serve to restrain people from performing a behavior, or they can facilitate people performing a behavior (Lewin, 1951). Beliefs can change through "unfreezing" prior beliefs, "moving" (changing, removing, or creating) beliefs, and then "refreezing" the new beliefs (Lewin, 1951). Once refreezing occurs, the new beliefs can serve as restraining or facilitating forces, and the new behavior that follows from the belief change will persist as long as the new belief persists. This unfreezing–moving–refreezing process can be triggered by exposure to new information (Piaget, 1975/1985) or by adopting new ways of interpreting existing beliefs (Vosniadou & Brewer, 1987; for review, see Eagly & Chaiken, 1993).

Self-perceptions. Self-perceptions, or "self-theories," form another class of malleable mental content. Self-perception describes how people perceive who they are (Bem, 1972).

One way people come to understand themselves is by observing their own behavior and feelings. (Other channels involve more directly changing their theories about who they are.) Self-perception can affect how people view their abilities, values, and preferences, as well as their identities (Tajfel & Turner, 1986) and self-theories (Dweck, 2000). Because people act consistently with their identities and self-theories, changing how people see themselves may persistently change their behavior.

Interpretation. The way people interpret ambiguous information is also malleable mental content that could affect the persistence of behavior-change interventions. The world present people with many types of ambiguous information, including emotions, performance feedback, normative behaviors, and social reactions. People use “schemas” (Ashmore & Del Boca, 1981) to make sense of ambiguous information (Fiske & Linville, 1980; Hastie, 1981; Rumelhart & Ortony, 1976; Taylor & Crocker, 1981; Wilson, 2011). Persistent behavior change may arise when treatments enduringly change how ambiguous information is interpreted, or “construed.” Each time people encounter ambiguous information in the future, they may use these new schemas to interpret the information and may behave differently as a result.

Several predictions follow concerning the conditions that make it more or less likely to generate persistent behavior change by changing how or what people think. First, this pathway can induce persistent behavior change only if the targeted mental content changes. Some beliefs, like religious beliefs, perhaps, are so deeply held that they may prove impossible to modify, remove, or replace. Interventions leveraging this pathway would be futile if targeting such deeply held aspects of people’s thinking. Second, persistent behavior change will arise only if the targeted mental contents causally affect people’s behavior. If a belief, self-perception, or interpretation does not directly influence behavior, then changing it will not meaningfully affect how people act, and therefore persistent behavior change will not follow. Third, for this pathway to produce persistent treatment effects, the changes to people’s thinking must be enduring. If the new beliefs, self-perceptions, or interpretations erode over time or revert back to their previous state, then the behavior change will not persist. If people encounter evidence that does not support their newly adopted beliefs, people may discard the new beliefs or revert back to their previous beliefs, possibly allowing the old behaviors to occur again.

If policymakers wish to induce persistent behavior change by leveraging this pathway, they could identify what beliefs, self-perceptions, or interpretations inhibit behavior change or facilitate it. Once identified, policymakers could then develop interventions that change these mental contents by providing, for example, corrective information that reveals the inaccuracy of prior beliefs or by providing

feedback that influences people’s self-perceptions. In the domain of exercise, for example, if policymakers determine that people do not work out because they do not view themselves as being athletic enough to exercise, interventions could change this self-perception. People might be called “athletes” and be encouraged to wear identity-consistent athletic clothing (C. J. Bryan, Walton, Rogers, & Dweck, 2011). This could lead people to see themselves as “athletes” and induce them to exercise more regularly. In the domain of personal finance, policymakers may determine that people believe regularly saving small amounts of money is hopeless, because they would never be able to reach their long-term savings goals. For example, many people fail to understand how compound growth works. That is, people who invest US\$100 and earn annual returns of 10% for 20 years end up with US\$673; this is because the amount of money earning the 10% return each year grows. Many intuitively believe that they would earn US\$10 each year, ending in total assets of US\$300 at the end of the 20 years (Stango & Zinman, 2009). If an intervention enduringly changed beliefs about how compound growth works, and if that belief influenced savings behavior, then that belief could contribute to persistent behavior change.

Changing Future Costs

OPOWER HERs may generate persistent treatment effects by making energy-conserving behaviors easier to perform in the future. For example, the HERs may make people more highly value energy efficiency when purchasing new appliances, and as a result, they may choose more energy-efficient models. Owning energy-efficient appliances makes conserving energy easier in the future, as the new appliances automatically consume less energy than their less energy-efficient alternatives. The appliances would reduce people’s future energy use, without requiring people to exert ongoing active effort. In other words, the future mental and physical costs of conserving energy would decrease, resulting in persistent behavior change.

Some behaviors are costly to perform, and people may need considerable time, attention, self-control, mental or physical effort, or material resources to carry them out. If the costs of action are too great, people may fail to perform target behaviors. Therefore, changing the costliness of behaviors may make people more likely to perform them in the future. Interventions that induce people to automatically perform a target behavior can reduce the costs of performing that behavior in the future. For example, “defaulting” new employees into 401(k) savings programs (and allowing them to opt-out if they choose) tends to increase people’s participation in the savings plan (Madrian & Shea, 2001; Thaler & Benartzi, 2004; see also Johnson & Goldstein, 2003). As time goes on, saving money in this plan requires little cognitive or attentional “cost”—money is automatically deposited in the account.

While defaults lower the costs of performing target behaviors in the future, commitment devices increase the costs of failing to perform a future target behavior. Commitment devices allow people to voluntarily select a binding penalty that will be implemented if they fail to achieve a self-selected goal (G. Bryan, Karlan, & Nelson, 2010). Commitment devices and defaults are just two examples of how interventions can change the future costs of the target behaviors.

This pathway may be most potent for people who understand that they have problems following through on their intentions and may want to take proactive steps to reduce future costs. Some interventions that leverage this pathway, such as commitment devices, require people to voluntarily opt-in to the intervention. If people believe that they always follow through on their intentions and do not need help in doing so, they may be less likely to participate in these types of interventions.

Policymakers who wish to induce persistent behavior change through reducing future costs should identify whether they can create interventions focused on inducing specific current actions that reduce future costs. For example, if it were equally difficult to induce people to close their windows now or program their thermostat now, focusing on programming thermostats likely has greater payoff in the future by reducing the future costs of energy efficiency. In addition, policymakers can increase the availability of tools that reduce future costs. For example, policymakers could increase the availability of commitment devices (Rogers, Milkman, & Volpp, 2014; Schwartz et al., 2014) or subsidize the development and take-up of tools that are easier to automate and program. In the domain of exercise, for example, an intervention that increased take-up of long-term gym memberships might lead to more persistent exercise by decreasing the future per-visit cost of going to the gym. Similarly, increasing take-up of gym lockers might have a similar effect: It simply becomes easier in the future to exercise when one's shoes and clothes are already at the gym. As discussed previously, the exemplar for persistent treatment effects involves interventions that default new employees into their employer's 401(k) savings plan. This personal finance intervention—making enrollment opt-out as opposed to opt-in—can have profound persistent effects on savings behavior.

External Reinforcement

The OPOWER HERs may generate persistent treatment effects by inducing people to perform behaviors that subsequently expose them to new external processes that reinforce the behavior. For example, OPOWER HERs may prompt people to purchase energy-efficient products that offer refunds if people provide contact information. Environmental groups like the Sierra Club sometimes purchase lists of such people and try to recruit them to join their organizations. These recruitments may offer magazine subscriptions,

opportunities to donate money, discounts on other energy-efficient products, and information on environmental activism opportunities. Once the HERs end, these external forces may continue to encourage persistence of energy-saving behaviors.

A related type of external reinforcement involves social feedback cycles. People who receive HERs may talk with their family and friends about the steps they have taken to reduce their energy use. During these conversations, people may describe their energy-reducing investments (i.e., installing solar panels or geothermal wells). In future interactions, family and friends may ask about further steps taken to reduce energy use; they may ask for advice on reducing their own energy use; or they may suggest other ways to be more energy efficient. Through this process, people who receive the OPOWER HERs may feel heightened social monitoring of their behaviors, and they may take further steps to conserve energy. This process could repeat itself indefinitely, creating a recursive cycle.

These two examples illustrate how interventions can expose people to external reinforcements, which can cause persistence. Below we expand on these.

Rip currents. Some external reinforcements may act like “rip currents,” channels of ocean water running perpendicular to the beach that carry anything that enters them far into the ocean. People swimming just a foot from a rip current are unaffected; however, if people enter these channels, they could be carried deep into the ocean. By analogy, interventions can push people into “rip currents” of other ongoing external processes that amplify the interventions' impacts. These outside processes would not be engaged if the intervention had not induced people to perform the initial behaviors.

Recursive social processes. Recursive social processes are social feedback loops. They arise when behavior change is supported by interactions with other people. If a treatment results in people behaving differently, others may react differently toward them. As these social dynamics build on themselves, treatment effects may persist even after interventions are discontinued. Social relationships settle into a different equilibrium—one that incorporates the changed social perceptions and relationships (Yeager & Walton, 2011).

Several predictions can be made regarding when interventions leveraging external reinforcement will be most likely to generate persistent treatment effects. Rip-current processes may produce persistence when several outside forces could reinforce the target behavior. Rip currents may not generate persistence if performing an initial behavior exposes people to external forces that specifically discourage target behaviors. Social recursive processes may be particularly potent for people who are especially connected with their existing friends and family or are especially concerned about

the perceptions of their existing friends and family. Another context where these processes may be especially potent would be when interventions increase the possibility of making new bonds with individuals who can reinforce the targeted behavior.

Policymakers could leverage external reinforcement by identifying pre-existing rip currents in the world and designing interventions that intentionally link to these external forces. Similarly, policymakers could design interventions that integrate social elements. This could involve explicit encouragement (“tell your friends!”) or building social aspects into interventions (“bring your partner to the smoking-cessation meeting”). An alternative strategy might administer interventions directly to people’s social networks, instead of, or in addition to, administering interventions solely to the people who are the interventions’ primary targets. This may be a particularly useful strategy for individuals who are more difficult to reach than those in their social networks. In the domain of exercise, external reinforcement, and particularly recursive social processes, could be harnessed to generate persistence by developing interventions that build friendships focused on fitness. An intervention that induces people to attend a few weekend runs with a running club might generate persistent behavior change if people develop friendships with others in the club. In the domain of personal finance, external reinforcement through rip currents might be leveraged when an intervention prompts targets to sign up for a 401(k) plan. Targets might then receive quarterly updates from the firm managing the 401(k). In these updates, people may be offered other financial products, such as 529 savings plans, individual retirement accounts (IRAs), home equity loans, mortgage refinancing appeals, and financial planning services. Besides keeping people mindful of their savings goals, these additional offerings may successfully enroll targets in other desirable personal finance programs.

Conclusion

Organizations devote vast resources to changing people’s behavior, yet little in the way of a comprehensive framework exists to guide our understanding of when and why behavior changes persist. This article describes an evidence-based framework highlighting the importance of habit formation, changing what and how people think, changing future costs, and harnessing external reinforcement. Doubtless, alternative frameworks identifying additional pathways may develop. We hope this article accelerates the development of those alternatives.

One important implication for policymakers is that interventions can cause persistent behavior change for reasons that are entirely different than those that made the initial intervention successful. That is, people may enduringly change their behavior for different reasons than those that caused them initially to change their behavior. This connects

to a practical implication for policymakers: Interventions should be designed to intentionally leverage as many pathways to persistence as possible. This means studying the underlying psychology affecting behaviors as well as the contexts in which the interventions will be administered.

A final implication of this work is for researchers. Understanding persistence is increasingly important for testing theories and applying interventions in the field (Rogers & Frey, 2014; Thaler & Sunstein, 2009). Most behavioral research examines outcomes just once and often shortly after a treatment has been administered. That approach fails to illuminate how treatment effects change over time. This profoundly constrains our understanding of human behavior. We hope that more behavioral scientists intentionally design their research measures to assess whether persistence arises, which of the four pathways described in this framework contribute to it, and which do not.

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