

# 36 Incentive-Based Interventions

Uri Gneezy, Agne Kajackaite, and Stephan Meier

## Practical Summary

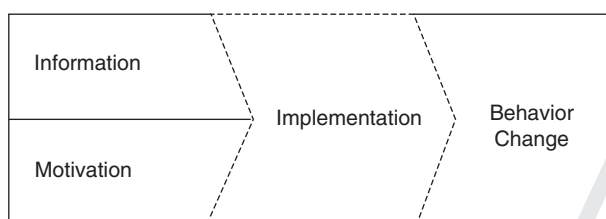
This chapter discusses how and why incentives affect behavior change. Incentives are often introduced into situations in which people are already motivated to change their behaviors but have trouble following through with their intentions. Our framework lays out four “channels” through which incentives can support behavior change: Incentives can create desired or break undesired habits and lead to long-term change even after they have been removed. Well-structured upfront and regular incentives can overcome the dilemma people face when benefits of an activity are too far in the future but costs are immediate, making implementation of behavior change difficult. Incentives can also help overcome setup and switching costs that serve as barriers to behavior change. The four channels and the supporting empirical evidence have implications for how incentive-based interventions work and provide guidance on how best to design them for increased efficacy.

## 36.1 Introduction

Economics is based on the premise that incentives matter. If the cost associated with an activity or product increases, people will consume less of it. Similarly, if the benefit associated with an activity or product increases, people will consume more of it. This reaction to cost-benefit analysis is what economists call the *basic law of demand*. The law of demand applies not only to products that are standard tangible goods, such as milk or bread, but also to ones that are intangible, such as one’s work performance, exercise, or education. Experimental studies show people adjust their behavior in response to incentives (e.g., Angrist et al., 2002; Ashraf et al., 2006; Bachireddy et al., 2019; Charness & Gneezy, 2009; Thaler & Sunstein, 2008; Friebel et al., 2017; Gneezy et al., 2011; see also Chapter 14,

this volume). Given this behavior, an important question is how incentives can work as a tool for behavior change. Can incentives reduce undesirable behavior (e.g., smoking or drinking) and increase desirable behavior (e.g., exercising or saving for retirement)?

The empirical evidence discussed in the following sections shows the effect of incentives on behavior is more complicated than predicted by the basic law of demand in economic theory. In some cases, research finds no effect of incentives on behavior; in others, the incentives backfire and reduce the desired activity (e.g., Falk & Kosfeld, 2006; Fehr & List, 2004; Frey, 1997; Gneezy & Rustichini, 2000; Mellström & Johannesson, 2008). Reconciling these findings, this chapter presents a framework for understanding when and how incentives work to change behavior and, in particular, habits.



**Figure 36.1** Impediments and facilitators of behavior change

### 36.1.1 Definitions: What Are Incentives?

Given the centrality of incentives to the key premise of the current chapter, it is important to provide an operational definition of what an incentive is. Incentives are rewards or punishments that motivate agents to take up an activity and guide the way they perform it. Incentives can be positive or negative and can be tangible or not. For example, positive incentives can take the form of tangible rewards such as money, vouchers, badges, and trophies or be intangible like feedback, praise, or affection. Similarly, negative incentives can be tangible, such as fines, or intangible, like criticism or public berating and so on. These incentives can be used to positively or negatively reinforce behavior (see Chapter 8, this volume).

### 36.1.2 Incentives and Behavior Change: Theory and Empirical Evidence

According to economic theory, people react to changes in relative prices – the cheaper and more beneficial a product or an activity is, the more of it they consume. However, information on these costs and benefits is often limited and may even be asymmetric, with different people having different information. In the economic model, people search for information but only if the cost of acquiring it is not too high. Incentives can change the calculus of information acquisition by increasing the value of information.

Moreover, they can increase or decrease the motivation to take up a certain activity by changing the cost or benefit of the activity.

However, neither lack of information nor lack of motivation can explain many of the failures to change behavior. For example, many people want to lose weight but fail to do so. This failure is not due to a lack of information or motivation: They know the benefits and know what they need to do and are motivated, yet they fail. The difficulty lies in finding a way to implement the behavior change (see Figure 36.1) (for a perspective from health psychology, see Chapters 6 and 39, this volume; see also Adams et al. 2014; Giles et al. 2014).

## 36.2 Four “Channels” for Incentives and Behavior Change

In this chapter, four processes or channels are proposed through which incentives can help in implementing behavior change: (1) creating habits; (2) breaking habits; (3) providing regular and upfront incentives; and (4) removing barriers to change. These channels are described in detail in this section.

### 36.2.1 Creating Habits by Building a “Stock” of Behavior

An important goal of incentives is to change behavior not only in the short term, while the incentives are used, but also in the long term, after the incentives have been removed (see Chapter 8, this volume). Consider people who

do not exercise. If someone were to pay them enough for each time they went to the gym, they would likely begin attending, perhaps even enthusiastically. However, the fact that they would attend while the incentives are in place does not necessarily mean they would form a habit, that is, continue to exercise after the incentives are removed. Can incentives help in developing habits effectively?

In economics, the leading theory of habit formation is based on the Becker–Murphy model (Becker & Murphy, 1988; see also Becker, 1992). According to this model, past consumption builds up a “capital stock” of behavior, and a person’s current utility from consumption depends on this capital stock. A habit may form when the utility from consuming an activity or product (e.g., exercise, alcohol, cigarettes, or social media) depends on how much the person consumed it in the past (see Chapter 13, this volume).

Gym attendance can illustrate the process of building up habitual stock. The first visits to the gym are rough – the body is not ready, visual improvements cannot be immediately seen, and muscles feel sore for days. If one keeps exercising (“consuming this good”), however, the activity becomes more enjoyable as the benefits become tangible, visible, and clear – the body feels stronger and better in daily life, weight loss becomes apparent, and muscles begin to shape. Past consumption of the gym positively affects the utility of present consumption, leading to the formation of habitual stock. Once the process begins, building the habit is easy enough – getting through the first stages is the tough part. Incentives can help with building up this stock of behavior (see Chapter 41, this volume).

In a series of field experiments with university students, Charness and Gneezy (2009; see Sidebar 36.1) aimed to increase gym attendance by using monetary incentives. Their participants received informational brochures about the benefits of exercise and, depending on the treatment

group, received additional incentives. The first group served as a control and received no financial incentives. The second and the third groups were promised \$25 contingent on attending the university’s gym at least once during the next week. After that one week, the experiment was over for the second group but the third group was promised an additional \$100 contingent on attending the gym at least eight times in the four following weeks.

Overall, participants met the minimum number of visits required in order to receive the incentives, confirming the notion that, if people are incentivized to go to the gym, they will attend. The study found that, although simply going to the gym once did not change long-run behavior, a four-week incentive increased gym attendance significantly. The increase in the number of gym visits did not significantly decline in the weeks following the removal of the incentives. This result shows that helping students get through the initial gym visits by giving them money for attending had an effect not only in the short term but also in the long term, aiding in what seems to be habit formation. It suggests that an incentive stretching over four weeks can have an impact on the behavior past the incentivized period.<sup>1</sup>

Royer et al. (2015) ran a similarly incentivized gym-attendance experiment with employees in a Fortune 500 company. They also found a positive effect of incentives on forming habits but only for people who did not go to the gym at all prior to the experiment. People who had gone to the gym before reverted back to their previous level of gym attendance after the incentives were removed. However, when accompanied by a self-funded commitment device – willing individuals pledged not to skip more than fourteen days

---

<sup>1</sup> See also Acland and Levy (2015), who replicated the results of the experiment by Charness and Gneezy (2009) but used different instructions and emphasis. They found a stronger decline in gym attendance over time after the intervention than Charness and Gneezy (2009).

### Sidebar 36.1 Incentives to exercise

Monetary incentives can motivate people to exercise and can continue to have an effect even after the incentives are removed. Charness and Gneezy (2009) introduced a one-month monetary incentive for college students contingent on gym attendance (attending the gym at least eight times) and found the incentives led to an increase in exercising both during and in the months following the experiment (“Eight-times” group in Figure 36.2). Figure 36.2 presents the main results of the experiment.

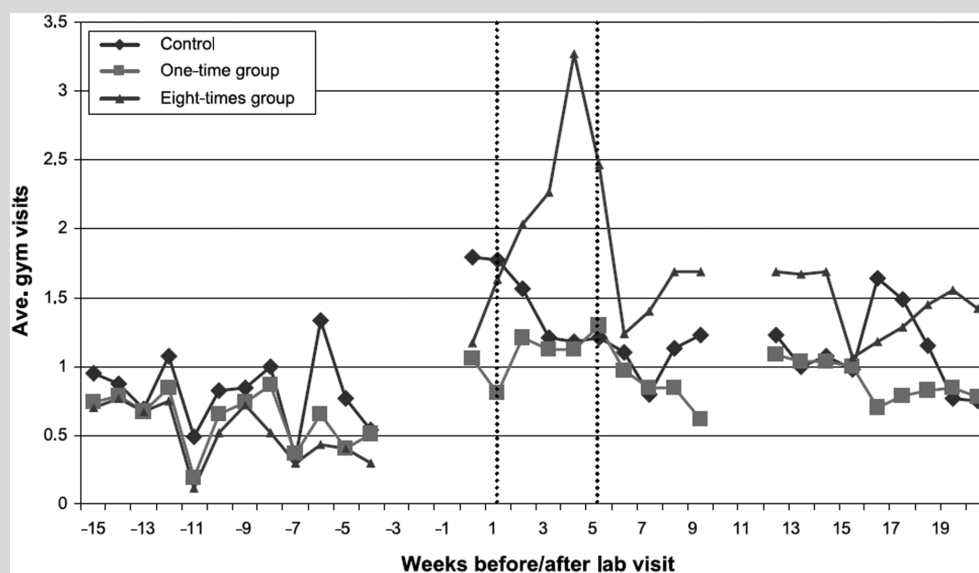


Figure 36.2 Average gym visits with and without incentives

The horizontal axis in Figure 36.2 represents time, starting before the incentives to the participants were introduced, continuing after incentives had ceased. The dashed vertical lines in Figure 36.2 indicate the period of incentivized gym attendances, and the vertical axis is the average number of times a student visits the gym per week. Results indicated that students who were incentivized to go to the gym for a month were significantly more likely to continue going in the following weeks, after the incentive program ended. Incentivizing the students to go to the gym at least eight times was more effective than incentivizing them to go to the gym at least one time (“One-time” group in Figure 36.2). The findings suggest that introducing monetary incentives to exercise can increase gym attendance in the long term – after the incentives are discontinued.

of exercising in a row in the following eight weeks – incentives led to habit formation for both previous non-gym-goers and gym-goers.

Weight-loss programs provide another example of how incentives can be used to change habits through habitual stock. Volpp et al. (2008) conducted a field experiment using two kinds of monetary incentives to change diet and exercise habits in obese participants. The control group received no incentives, whereas the first incentives group played a lottery at the beginning of the intervention and received the winnings if they lost at least the given target weight over the following sixteen weeks. The second incentives group invested their own money at the beginning of the intervention and lost it if they failed to lose at least the target weight over the following sixteen weeks. Both interventions were successful – participants lost more weight in the two incentives groups than in the control group. Specifically, whereas around half of the participants in both incentive groups reached the target weight, only 10 percent did so in the control group. These results show that paying participants to lose weight or, alternatively, making them pay for failing to lose weight changes behavior significantly. To see whether this behavior change would persist after the incentives were removed and the habit of a new diet and exercise was successfully formed, some participants were asked to return for a seven-month follow-up weigh-in. Volpp et al. (2008) found both incentive groups did regain some weight but they regained less weight than the control group and weighed significantly less at the seven-month follow-up than at the beginning of the study. Thus, even though the effects declined over time, some habits in diet and exercise were successfully formed.

This evidence exemplifies how incentives can be used to get past the challenging “first stages” of the behavior change process and successfully help form habitual “stock” for diet and exercise; but can incentives be used to aid in habit

formation in arguably less salient domains? For example, can they be used to help form a philanthropic habit? Meier (2007) studied this question in a field experiment with university students in Switzerland, who had to decide anonymously whether to contribute to two social funds each semester. Randomly selected students in the treatment group had their donations partially subsidized by an anonymous donor, whereas none of the students in the control group received incentives. Meier (2007) found students with subsidized donations donated more to the social funds during the experiment. However, after removal of the incentive, these treatment-group students donated even less than those who were in the control group. In other words, the incentive not only failed to create the desired habit but also backfired. A possible explanation for this result is that the incentive “crowded out” or “undermined” intrinsic motivation to give. The “crowding-out” literature suggests, after incentives are removed, levels of behavioral participation may worsen compared to when no incentives are introduced (see Chapters 8 and 35, this volume).

Another example of research in creating stock of habitual behavior comes from the education context. Levitt et al. (2016) ran a large-scale natural experiment with low-performing schools in Chicago Heights. They introduced multiple performance-based monetary incentives paid based on attendance, behavior, grades, and standardized test scores. The incentives were either fixed or lottery-based, were received either by the students or by their parents, and were introduced for the entire school year. In the fixed-incentive treatment, students (or parents, depending on which fixed treatment) who met the goals of the month received \$50. In the lottery-incentive treatment, 10 percent (10 of about 100 people) received a \$500 prize. Levitt et al. (2016) found the positive effect of such incentives to be overall small; however, the incentives worked on students who were just below the threshold of meeting the defined goals. These students continued to

outperform their control-group peers a year after the incentives ended, which suggests they formed an effective study habit. However, this positive effect disappeared two years after the intervention, implying the habit may fade over time.

Together, these studies on health, philanthropy, and education suggest habits can be developed when people receive incentives to start a new activity, presumably by encouraging people to build a stock of behavior. Notably, however, these incentives can backfire if they crowd out intrinsic motivation to engage in an activity, as seen in the experiment by Meier (2007). Furthermore, the studies discussed in this section show that, even if a habit is successfully formed, it can still be only temporary. More research is needed in order to understand how incentives can be used to create habits that persist over longer periods of time.

### 36.2.2 Breaking Habits

The experiments discussed in Section 36.2.1 describe interventions aimed at creating new habits. The conceptual model prescribes that creating a stock of behavior increases the marginal utility from consuming an activity. If past consumption can create habits, could reducing consumption “kill” habits by reducing the stock of behavior? This notion of successfully “killing” a habit is supported by the plausible assumption that the stock of behavior decays over time; or, according to the Becker–Murphy model, there is a “disappearance of the physical and mental effects of past consumption” over time. Consider the exercising example – enjoyment from going to the gym today is likely influenced more by gym visits from the past month than by gym visits from a year ago.

If the habitual stock of relevant behavior decays over time, incentivizing people to stop a certain activity for a while can reduce the probability that they will return to their old habits once the incentives are removed. Looking at smoking

cessation during pregnancy and postpartum, Higgins et al. (2012) used incentives in the form of vouchers redeemable for retail items. Their fifty-eight participants were assigned to either contingent- or noncontingent-voucher conditions. In the contingent condition, participants earned vouchers for biochemically verified smoking abstinence, whereas, in the noncontingent condition, receiving the vouchers did not depend on smoking behavior. They found the contingent vouchers increased seven-day point-prevalence abstinence at the end of pregnancy to 37 percent (compared to 9 percent for the noncontingent group) and twelve-week postpartum (33 percent vs. 0 percent, respectively). This effect was sustained through the twenty-four-week postpartum assessment (27 percent vs. 0 percent), which was twelve weeks after the discontinuation of the voucher incentive.

In another study looking at smoking cessation, Volpp et al. (2009) introduced incentives spread over a period of time. Specifically, participants were paid to attend a smoking-cessation program, were promised \$250 if they refrained from smoking in the following six months, and were promised \$400 if they stopped for an additional six months. The authors found smoking decreased significantly during the intervention period, and the quitting rate after the intervention was 9 percent.

Sometimes, incentives may be used to break a certain habitual behavior in order to create a new one in its place. Habit-driven purchase patterns are one common illustration. When buyers first purchase an item, for example shampoo, they likely deliberate for some time. If they are happy with the results after use, they continue buying this same shampoo. They will continue this purchasing habit visit after visit to the store and will not spend time searching for alternatives (Ehrenberg, 1991; Khare & Inman, 2006; Seetharaman, 2004; Wood et al., 2002; see the discussion in Carden et al., 2017). Even if other brands produce a superior shampoo that the

customers may prefer to the current one they use (e.g., a new shampoo that was not on the market when the consumer originally chose their current shampoo), they will not notice the advantage because of their now ingrained habit.

As Carden et al. (2017) argue, incentives can override this habit, making people activate a “control” mindset. For example, if the superior shampoo brand were to offer an incentive (e.g., buy-one-get-one-free), it might catch the customer’s eye and stop their habitual behavior by making them reconsider their purchase decision. Once the new brand makes it into the shopping cart, the customer will use it for a while, build up a stock of behavior, and create a habit of using this new shampoo even when the discount is discontinued.

Together, these studies suggest incentives can help “kill” habits. A successful way to “kill” a habit is to incentivize quitting an activity *for a while*. Once a person stops an activity, the habitual stock will start decreasing. The goal is to deplete this stock such that, by the time the incentives are removed, the stock will have decreased to the point that the activity is discontinued, as seen in the smoking studies.

### 36.2.3 Providing Upfront Incentives

Implementing a behavior change can be particularly challenging when the costs and benefits of the behavior change are temporally separated, as is often the case. For example, the benefit of eating healthier, going to the gym regularly, or saving for retirement is costly in the present and is only beneficial in the future. Future benefits are discounted differently by different individuals. If the individual’s discount rate is constant and they care about the future in a consistent manner, implementing behavior change depends on whether the *future discounted benefits* are large enough to outweigh the *present costs*.

However, many individuals do not discount the future in a dynamically consistent manner;

instead, their discount rate changes depending on whether they make an *intertemporal* decision. For example, Read and van Leeuwen (1998) found that 49.5 percent of their participants chose to have a healthy snack when asked what they wanted to eat in a week but 83 percent chose the unhealthy snack when asked what they wanted to eat that day. Similarly, Sadoff et al. (2014) gave participants in their field experiment the choice to change their grocery order, placed a week ago, at the time of delivery. Twenty-one percent of their sample took up this offer and 96 percent of their choices made at the time of delivery led to unhealthier choices. These studies suggest the calculation of present cost versus discounted future benefit changes when the future becomes the present.

One way to formalize such dynamic inconsistency is to assume that, when the present is involved in an intertemporal decision, individuals discount future payoffs even more than when two points in the future are involved in that same decision. This inconsistency is called *present bias* (e.g., Laibson, 1997; O’Donoghue & Rabin, 1999; Strotz, 1956). In a study on credit card debt, Meier and Sprenger (2010) found around 36 percent of participants exhibited present-biased preferences in a purportedly unrelated task designed to capture dynamic inconsistencies. They then found the individuals who were present-biased in this experimental task had a 16 percent higher probability of being in debt. Such present-biased preferences can therefore lead to constant violation of plans made for the future and make the implementation of behavioral change difficult.

Present-biased preferences help explain the difficulty people have with changing behavior and also shed light on how incentives could be structured and timed in order to overcome this obstacle. Given present bias, the intuitive and theoretical approach to the timing and structure of incentives is to make them front-loaded and not too far in the future (e.g., Aggarwal et al.,

2018; O'Donoghue & Rabin, 1999). For an impatient person, providing delayed incentives is less effective in encouraging activity take-up, such as going to the gym, or in increasing activity frequency, such as walking more. To increase efficacy for these types of people, incentives must be given earlier and more frequently. For example, in encouraging an impatient person to walk more, theory predicts incentives given after a month of taking “X” steps per day would not be as effective as incentives given after a week of reaching the goal.

Although the theoretical predictions are clear and intuitive, only a small number of empirical studies have explicitly examined the efficacy of different timing and structure of incentives, and the evidence they provide is inconclusive. Carrera et al. (2017) studied the efficacy of a front-loaded incentive structure compared to a smaller constant regular incentive for about 1,000 employees in a Fortune 500 firm. In particular, employees were assigned to receive either \$25 per gym visit for the first two weeks and \$5 in the remaining six weeks or \$10 per visit for the full eight weeks. In both treatments, employees received the incentive for a maximum of two visits per week, that is, the total incentive budget was \$160 per person. The results do not support the conjecture that “front-loaded” incentives increase gym membership. Additionally, front-loaded incentives also did not increase the number of visits per member.

Bachireddy et al. (2019) found similar results: They manipulated the structure of a financial incentive scheme aimed at increasing physical activity through more daily steps for about 3,500 participants. They compared three different allocations of a given budget across time: (1) a constant payment across time periods; (2) a decreasing incentive schedule, with incentives that started high and decreased over time; and (3) an increasing incentive schedule, with incentives that started low and increased over time. In their study, the constant-incentive schedule

worked better than both the decreasing and the increasing schedule both during the intervention and post-intervention. Overall, although both Carrera et al. (2017) and Bachireddy et al. (2019) showed that incentives work, a frequent and constant incentive structure was more efficacious in increasing exercise than distributing the incentive unevenly across time, even when this distribution amounted to a “front-loaded” scheme.

Aggarwal et al. (2018) ran a field experiment with diabetes patients to test whether increasing the frequency of payment for physical activity has any additional impact. Specifically, they looked at whether daily payments would be more effective than monthly payments. They did not find support for this prediction. However, in additional treatments, they found that offering an incentive was only successful in increasing physical activity if impatient individuals reached the goal multiple days in a row. They pose that, if individuals discount monetary incentives less than they discount effort costs of future behavior (as shown in Augenblick et al., 2015), an incentive structure that pays for an action in a given period contingent on an action in other periods can be effective.

Notably, their finding was dependent on how individuals discounted the future. Because large heterogeneity exists in discounting between different people, individually tailored incentives may prove to be more effective. Andreoni et al. (2016) show in a work setting that incentive schemes individually tailored to an individual's discounting pattern are more effective than schemes that do not consider an individual's impatience. Tailoring the structure of incentives for behavioral change could prove to be very fruitful but more research in the area is needed.

An additional difference between delayed incentives and earlier, and more regular, incentives could be that the latter are more salient because people experience them more frequently. John et al. (2018) showed in their field



experiment that incentives, independent of their structure, were ineffective if the incentives were not made conspicuous. Incentives were only effective at increasing physical activity when accompanied by regular reminders about the incentive structure. Related to salience, Kast et al. (2018) found an increase in the interest rate from 0.3 percent to 5 percent had little influence on the savings rate. However, their more immediate and very salient nonmonetary incentive of having to share whether one saved or not with a peer group on a weekly basis almost doubled the savings rates. Of course, multiple differences exist between the different incentive schemes; future research on the salience aspect of incentives, independent of their structure, is necessary.

A more challenging but arguably more sustainable way to overcome a high discount factor is to try to lower the immediate cost of the activity. For example, Milkman et al. (2013) proposed a way for people to incentivize themselves, using what they call “temptation bundling.” In their field experiment, “want” activities (page-turner audiobooks) were bundled with “should” behaviors that had delayed benefits (exercising); consider, for example, allowing yourself to watch your favorite TV show *only* while exercising. Bundling this “should” behavior with this “want” activity could help make the immediate experience of the “should” behavior less painful.

### 36.2.4 Removal of Barriers and Reducing Switching Costs

Before choosing which company to buy a product from, a customer may be indifferent between two products of the same type. However, once the customer chooses a given company, inertia often imposes a switching cost. These switching costs can come in different forms, as this section discusses, but a defining characteristic is their tendency to create inertia in behavior that affects choices and equilibrium in markets. Some of these costs, such as learning about the product,

are *natural*, whereas others are *artificial* costs imposed by firms, such as repeat-purchase discounts or loyalty programs. The economics literature (e.g., Klemperer, 1987a, 1987b) shows equilibrium in markets with switching costs may be the same as the collusive outcome in an otherwise identical market without switching costs. The higher the switching costs are, the more market power companies have.

Burnham et al. (2003) distinguish between three types of switching costs in their typology. The first, procedural switching costs, come in the form of time and effort. Consider a person who is switching from Windows to Mac. That person faces the cost of having to learn a new operating system and interface, something that takes both time and effort. Similarly, a person thinking about changing gyms faces the procedural switching cost of learning how the new gym works, what the timetable of classes is, when to pay, and so on. If the person is already part of a gym, the switching costs may act as a barrier and the member may simply stick with the less desirable old gym.

The second type of switching cost is financial and may be artificially created by companies. For example, fees may be associated with switching banks, or lost reward points may be associated with switching airlines. Consider a person who is planning a trip. All else being equal, that person might not choose the cheapest flight available but may instead choose the flight with the airline with which they have a loyalty program.

Burnham et al. (2003) term the third type of switching cost “relational.” This cost comes in the form of any psychological or emotional discomfort a person might feel from either the loss of identity or the breaking of bonds. Consider brand loyalty. People get attached to brands to the point that certain products can become a piece of their identity – switching to another brand due to price or availability might thereby bring about psychological and emotional discomfort.

The data support this theoretical prediction. For example, Neiman and Vavra (2018) studied

**Sidebar 36.2 Switching costs and market power**

Sometimes switching costs are so high that they lead to market power in the hands of a few companies. For instance, in the early days of cell phones, customers who wanted to switch carriers had to also change their phone number. Recognizing this switching cost, the Federal Communications Commission (FCC) in the United States mandated that all wireless carriers had to offer number portability by 2004. Park (2011) looked at the response of wireless pricing to the introduction of number portability. Examining around 100,000 calling plans, Park found that the prices of wireless plans dropped by 6.8 percent in the seven months after the FCC ruling. In other words, the switching cost had been a significant barrier to switching and, once this barrier was removed, companies turned to decreasing prices to acquire new customers and retain existing ones.

data on 700 million purchases in more than 160,000 households over the span of a decade. They found that people are increasingly buying only their one favored product in a given category. The implication of this habit is that companies are no longer forced to diversify and compete for business, creating consolidated market power. To increase competition in markets, legislators often create policies that attempt to reduce the market power of companies associated with switching costs (for an example, see Sidebar 36.2).

Incentives can be used to both create and reduce these costs. For example, many companies offer great upfront deals to attract customers and get them “hooked” on a product. Consider a person who does their taxes using a certain software, for example TurboTax. That person needs to invest time and effort into entering information, from addresses to workplace names. TurboTax software can save this information such that the effort of doing their taxes the next year is considerably lower. To avoid procedural switching costs, customers might be willing to pay more just to stick with this software, even if cheaper or better options are available the following year. Amazon’s 1-Click patent epitomizes this cost;

customers only ever need to enter their information once for the system to remember it. Although how much money the patent has brought Amazon is unclear, estimates indicate billions annually.

Incentives can also be used to reduce switching costs and help change behavior by removing barriers. Cappelen et al. (2019) ran a large randomized controlled trial in which they tested the hypothesis that incentives that reduce barriers for physical activity can improve academic performance. In the study, college students in Bergen, Norway, were given a free gym membership (worth about \$140) for a semester. The authors found this removal of barriers encouraged students to attend the gym more often, which in turn led to an improvement in their academic performance. The prevalent concern regarding contingent incentives in an educational context is that they can crowd out the intrinsic motivation to study. The removal-of-barriers-to-exercise approach has the added bonus of being a more politically feasible, and perhaps more fruitful, way to increase educational outcomes than incentivizing the educational outcomes directly.

Homonoff et al. (2019) studied a large-scale wellness program at a university that offered gym membership reimbursements for students who

attended the gym at least fifty times in a six-month period. Their data consisted of individual-level administrative data on daily gym attendance over a five-year period: one year before policy implementation, the three years the policy was in place, and one year after policy termination. In other words, they used a natural experiment conducted by the university, considering the before, during, and after effects of the removal-of-barriers approach. Their approach provides a much larger sample (100,000 student/year observations and 1.5 million gym visits) than most experiments. As expected, the authors found an effect at around the fifty-visit threshold and an overall 20 percent increase from the mean. Importantly, they also found that approximately 50 percent of the program effect persisted after policy termination, evidence indicating habit formation.

The barrier-removal approach also succeeded in changing behavior when used in the Home Energy Report, which the Opower company sends by mail to millions of households in America regularly. In contrast to previous examples that used financial incentives, this intervention used a social comparison – the report told consumers where they stood in their energy consumption relative to their neighbors. In addition, the report included individual tips on how to reduce energy consumption. Allcott and Rogers (2014) show the reports reduced energy consumption significantly and the effect persisted even for households that stopped receiving the reports post-intervention. The positive effect decayed over time but, importantly, stayed significant. Brandon et al. (2017) analyzed the Opower data and concluded the behavior change was mostly due not to changes in habits but rather to investments in capital. In other words, the social-comparison incentives drove participants to overcome the costs associated with switching to better technologies, such as purchasing more efficient appliances.

### 36.3 Incentivizing Behavioral Change: Practical Implications

In the current chapter, four ways incentives can affect behavior change have been presented, with a number of supporting empirical examples outlined. The four channels, along with the steps required for successful implementation of behavior change using incentives, are as follows:

1. Incentives can help create habits by building up the stock of behavior. Increasing recent experience makes current behavior less costly and more enjoyable.
2. Incentives can help kill habits by reducing the stock of behavior. Decreasing recent experience makes current behavior costlier and less enjoyable.
3. Incentives can help counter present bias. Using frequent and regular incentives helps change behavior.
4. Incentives can help remove barriers to change. Using incentives to reduce switching costs makes activity take-up cheaper or free.

### 36.4 Summary and Conclusion

This chapter has provided a framework for, and outlined empirical evidence on, how incentives can affect behavior change. As the impediment to behavior change is often not a lack of motivation or a lack of information but difficulties in implementing the change, four channels in which incentives can affect the implementation of behavior change were reviewed. Incentives can create positive habits and can break negative habits. Incentives may also help counteract present-biased preferences. Finally, incentives can help by removing barriers to change. These four channels and the supporting empirical evidence have implications for how incentive-based interventions work and provide guidance on how best to design the incentives for optimal efficacy.

## References

- Acland, D., & Levy, M. R. (2015). Naiveté, projection bias, and habit formation in gym attendance. *Management Science*, *61*, 146–160. <https://doi.org/10.1287/mnsc.2014.2091>
- Adams, J., Giles, E., McColl, E., & Sniehotta, F. (2014). Carrots, sticks and health behaviours: A framework for documenting the complexity of financial incentive interventions to change health behaviours. *Health Psychology Review*, *8*, 286–295. <https://doi.org/10.1080/17437199.2013.848410>
- Aggarwal, S., Dizon-Ross, R., & Zucker, A. (2018). Incentivizing behavioral change: The role of time preferences. [http://faculty.chicagobooth.edu/rebecca.dizon-ross/research/papers/Incentive\\_Design.pdf](http://faculty.chicagobooth.edu/rebecca.dizon-ross/research/papers/Incentive_Design.pdf)
- Allcott, H., & Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *American Economic Review*, *104*, 3003–3037. <https://doi.org/10.1257/aer.104.10.3003>
- Andreoni, J., Callen, M., Khan, Y., Jaffar, K., & Sprenger, S. (2016). Using preference estimates to customize incentives: An application to polio vaccination drives in Pakistan. NBER Working Paper No. 22019. [www.nber.org/papers/w22019](http://www.nber.org/papers/w22019)
- Angrist, J., Bettinger, E., Bloom, E., King, E., & Kremer, M. (2002). Vouchers for private schooling in Colombia: Evidence from a randomized natural experiment. *American Economic Review*, *92*, 1535–1558. <https://doi.org/10.1257/000282802762024629>
- Ashraf, N., Karlan, D., & Yin, W. (2006). Tying Odysseus to the mast: Evidence from a commitment savings product in the Philippines. *Quarterly Journal of Economics*, *121*, 635–672. <https://doi.org/10.1162/qjec.2006.121.2.635>
- Augenblick, N., Niederle, M., & Sprenger, C. (2015). Working over time: Dynamic inconsistency in real effort tasks. *Quarterly Journal of Economics*, *130*, 1067–1115. <https://doi.org/10.1093/qje/qjv020>
- Bachireddy, C., Joung, A., John, L. K. et al. (2019). Comparing financial incentive structures for promoting physical activity: A randomized controlled trial. [https://static1.squarespace.com/static/5353b838e4b0e68461b517cf/t/5b5760c82b6a28ce3b6a9745/1532453064822/Incentives\\_for\\_Physical\\_Activity\\_RCT\\_Manuscript\\_PNAS.pdf](https://static1.squarespace.com/static/5353b838e4b0e68461b517cf/t/5b5760c82b6a28ce3b6a9745/1532453064822/Incentives_for_Physical_Activity_RCT_Manuscript_PNAS.pdf)
- Becker, G. S. (1992). Habits, addictions and traditions. *Kyklos*, *45*, 327–345. <https://doi.org/10.1111/j.1467-6435.1992.tb02119.x>
- Becker, G. S., & Murphy, K. M. (1988). A theory of rational addiction. *Journal of Political Economy*, *96*, 675–700. <https://doi.org/10.1086/261558>
- Brandon, A., Ferraro, P., List, J., Metcalfe, R., Price, M., & Rundhammer, F. (2017). Do the effects of social nudges persist? Theory and evidence from 38 natural field experiments. NBER Working Paper No. 23277. [www.nber.org/papers/w23277](http://www.nber.org/papers/w23277)
- Burnham, T. A., Frels, J. K., & Mahajan, V. (2003). Consumer switching costs: A typology, antecedents, and consequences. *Journal of the Academy of Marketing Science*, *31*, 109–126.
- Cappelen, A., Charess, G., Ekström, M., Gneezy, U., & Tungodden, B. (2019). Exercise improves academic performance. <https://brage.bibsys.no/xmlui/bitstream/handle/11250/2452391/DP%2008.pdf?sequence=1>
- Carden, L., Wood, W., Neal, D. T., & Pascoe, A. (2017). Incentives activate a control mind-set: Good for deliberate behaviors, bad for habit performance. *Journal of the Association for Consumer Research*, *2*, 279–290. <https://doi.org/10.1086/695325>
- Carrera, M., Royer, H., Stehr, M., & Sydnor, J. (2017). The structure of health incentives: Evidence from a field experiment. NBER Working Paper No. 23188. [www.nber.org/papers/w23188](http://www.nber.org/papers/w23188)
- Charness, G., & Gneezy, U. (2009). Incentives to exercise. *Econometrica*, *77*, 909–931. <https://doi.org/10.3982/ECTA7416>
- Ehrenberg, A. S. C. (1991). New brands and the existing market. *Journal of the Market Research Society*, *33*, 285–299. <https://doi.org/10.1177/147078539103300402>
- Falk, A., & Kosfeld, M. (2006). The hidden costs of control. *American Economic Review*, *96*, 1611–1630. <https://doi.org/10.1257/aer.96.5.1611>
- Fehr, E., & List, J. A. (2004). The hidden costs and returns of incentives: Trust and trustworthiness

- among CEOs. *Journal of the European Economic Association*, 2, 743–771. <https://doi.org/10.1162/1542476042782297>
- Frey, B. (1997). *Not Just for the Money: An Economic Theory of Personal Motivation*. Cheltenham: Edward Elgar.
- Friebel, G., Heinz, M., Krueger, M., & Zubanov, N. (2017). Team incentives and performance: Evidence from a retail chain. *American Economic Review*, 107, 2168–2203. <https://doi.org/10.1257/aer.20160788>
- Giles, E. L., Robalino, S., McColl, E., Sniehotta, F. F. & Adams, J. (2014). The effectiveness of financial incentives for health behaviour change: Systematic review and meta-analysis. *PLoS ONE*, 9, e90347. <https://doi.org/10.1371/journal.pone.0090347>
- Gneezy, U., Meier, S., & Rey-Biel, P. (2011). When and why incentives (don't) work to modify behavior. *Journal of Economic Perspectives*, 25, 191–209. <https://doi.org/10.1257/jep.25.4.191>
- Gneezy, U., & Rustichini, A. (2000). A fine is a price. *Journal of Legal Studies*, 29, 1–18. <https://doi.org/10.1086/468061>
- Higgins, S. T., Washio, Y., Heil, S. H. et al. (2012). Financial incentives for smoking cessation among pregnant and newly postpartum women. *Preventive Medicine*, 55, S33–40. <https://doi.org/10.1016/j.ypmed.2011.12.016>
- Homonoff, T., Willage, W., & Willen, A. (2019). Rebates as incentives: The effects of a gym membership reimbursement program. <https://wagner.nyu.edu/files/faculty/publications/Homonoff%2C%20Willage%2C%20and%20Willen%20%282019%29.pdf>
- John, L. K., Milkman, K. L., Gino, F., Tuckfield, B., & Foschini, L. (2018). The ineffectiveness of inconspicuous incentives: A field experiment on inattention. <https://static1.squarespace.com/static/5353b838e4b0e68461b517cf/t/5966320a86e6c01e1f7bdffe/1499869712747/IncIncentivesSubmittedMSciBEDec2017.pdf>
- Kast, F., Meier, S., & Pomeranz, D. (2018). Saving more in groups: Field experimental evidence from Chile. *Journal of Development Economics*, 133, 275–294. <https://doi.org/10.1016/j.jdeveco.2018.01.006>
- Khare, A., & Inman, J. J. (2006). Habitual behavior in American eating patterns: The role of meal occasions. *Journal of Consumer Research*, 32, 567–575. <https://doi.org/10.1086/500487>
- Klemperer, P. (1987a). Markets with consumer switching costs. *Quarterly Journal of Economics*, 102, 375–394. <https://doi.org/10.2307/1885068>
- Klemperer, P. (1987b). The competitiveness of markets with switching costs. *RAND Journal of Economics*, 18, 138–150. <https://doi.org/10.2307/2555540>
- Laibson, D. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics* 112, 443–477. <https://doi.org/10.1162/003355397555253>
- Levitt, S. D., List, J. A., & Sadoff, S. (2016). The effect of performance-based incentives on educational achievement: Evidence from a randomized experiment. NBER Working Paper No. 22107. [www.nber.org/papers/w22107](http://www.nber.org/papers/w22107)
- Meier, S. (2007). Do subsidies increase charitable giving in the long run? matching donations in a field experiment. *Journal of the European Economic Association*, 5, 1203–1222. <https://doi.org/10.1162/JEEA.2007.5.6.1203>
- Meier, S., & Sprenger, C. (2010). Present-biased preferences and credit card borrowing. *American Economic Journal: Applied Economics*, 2, 193–210. <https://doi.org/10.1257/app.2.1.193>
- Mellström, C., & Johannesson, M. (2008). Crowding out in blood donation: Was Titmuss right? *Journal of the European Economic Association*, 6, 845–863. <https://doi.org/10.1162/JEEA.2008.6.4.845>
- Milkman, K. L., Minson, J., & Volpp, K. (2013). Holding the hunger games hostage at the gym: An evaluation of temptation bundling. *Management Science*, 60, 283–299. <https://doi.org/10.1287/mnsc.2013.1784>
- Neiman, B., & Vavra, J., (2018). The rise in household spending concentration. Available at SSRN. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3137782](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3137782)
- O'Donoghue, T., & Rabin, M. (1999). Doing it now or later. *American Economic Review*, 89, 103–124. <https://doi.org/10.1257/aer.89.1.103>
- Park, M. (2011). The economic impact of wireless number portability. *The Journal of Industrial*

- Economics*, 59, 714–745. <https://doi.org/10.1111/j.1467-6451.2011.00471.x>
- Read, D., & van Leeuwen, B. (1998). Predicting hunger: The effects of appetite and delay on choice. *Organizational Behavior and Human Decision Processes*, 76, 189–205. <https://doi.org/10.1006/obhd.1998.2803>
- Royer, H., Stehr, M., & Sydnor, J. (2015). Incentives, commitments, and habit formation in exercise: evidence from a field experiment with workers at a Fortune-500 company. *American Economic Journal: Applied Economics*, 7, 51–84. <https://doi.org/10.1257/app.20130327>
- Sadoff, S., Samek, A., & Sprenger, C. (2014). Dynamic inconsistency in food choice: Experimental evidence from a food desert. Becker Friedman Institute for Research in Economics Working Paper No. 2572821; CESR-Schaeffer Working Paper 2015-027. Available at SSRN. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2572821##](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2572821##)
- Seetharaman, P. B. (2004). Modeling multiple sources of state dependence in random utility models: A distributed lag approach. *Marketing Science*, 23, 263–271. <https://doi.org/10.1287/mksc.1030.0024>
- Strotz, R. H. (1956). Myopia and inconsistency in dynamic utility maximization. *Review of Economic Studies*, 23, 165–180. <https://doi.org/10.2307/2295722>
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.
- Volpp, K. G., John, L. K., Troxel, A. B., Norton, L., Fassbender, J., & Loewenstein, G. (2008). Financial incentive-based approaches for weight loss: A randomized trial. *Journal of the American Medical Association*, 300, 2631–2637. <https://doi.org/10.1001/jama.2008.804>
- Volpp, K. G., Troxel, A. B., Pauly, M. V. et al. (2009). A randomized, controlled trial of financial incentives for smoking cessation. *New England Journal of Medicine*, 360, 699–709. <https://doi.org/10.1056/NEJMsa0806819>
- Wood, W., Quinn, J. M., & Kashy, D. A. (2002). Habits in everyday life: Thought, emotion, and action. *Journal of Personality and Social Psychology*, 83, 1281–1297.