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What Happens When Payments End? Fostering Long-Term Behavior Change With Financial Incentives

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Abstract

Financial incentives are widely used to get people to adopt desirable behaviors. Many small landholders in developing countries, for example, receive multiyear payments to engage in conservation behaviors, and the hope is that they will continue to engage in these behaviors after the program ends. Although effective in the short term, financial incentives rarely lead to long-term behavior change because program participants tend to revert to their initial behaviors soon after the payments stop. In this article, we propose that four psychological constructs can be leveraged to increase the long-term effectiveness of financial-incentive programs: motivation, habit formation, social norms, and recursive processes. We review successful and unsuccessful behavior-change initiatives involving financial incentives in several domains: public health, education, sustainability, and conservation. We make concrete recommendations on how to implement the four above-mentioned constructs in field settings. Finally, we identify unresolved issues that future research might want to address to advance knowledge, promote theory development, and understand the psychological mechanisms that can be used to improve the effectiveness of incentive programs in the real world.

Keywords

allied field: behavioral economics, conservation psychology, environment, financial incentives, long-term behavior change, methodology: behavioral, persistence

In many developing countries, landholders receive monetary compensation from the government in exchange for engaging in specific conservation practices. Globally, $36 billion to $42 billion is invested annually in these so-called payment for ecosystem service (PES) programs, which are considered crucial for mitigating climate change, maintaining biodiversity, and promoting the economic development of small landholders (Salzman et al., 2018). PES programs offer landholders short-term payments (≈5 years) to restore degraded ecosystems or replace environmentally harmful land-use practices with sustainable ones (Pagiola et al., 2016). Although effective in the short term, these programs often fail to produce long-term behavior change because landholders tend to revert to previous unsustainable practices after the payments end (Dayer et al., 2018). One may then wonder how landholders can be induced to continue to engage in conservation practices after a strong extrinsic incentive is removed (Kerr et al., 2017).

Behavior change among rural landholders in developing countries is merely one example of a larger phenomenon that psychologists and practitioners have struggled with for a long time: how to promote long-term behavior change when financial incentives are initially given and then removed. Companies pay employees to go to the gym (Carrera et al., 2018) or to eat more fruits and vegetables (Thorndike et al., 2016). Schools pay adolescents for reading books (Fryer, 2011). Cities implement temporary rewards programs for bicyclists who pass specific locations on the bike

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paths (Dong et al., 2016). In each of these programs, the goal is to create long-term behavior change, that is, to get people to continue to do the desirable behavior even after the financial incentive is removed.

It is well known that extrinsic incentives can decrease the likelihood that people continue to engage in enjoyable activities (Lepper et al., 1974; Rode et al., 2015). One might think that an easy way to promote long-term behavior change is to never use extrinsic incentives at all. But sometimes extrinsic incentives are unavoidable. A financial incentive may be necessary to get people to try a new behavior so that they can realize it is less tedious and more enjoyable than they had assumed (e.g., biking to work). It may also be needed to overcome people's resistance to change or to bridge the gap until a new professional practice, such as organic farming, becomes profitable (Carrera et al., 2020; Charness & Gneezy, 2009). On a policy level, financial incentives are frequently used because they are easily disseminated across local, state, and federal entities (Maki et al., 2016).

What needs to happen so that people continue to perform the desired behavior after the end of a financial-incentive program? Although most developers of incentive programs seem to be aware that long-term behavior change will occur only if the financial incentive is replaced by one or more psychological incentives after the payment period, there seems to be a lack of understanding of what these psychological incentives might be and how to leverage them in a field setting. Surprisingly, the psychological literature provides relatively little guidance, which is in part due to scarcity of research on this topic (Fontecha et al., 2022). The purpose of the present article is to provide both a theoretical and applied account of the factors that affect long-term behavior change in a context in which extrinsic incentives are initially given and then removed.

We start by briefly outlining the history and context of payment for ecosystem service programs to provide a concrete example. We then present four psychological constructs—motivation, habits, social norms, and recursive processes—that we have identified as being crucial for promoting long-term behavior change when initial financial incentives are discontinued. In the following section, we present recent empirical studies of interventions in public health, education, sustainability, and conservation that successfully used financial incentives to induce long-term behavior change. We identify why some programs are effective and other programs are not. Our analysis leads to a set of specific recommendations for how to increase the long-term effectiveness of behavior-change programs that employ short-term financial incentives. We end by suggesting next steps for advancing research in this area that has both important theoretical and applied implications.

Overview of PES Programs

To provide context about the application of financial incentives for conservation, we briefly describe PES programs in the present section. PES programs are an innovative policy that seek to increase engagement in conservation practices by providing small landholders with direct cash payments (Wunder et al., 2018). For example, most PES programs are focused on reducing deforestation—fueled by timber production and/or the creation of agricultural land—and promoting reforestation or sustainable forest management instead, which is beneficial for biodiversity, air filtration, pollination, and soil regeneration (Gómez-Baggethun et al., 2010; Kerr et al., 2017).

Although financial-incentive programs are sometimes criticized for monetizing nature and undermining intrinsic motivation for conservation behaviors (Akers & Yasué, 2019), PES programs are hailed as a win-win solution for landholders and conservationists because participation is voluntary and financial compensation is provided (DeCaro & Stokes, 2008). PES programs contrast with so-called protected-area policies that establish parks and reserves and expel local communities from their homes or implement fines for extracting natural resources (Brockington, 2002; Naughton-Treves et al., 2005). Therefore, PES programs are more ethical because landholders can remain on their land while engaging in conservation practices, at least during the duration of the program (Piñeiro et al., 2020).

However, PES programs are not the panacea conservationists had hoped for (Arriagada et al., 2018; Börner et al., 2016; Costedoat et al., 2015). Although most of them effectively change short-term behavior, evidence suggests that they also have negative side effects, particularly in the long run (Akers & Yasué, 2019). First, financial incentives can have lasting negative consequences on how landholders view and value nature and their motivations for engaging in conservation. Behaviors that were once intrinsically motivated can become extrinsically motivated (Rode et al., 2015). For example, before financial incentives, landholders in Cambodia valued forests for their noneconomic benefits such as food, fuelwood, and medicine. Once a PES program was implemented, however, landholders focused more on the financial benefits of forests (Chervier et al., 2019). Second, research demonstrates that participants often revert to past behaviors once payments end (Barnes et al., 2020; Samii et al., 2014; Snilsveit et al., 2019; Swann & Richards, 2017). Although they support short-term adoption of conservation practices, financial incentives alone are often insufficient for creating long-term behavior change (Kemigisha et al., 2023). We review the few examples of successful PES programs in the

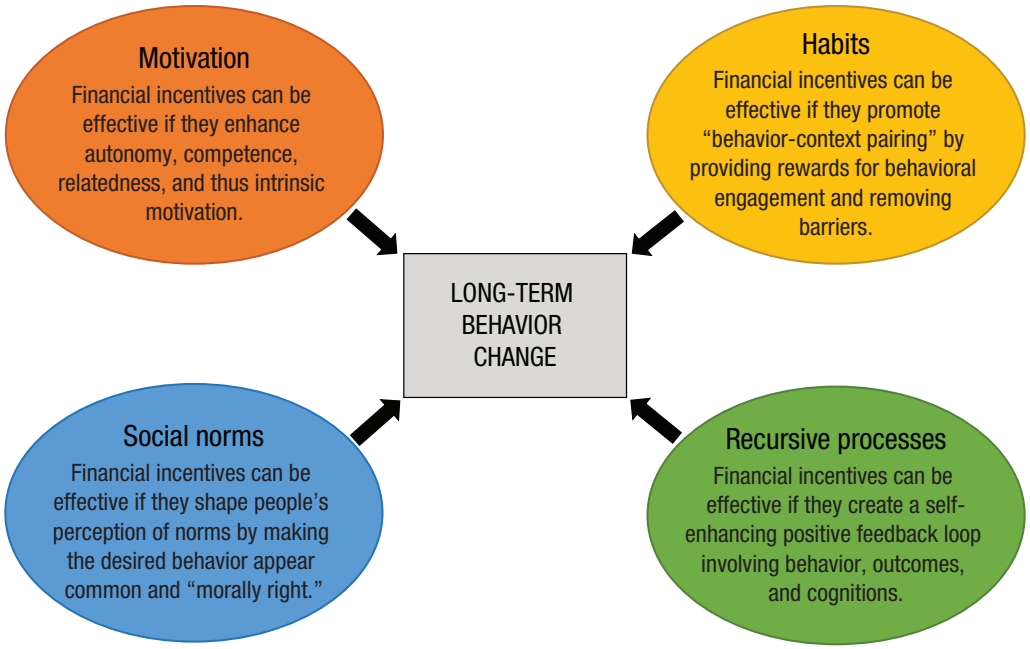

Fig. 1. Four proposed psychological constructs that influence long-term behavior change in the context of financial-incentive programs.

Conservation section below. As we show, the successful programs all leveraged one or more of the psychological constructs that play a key role in enduring behavior change after the payments end.

Psychological Constructs Relevant for Long-Term Behavior Change

To identify the psychological constructs involved in long-term behavior change, we reviewed the relevant literature on financial incentives. We came to five major conclusions. First, most incentive-based programs are not evaluated, and thus, it is not known whether they are effective. Second, the incentive-based programs that are evaluated generally limit themselves to measuring behaviors toward the end of the payment period, while financial incentives are still being distributed, with little to no consideration of whether the behavior change persists thereafter. Third, most of the programs that did assess long-term effects found financial incentives to be ineffective, meaning that participants reverted to their previous, undesirable behaviors after the payments ended. Fourth, a small number of incentive-based programs did lead to long-term behavior change, but it is often unclear why these programs were effective and what distinguished them from other, ineffective programs. Fifth, attempts to understand the complex processes that induce lasting behavior change are mired by inconsistent terminology, diverging definitions, and a lack of taxonomy (Dayer et al., 2018; Hecht et al., 2019).

Based on the empirical literature, which we review in the When Do Financial Incentives Work? section and based on review articles by Dayer et al. (2018), Hecht et al. (2019), Gneezy et al. (2011), and Rogers and Frey (2014), we identified four psychological constructs—motivation, habits, social norms, and recursive processes (Fig. 1)—that are relevant for long-term behavior change in contexts in which financial incentives are unavoidable or traditionally used. Although other psychological constructs play a role, too, we decided to focus on the four that seem to be most impactful and for which there is the strongest empirical evidence. In the following subsections, we discuss each psychological construct.

Motivation

Motivation is a strong driver of behavior and is often of central importance to understanding why people do or do not engage in specific behaviors (Asah & Blahna, 2013; Schultz, 2011). According to self-determination theory, individuals can be motivated for different reasons, aligned on a continuum ranging from extrinsic to intrinsic motivation (Ryan & Deci, 2000). Individuals with purely extrinsic motivations engage in a behavior to obtain some reward or desired outcome. Intrinsically motivated individuals, however, perform a behavior out

of genuine enjoyment and/or interest. There are intermediate forms of motivation that differ in the extent to which extrinsic or intrinsic motivations are the primary drivers of the behavior. Research on self-determination theory has shown that the more a behavior is intrinsically motivated, the greater an individual's performance, creativity, and persistence (Steinhorst & Klöckner, 2018). Furthermore, people often cease to engage in extrinsically motivated behaviors when the reward is removed or when the behavior no longer leads to the desired outcome (Ryan & Deci, 2000).

Self-determination theory further suggests that individuals' motivation can change over time. For example, it has been shown that offering rewards for genuinely enjoyable activities can shift motivation toward the more extrinsic extremity of the continuum (i.e., "crowding out"; Ezzine-de-Blas et al., 2019). The opposite is also possible in that people can be initially extrinsically motivated but over time assimilate and integrate the behavior into their own goals, values, and identity, a process referred to as "internalization" or "crowding in" (Akers & Yasué, 2019). The following constructs have been shown to promote internalization: (a) autonomy, the ability to choose one's actions and make choices that reflect true interests and values (Wichmann, 2011); (b) competence, the perceived ability to accomplish a task or achieve personal development; and (c) relatedness, the quality of one's relations and feelings of social belonging with others (Chervier et al., 2019). Taken together, this research suggests that financial incentives tend to undermine intrinsic motivation and thus long-term behavior change. However, these detrimental effects can be reduced if they are paired with program features known to promote autonomy, competence, and relatedness.

Habits

At least 40% of people's daily behaviors are habitual (Wood et al., 2002), making habits one of the best predictors of behavior (Mazar et al., 2021). Habits are mental associations that form through repeated engagement in a behavior in a specific situation (i.e., "behavior-context pairing") in the pursuit of a goal (Kruglanski & Szumowska, 2020). The stronger the mental association and automation of the behavior, the stronger the habit (Klöckner, 2013). Although self-determination theory provides a strong theoretical grounding for motivation-driven behavior, it fails to account for behavior that requires less self-regulation, such as habits. Habits can impel people to act even without conscious effort or attention, when they have low willpower, are stressed, or are unable to respond deliberately (Linder et al., 2022). Once a behavior has turned into a strong habit, individuals tend to act in accordance with their past behavior while intentions play only a secondary role (Wood & Neal, 2009). This is particularly true when there are no barriers (or "behavioral friction") that prevent the execution of the habitual behavior (Gardner et al., 2020).

Because the human brain is reward sensitive, individuals quickly develop mental associations between actions that are pleasant or result in rewards and the context in which these actions occur (Kruglanski & Szumowska, 2020). Incentives, financial or otherwise, can foster the development of habitual behavior (Allcott & Rogers, 2014), especially when they are disbursed in close spatial and temporal proximity to the behavior (Carden & Wood, 2018). As a result, financial incentives can lead to long-term behavior change if they foster habit development. It is important for the rewards to support behavior-context pairing, for example, by making the rewards contingent on doing the behavior in the same context (i.e., time, place, or social environment). Behavior-change programs using incentives can also be effective if they remove psychological, physical, and logistical barriers that might prevent the habitual behavior from being executed naturally without much conscious guidance (Rogers & Frey, 2014).

Social norms

The human desire to belong and feel connected drives individuals to act in accordance with social norms, the unwritten rules of society (Farrow et al., 2017). Social norms signal which behaviors are common and/or socially appropriate and are reinforced through interactions between people (i.e., social approval vs. sanctioning; Prentice, 2018). According to the theory of normative conduct (Cialdini et al., 1991), there are two types of social norms: Descriptive norms represent how common a certain behavior is, and injunctive norms define what is right and wrong. Both types of norms influence behavior, and when they contradict each other (e.g., the "wrong" behavior is common), the more salient norm has the greatest impact on behavior (Miller & Prentice, 2016).

Financial incentives can shape people's perceptions of what is "descriptively normative" through (a) engaging a large percentage of the population in the incentivized behavior and (b) bringing people together to see their peers engaging in the desired behavior. Financial rewards can also change injunctive norms. If decision makers or community leaders incentivize certain behaviors, then these authority figures clearly value that behavior; the importance of the behavior can be highlighted in outreach campaigns. Because people often underestimate the influence of external factors on

others' behavior, they develop the belief that most of their peers engage in the desired behavior because they enjoy it or consider it the socially acceptable thing to do (Ross, 1977). Thus, an incentive-induced shift in descriptive norms can sometimes lead to a subsequent shift in injunctive norms (Brauer & Chaurand, 2010).

Recursive processes

Recursive processes have been shown to play a major role in long-term behavior change, especially in educational settings. The literature on "wise interventions" describes recursive processes as positive-feedback loops in which multiple variables reciprocally influence one another (Walton & Wilson, 2018). Behavior change is most likely to persist if the intervention triggers the following three elements: The initial *behavior* change leads to positive *outcomes*, which, in turn, affect individuals' *cognitions* (e.g., beliefs, attributions, and identities). The cognitions, in turn, promote greater adoption of the desired behavior, which then leads to even better outcomes, and so forth. Thus, recursive processes involve a self-enhancing cycle in which behavior, outcomes, and cognitions mutually reinforce each other (Hecht et al., 2019).

Financial incentives can lead to long-term behavior change if they stimulate recursive processes. First, it is important that the rewarded behavior actually leads to a desirable outcome for participants, be it weight loss, better grades, or revenue from sustainable forest management. Second, the positive outcome needs to alter an individual's cognitions. For this to occur, the behavior-change program may need to assist individuals with the process of changing how they perceive themselves and the situation. Ideally, people develop the identity of a person who engages in the desired behavior (e.g., "I am a runner") and related self-enhancing attributions (e.g., "I can do this"; Houser-Marko & Sheldon, 2006). Finally, the financial incentive needs to ensure that the individual's altered cognitions translate into an increased adoption of the desired behavior. For example, an intervention can help students adopt a "growth mindset" rather than a "fixed mindset." Having a growth mindset can change low-achieving students' beliefs about their academic aptitude (cognitions) and motivate them to study more (behaviors). More time and effort invested in studying can improve grades (positive outcomes).

When Do Financial Incentives Work?

When reviewing the empirical literature on financial incentives and behavior change, we identified four domains with the most relevant research: public health, education, sustainability, and conservation. We briefly review these empirical findings in this section. In each of the four domains, we selected studies that provided insights into why financial incentives sometimes do but often do not lead to long-term behavior change. More precisely, for a study to be included in our review, it had to (a) have a control group or a baseline measure, (b) measure behavior more than 3 months after the end of the payment period, and (c) include three conditions: no incentives, incentives only, and "incentives plus," meaning that the program included at least one additional method for changing behavior. Because our initial search yielded only a handful of studies that met these conditions, we decided to relax our criteria to include studies that measured behavior as short as 2 weeks after the end of the payment period or lacked one of the three above-mentioned conditions.

As we conclude below, the programs that produce long-term effects do more than just provide financial incentives. They successfully leverage one or more of the psychological constructs discussed in the previous section, that is, they contain program elements specifically designed to promote intrinsic motivation, facilitate habit formation, alter people's perceptions of social norms, and/or initiate a recursive process. Some incentive programs engage only one of these constructs, whereas others try to leverage multiple.

Public health

Financial incentives in both public- (e.g., Medicaid programs) and private-health sectors (e.g., employer-wellness programs; see Lieberman et al., 2019; Vulimiri et al., 2019) are not only popular but also have been frequently evaluated. In a recent "megastudy," Milkman et al. (2021) tested the effectiveness of various interventions to increase gym visits. The authors included one baseline condition and 53 treatment conditions. Participants in all conditions engaged in planning, were sent reminders, and received small financial incentives for 4 weeks, but participants in the treatment conditions were exposed to additional materials or messaging.

The 53 interventions varied in effectiveness. Although 24 led to significant behavior change during the intervention, only four increased gym visits 4 weeks after the financial incentives ended. In one successful intervention, the researchers provided participants with a captivating free audiobook to listen to at the gym (e.g., *The Hunger Games*), whereas another successful intervention conveyed normative messages to promote working out (e.g., "Research from 2016 found that 73% of surveyed Americans exercised at least three times per week. This has increased from 71% in 2015"). The findings are well aligned with our discussion on the four psychological constructs relevant for long-term

behavior change. Participants who received an audiobook were more intrinsically motivated to go to the gym because they genuinely enjoyed listening to the novel. Participants who received normative messages likely changed their perceptions of how often people work out and how common working out is.[1]

Interventions that foster relationship building also can have lasting effects. Participants in a weight-loss program who were given payments as a group, rather than individually, continued to lose weight 3 months after payments ended, whereas participants who received individual payments did not (Kullgren et al., 2013). In another study, participants who received 7 weeks of group counseling and financial incentives quit smoking for up to a year after the program ended. Individuals with only counseling did not (van den Brand et al., 2018; unfortunately, the study did not include an incentives-only condition). These interventions, which helped participants develop new relationships, likely fostered relatedness among participants and changed their perceptions of which behaviors are socially normative. Unlike individual payments or programs, group payments and group counseling encouraged participants to interact and hold each other accountable. Seeing one's peers persist in healthy behaviors likely reinforced the notion that these behaviors are descriptively normative, leading to long-term behavior change.

In so-called deposit-contract programs, participants wager their own money and get it back (plus additional financial incentives) only if they make the necessary behavioral changes by a predetermined deadline. These programs, which combine commitment devices with financial incentives, are becoming increasingly popular (Boonmanunt et al., 2023). In one smoking-cessation study, participants were randomly offered either cash incentives of $800 or deposit contracts of $150 plus up to $650 in cash incentives that were distributed at specific benchmarks throughout the 6-month intervention (Halpern et al., 2015). Unsurprisingly, the uptake rate of deposit contracts was much lower than that of cash incentives—14% versus 90%, respectively. However, 52% of the participants with deposit contracts abstained from smoking for 6 months after the end of the intervention compared with only 17% who accepted the cash incentives. Deposit contracts can help amplify participants' existing intrinsic motivation to change their behavior by pairing it with an additional extrinsic reward (de Walque, 2020). Taken together, the findings from the public-health domain highlight the importance of designing financial-incentive programs that not only distribute payments but also increase participants' intrinsic motivation or change their perceptions of relevant social norms.

Education

Some practitioners and researchers have employed financial incentives in schools to reduce achievement gaps between marginalized and nonmarginalized populations. The goal is to motivate students and parents alike to prioritize school attendance, studying, and grades (Bettinger, 2012; Visaria et al., 2016). Although there are relatively few studies evaluating financial incentives in the education domain, the existing research is robust and provides useful longitudinal insights.

Two large-scale studies examined the effectiveness of financial incentives for high school students. In one 5-year study, high school freshmen in low-performing public schools with high dropout rates near Chicago were paid monthly incentives if they met attendance, behavior, grade, and test-score requirements. Although the overall effects were modest, the program had a large, beneficial impact on students who were on the threshold of meeting graduation requirements at baseline. Grades for this group increased by 11 to 12 percentage points 2 years after financial incentives ended (Levitt et al., 2016).

In another study in Houston, fifth-grade students, parents, and teachers across 50 traditionally low-performing public schools received financial incentives when students mastered math objectives via an online math platform that tailored assignments and assessments to the student's level (Fryer & Holden, 2013). Despite an increase in effort by all students, both during the intervention and 2 years later, only high-achieving students performed better in math compared with their baseline scores. Low-achieving students did not improve in math, and even worse, their reading scores decreased significantly.

Why do the results of these two programs, which are similar in design, differ so drastically? In Houston, incentives were linked to outcomes (e.g., grades, test scores), which did not engage one of the four psychological constructs. In Chicago, payments rewarded students for the process of learning (also see Fryer, 2010, 2011), which likely ignited a recursive process. Because of increased attendance and improved studying behavior, students likely got better grades, which shifted how students thought about themselves (e.g., "I am a capable student"). When financial incentives are linked to the process of learning, they can be more effective over the long run because they initiate a self-perpetuating positive-feedback loop (Hecht et al., 2019).

Other education programs integrated financial incentives with "educational services" such as mentoring,

academic advising, tutoring, and study groups. In research conducted in the United States, Rodríguez-Planas (2012) found that 5 years after the program ended, students who received mentoring, tutoring, and workshops on life skills in addition to financial incentives were 13% more likely to attend postsecondary training and 23% more likely to complete 2 years of college or postsecondary education than control students who were offered neither incentives nor educational services. Likewise, at a Canadian university, students with average academic performance were assigned to one of four experimental groups who received the following services: (a) peer advising and organized study groups; (b) a scholarship; (c) peer advising, study groups, and a scholarship; or (d) a control group who received nothing (Angrist et al., 2009). One year after the intervention ended, students who received peer advising, study groups, and the scholarship achieved better grades and completed more course credits than participants in the other groups.

Programs that provided educational services in addition to financial incentives were likely successful because they effectively leveraged several of the aforementioned psychological constructs. Scholarships incentivized students to spend more time on schoolwork, and mentoring, peer advising, and study groups increased students' competence (i.e., intrinsic motivation) and helped students establish new relationships that reinforced positive social norms.

Sustainability

For almost 50 years, researchers have explored how financial incentives can influence a variety of pro-environmental behaviors (e.g., recycling, meat consumption; Maki et al., 2016). Here, we compare three large-scale field experiments that tested the effects of financial incentives on sustainable commuting behaviors. The first study in Sweden provided 14,000 participants with free transit passes and measured the effects over 8 months (Gravert & Olsson Collentine, 2021). The first group of participants received 4 weeks of free rides, and the second group received 2 weeks of free rides and social-norms messaging. Both treatment groups were compared with participants in a baseline condition who received only 2 weeks of free rides. During the intervention, ridership across all three groups increased, but only participants from the 4-week treatment group rode public transport significantly more than the baseline group during the 8 months after incentives ended.

The second study provided 475 participants in Norway with financial incentives to cycle to work, which was tracked via a phone application during the 5-week intervention (Ciccone et al., 2021). Participants were randomly assigned to the control group or one of three treatment groups. Group 1 received 20 cents per kilometer cycled; Group 2 received one lottery ticket for each kilometer cycled, which were entered into a lottery for NOK 9,000 (≈USD$900); and Group 3 participated in a conditional lottery, which had the same design as Group 2, but at the end, researchers randomly selected one day out of the treatment period and if the participant of the winning lottery ticket had not logged any kilometers for the selected day, they received an email saying they won but would not receive the jackpot. All participants, including participants in the control group, were entered into a different lottery for NOK 1,000 (≈USD$100) as an incentive to use the app for the duration of the experiment. During the intervention, all treatment groups cycled about 2.4 more kilometers a day than the control group, but only the conditional lottery group cycled significantly more kilometers 2 weeks after intervention.

The third study promoted commuting via public transit in an undisclosed European city among airport employees who lived along bus routes but were not bus users (n = 7,564; Kristal & Whillans, 2020). In the first condition, a letter was sent to the participants with bus-route information and how to purchase a discounted bus pass through their employer. In the second condition, participants received the same letter plus 1 week of free bus tickets. Only 103 participants used at least one of the free bus tickets. Thereafter, recipients who did not use any of the free bus tickets were randomly assigned to either the control group, who did not receive another letter, or the treatment group, who received a letter highlighting the amount of money "lost" by not using the free bus tickets and additional information about discounted travel opportunities. All three interventions had negligible effects on commuting behavior.

Although the goal of all three interventions was to promote sustainable commuting practices, only the programs in Sweden and Norway were successful. We suggest that program success hinged on the engagement of the four psychological constructs. The studies in Sweden and Norway successfully changed long-term commuter behaviors by providing financial incentives for a sufficient time frame, leading participants to develop strong habits and overcome preconceptions about the difficulty of sustainably commuting to work. However, in Sweden, it seems that intensely leveraging one construct (habits) was more effective than weakly leveraging two constructs (habits and norms), whereas in Norway, encouraging daily cycling was more effective for habit development than intermittent cycling. Contrastingly, airport employees did not change their

commuting behavior. Ultimately, 1 week of financial incentives was insufficient, whereas 4 or more weeks of financial incentives fostered new habit development. Thus, financial incentives must be provided for a sufficient time frame to produce durable behavior change (Gravert & Olsson Collentine, 2021; Maki et al., 2016).

Conservation

Although PES programs have existed for 30 years, only a handful of studies have evaluated long-term impacts (Kemigisha et al., 2023). In Ecuador, two similar PES programs, SocioBosque and SocioParamó, were established by the government. SocioBosque paid private landowners to conserve their forests, which reduced the relative rate of deforestation by as much as 76% during the program (Jones et al., 2017). In SocioParamó, Indigenous communities were included in designing the PES program, which provided group payments to reduce livestock grazing on ecologically important land (Hayes et al., 2022). During the intervention, grazing declined by 12%. Five years into both programs, funding was unexpectedly suspended.

Although the two programs were both financial-incentive programs, the results differed drastically because of program design. Once payments were suspended, the rate of deforestation increased to preprogram levels on properties enrolled in SocioBosque (Etchart et al., 2020). In contrast, less than 5% of participants in SocioParamó were grazing animals on ecologically sensitive land more than 2 years after payments ended, compared with around 20% of households in the control communities (Hayes et al., 2022). SocioParamó participants stated that because the program was aligned with their values, they felt obligated to uphold the contract even when payments stopped (Rode, 2022). Including Indigenous communities during program design likely increased autonomy and intrinsic motivation and allowed participants to align their pro-environmental beliefs with their livelihood behaviors, which created a recursive process to foster persistence (Akers & Yasué, 2019). Moreover, the switch in livelihoods made reverting to old habits difficult once payments ended.

Some studies examined the effectiveness of PES programs with shorter contracts. In 2003, the World Bank funded a multinational program in Nicaragua, Costa Rica, and Colombia. In each country, about 100 participants received financial incentives for 2 or 4 years to plant trees to increase wildlife habitat, shade, and food production (Pagiola & Arcenas, 2013; The World Bank, 2008). The program allowed landholders to select which species to plant and where to plant them. During the program, tree cover increased and persisted beyond the program payments across all treatment groups, but results varied by country.

In Colombia, 8 years after the program ended, landholders in treatment groups had 6% more trees in their pastures and 8% more trees on their land overall compared with the control group (Calle, 2020). In Costa Rica, 9 years after the intervention, there was considerably more forest and natural pasture with high tree density on treatment farms compared with control farms, indicating that the planted trees were still standing (Rasch et al., 2021). In Nicaragua, 4 years after the intervention, the area of farmland covered by trees expanded from 35% to 43% (Pagiola et al., 2020). The land used for annual crops (i.e., non-tree crops) also remained well below its baseline level.

These programs were likely effective for three reasons. First, farmers were allowed to choose the type of trees and location to plant them (The World Bank, 2008), which fostered autonomy and competence. Second, planting trees resulted in direct economic and environmental benefits that increased over time and supported the internalization of extrinsic motivation (Calle, 2020). Third, the program increased the perception that tree-based agriculture was the norm. Farmers with more social ties and bigger networks were more likely to maintain and plant additional trees (Rasch et al., 2021).

In contrast, a PES program in Uganda was designed as a large-scale randomized control trial and paid participants for 2 years to protect forests. Half the 120 villages received payments, and the control villages did not (Jayachandran et al., 2017). During the program, deforestation fell from 9% to 4%, but once payments ended, deforestation resumed to previous rates (Jayachandran et al., 2018; Wunder et al., 2020). A follow-up study conducted household surveys and revealed that solely providing payments was insufficient for creating lasting forest-conservation practices (Kemigisha et al., 2023).

These international examples allow us to make insightful comparisons. The multinational program and SocioParamó integrated various psychological constructs. By providing training and alternative livelihood opportunities, landholders became more intrinsically motivated, and recursive processes were ignited, whereas the SocioBosque and the Uganda programs solely provided monetary incentives for forest conservation, which amplified extrinsic motivation rather than fostering internalization.

Summary of empirical studies

The empirical literature on the long-term effects of financial-incentive programs is scarce and somewhat inconclusive. Some financial-incentive programs produced

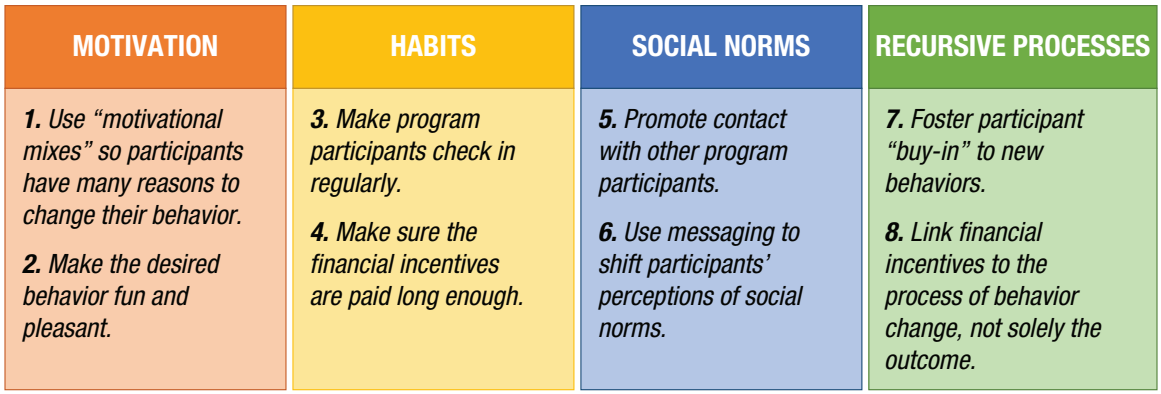

Fig. 2. Recommendations to researchers and practitioners for designing financial-incentive programs that elicit long-term behavior change.

enduring behavior change, but it is often unclear why this is the case because the studies failed to compare an incentive-only condition with an incentive-plus condition in which some other form of treatment is included (e.g., mentoring, social-norms messaging). One general conclusion can be drawn, however: Financial-incentive programs that produce long-term behavioral effects do more than just hand out payments. They usually include program elements designed to affect one or more psychological processes, and these processes generally align with motivation, habits, social norms, and recursive processes.

Concrete Recommendations for Researchers and Practitioners

It is relevant to know which psychological constructs need to be targeted to make financial-incentive programs effective in the long run, but this abstract knowledge provides limited insight into what researchers and practitioners need to do when they want to promote particular behaviors in real-life settings. Although the factors affecting tree-planting behavior differ from those that influence weight loss, academic achievement, or commuting, it is nevertheless possible to make some concrete recommendations about the elements of financial-incentive programs that make them more effective. In the present section, we suggest eight recommendations for maximizing the impact of short-term financial-incentive programs that emerged from our review of the empirical literature. Although many of the recommendations have ties to more than one of the four psychological constructs discussed above, we grouped them in categories based on the psychological construct that they are most closely associated with (Fig. 2).

1. Use "motivational mixes" so participants have many reasons to change their behavior

The more reasons participants have to engage in the desired behavior aside from the financial incentives, the less likely they are to revert to previous practices when the payments end (Kemigisha et al., 2023). It is thus important to design programs that leverage both extrinsic motivators, such as financial incentives, and intrinsic motivators, such as learning opportunities, for personal development or community building. Programs can also highlight the potential positive outcomes via messages or activities. For example, weight-loss programs can ask participants to reflect on what they look forward to doing after losing weight, teachers can share the real-world applications of course materials to stimulate student interest, and agricultural technicians can highlight to landholders the importance of creating a better future for their children.

2. Make the desired behavior fun and pleasant

Just as Milkman et al. (2021) gave their participants an interesting audiobook to listen to while working out, it is often possible to add program elements that make the to-be-adopted behavior more enjoyable. For example, farmers reported that they enjoyed doing farm work together so they could socialize (Tey et al., 2017). Fun activities foster intrinsic motivation because the financial incentive is no longer the only reason why the behavior is performed (Woolley & Fishbach, 2016). Furthermore, habits develop faster when behaviors are enjoyable (Kruglanski & Szumowska, 2020). Ideally,

pleasant program elements, such as listening to audiobooks or doing communal farming, will be continued by individuals after the program ends.

3. Make program participants check in regularly

Increasing the frequency with which participants are in contact with program advisors (e.g., farm technicians, guidance counselors) can increase participants' accountability, which, in turn, can help establish durable habits. Students who received educational services likely earned better grades because they had guidance and structured study schedules to support strong habit development (Angrist et al., 2009). The support of qualified advisors can also help individuals understand the causal connections between the behavior and the desired outcomes (e.g., transitioning to organic farming can increase production and reduce environmental impact) and can help promote favorable self-attributions (e.g., "You are a farmer who cares about the environment"), which can ignite recursive processes.

4. Make sure the financial incentives are paid long enough

Individuals need time to become competent in new behaviors (e.g., learning to use the transit app, effective exercise regimens). Ideally, the incentives last for a sufficiently long time so participants can develop habits and, better yet, make it difficult for participants to revert to past behaviors (e.g., a family may have sold the second car). Like others, we noticed that the duration of most programs was not justified and that the length of the payments were likely determined by the program creators' intuition or budget (Cawley & Price, 2013; Fontecha et al., 2022). Pilot testing is helpful to determine the definition of "long enough" because the ideal length of a program depends on the difficulty of the desired behavior.

5. Promote contact with other program participants

Group sessions, group payments, or cohort-based interventions all bring participants together. Providing opportunities for participants to see their peers engaging in the desired behavior or hearing their peers talk about the behavior reinforces positive social norms (Dayer et al., 2018). For example, group therapy for smokers (van den Brand et al., 2018) and community-based PES payments (Hayes et al., 2022) were more successful at changing long-term behavior than similar programs that used individual payment structures. An added benefit of increasing participant contact is that it also promotes relatedness and thus can foster intrinsic motivation.

6. Use messaging to shift participants' perceptions of social norms

During interventions, communicating frequently about the large number of peers who are engaging in the desired behavior or participating in the program can highlight desirable norms. Tailoring communication methods to specific audiences can help make messages more persuasive. In some societies, particularly Indigenous or non-Western ones, statistics might not be very persuasive or accessible (Martínez-Reyes, 2016). Instead, narratives are one alternative that can be used to communicate that the desired behavior is either already common ("descriptive norms") or is becoming more common ("dynamic norms"; Sparkman & Walton, 2017), such as in the Milkman et al. (2021) study that communicated a 2% increase from 2015 to 2016 in the number of Americans exercising 3 days a week. Another way to make programs more effective is by communicating that the desired behavior is "morally the right thing to do" and is endorsed by opinion leaders, decision makers, and admired peers (Dungan et al., 2019). Such communications can shift individuals' perceptions of injunctive norms and increase the likelihood that they will continue with the behavior after the payments end.

7. Foster participant buy-in in new behaviors

The more participants are invested in the program, the more opportunities they have to connect their cognitions and behaviors with outcomes, which can ignite a recursive process. Including participants in the design phase allows participants to shape concrete elements of the program and increases their investment. This was seen in the SocioParamó program in Ecuador, in which Indigenous landholders helped design the program, so it was aligned with their beliefs and values. Once payments stopped, they did not resume grazing because partaking in program design helped them connect their beliefs, behaviors, and outcomes (Hayes et al., 2022). Another way to increase participant investment is by providing choices during the intervention. For example, allowing landholders to select which tree species to plant (Pagiola et al., 2016, 2020) or letting participants choose which time of day to exercise (Milkman et al., 2021) increases autonomy and buy-in, which fosters persistence.

8. Link financial incentives to the process of behavior change, not solely the outcome

Remember that students performed better when they were paid for attendance and good behavior rather than for their grades (Levitt et al., 2016). Likewise, conservation programs that engaged landholders in planning and

Year	1	2	3	4	5	6	7	Total income
Fixed monthly payments	$200	$200	$200	$200	$200	-	-	$12,000
Decreasing monthly payments	$200	$200	$200	$160	$120	$80	$40	$12,000

Fig. 3. Example of payment schemes with fixed or decreasing payments over a 7-year period.

tree planting were more successful at creating long-term change than programs that solely paid farmers to protect existing forests (Calle, 2020). Providing financial incentives for outcomes establishes a quid pro quo relationship that magnifies the extrinsic motivations for engaging in the desired behavior. On the other hand, providing financial incentives for the process of behavior change helps participants jumpstart a self-perpetuating recursive process by altering cognitions, behaviors, and outcomes. These changes in cognitions and behaviors can also help form habits that outlast financial incentives.

Future Directions

Although some programs with financial incentives led to long-term behavior change, knowledge about the factors that made these programs effective is still rather limited. There are only a few studies in which researchers measured actual behaviors several months or even years after the payments ended. Some of the recommendations in the previous section are based on a single empirical study. Furthermore, most of the literature stems from the Global North, lacking socio-geographic diversity to make these findings broadly applicable. In the following paragraphs, we attempt to identify the most pressing research questions in the field. Finding answers to these questions will further the understanding about how to create long-term behavior change with financial-incentive programs and more generally, about the factors that causally affect human behavior.

What is the best way to promote habit formation? Drawing on what is known about habits, should participants be rewarded more frequently? More frequent incentives can serve as reminders to reinforce habits and foster persistence (de Walque, 2020; Thirumurthy et al., 2019). Moreover, how much flexibility should be built into programs? Although rigidity can help establish habits at first, flexibility can help participants persist (Milkman et al., 2021). If participants struggle to maintain their newly adopted behaviors, programs can provide additional support (e.g., bonuses after missed workouts). Research on how to balance the rigidity needed to form habits and the flexibility needed to sustain them will provide insight on how to foster strong habits. Most studies do not provide an explanation for the incentive-dissemination schedule (Vlaev et al., 2019). Further research on when, where, and how often incentives are disbursed could help the field understand how to maximize habit formation during financial-incentive interventions.

How can one create recursive processes? What design choices can be made to help participants see positive outcomes as a direct consequence of their new behavior? How can programs harness these positive outcomes to shift participants' cognitions so that they think differently about themselves and their social and physical environments? The goal is to shift people's attributions for why they do a behavior and reframe their thinking (Walton & Wilson, 2018). For example, providing students with financial incentives to go bird watching could eventually become an enjoyable hobby. In turn, students may change their beliefs about birds, which may change their self-image to "I am a birder." To align their behaviors with their attitudes (i.e., value-action gap), students may become motivated to engage in bird-friendly behaviors, such as adding stickers to windows to prevent collisions (Campbell & Brauer, 2020; Kollmuss & Agyeman, 2002). Concern for birds could grow into broader engagement in conservation behaviors. But how can the incentive structure be designed in a way to make recursive processes more likely? Although people are initially financially motivated (i.e., "I am doing this behavior for the financial incentive"), ideally, as the intervention progresses, participants attribute the behavior to their cognitions (i.e., "I am doing this behavior because I believe it is the right thing to do and my identity is tied to this practice").

What method of disbursing financial incentives leads to greater long-term behavior change? Currently, most programs hand out a fixed amount for a certain time period, and then the payments end abruptly. One may wonder whether it would be more effective to progressively decrease the payments. For example, rather than receiving the same monthly payment over a 5-year period, one might consider paying PES participants a monthly base rate for 3 years and then decreasing the payments by 20% every year over 4 additional years (see Fig. 3). The total amount spent on each participant is

the same, but a decreasing pay structure likely facilitates the process of internalization discussed in the Motivation section. The psychological literature on sunk costs, escalation of commitment, and maladaptive persistence suggests that people are often hesitant to change their behavior when a situation deteriorates progressively (Merkle et al., 2022; Weeth et al., 2020; Woods & Branlat, 2011). We are not aware of any studies that tested a decreasing payment structure despite the theoretical arguments that suggest a superior effectiveness.

The questions outlined above are only starting points. The more researchers learn about the psychological constructs that promote behavioral persistence, the better they can understand the factors influencing human behavior and are able to design financial-incentive programs that improve long-term outcomes in the real world.

Conclusion

The ephemeral effects of financial-incentive programs have plagued social scientists and practitioners across disciplines for many decades. Financial-incentive research has largely focused on changing behavior during an intervention but has failed to produce concrete recommendations on how to promote persistent change after the payments end. Through this review, we show that financial-incentive programs that leverage motivation, habits, social norms, and recursive processes promote long-term behavior change. If future financial-incentive programs harness psychological insights, they will be among the most effective tools for solving diverse behavioral issues.

We conclude by appealing to psychologists to study conservation among small landholders in developing countries (Cinner, 2018; Nielsen et al., 2021). In particular, restoring and conserving tropical forests in the Global South is one of the most effective strategies for mitigating climate change and biodiversity loss—two of the most important challenges of the 21st century (Lewis et al., 2019). In addition, PES programs are an ideal setting for psychologists to conduct research on financially induced long-term behavior change. With millions of recruited participants who are paid by public funds, it is relatively easy to implement large-scale randomized control trials. The outcomes are not only clearly defined and behavioral in nature but also sometimes even measured by other people. For the survival of people and the planet, it is of the utmost importance that psychologists delve deeper into the design of financial-incentive programs to develop effective solutions for mitigating climate change and protecting biodiversity.

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Note

1. The two other successful interventions included a bonus for returning to the gym after a missed workout and an intervention that encouraged people to plan their workouts. Both of these likely promoted habit formation.

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