

Beyond Willpower: Strategies for Reducing Failures of Self-Control

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Abstract

Almost everyone struggles to act in their individual and collective best interests, particularly when doing so requires forgoing a more immediately enjoyable alternative. Other than exhorting decision makers to “do the right thing,” what can policymakers do to reduce overeating, undersaving, procrastination, and other self-defeating behaviors that feel good now but generate larger delayed costs? In this review, we synthesize contemporary research on approaches to reducing failures of self-control. We distinguish between self-deployed and other-deployed strategies and, in addition, between situational and cognitive intervention targets. Collectively, the evidence from both psychological science and economics recommends psychologically informed policies for reducing failures of self-control.

Keywords

self-control, behavior change, behavioral economics, self-regulation

Men are rather reasoning than reasonable animals
for the most part governed by the impulse of
passion.

—Alexander Hamilton (1802)

Self-control failures contribute to a range of policy issues, from educational achievement (Duckworth et al., in press) and retirement savings (Benartzi & Thaler, 2013) to the obesity epidemic (VanEpps et al., 2016a) and the promotion of subjective well-being (Wiese et al., 2018). People with greater self-control fare better in terms of health, wealth, and many other dimensions of human flourishing (Moffitt et al., 2011). Scholarly attention to self-control has grown dramatically over the past 2 decades, as shown in Figure 1, which depicts the percentage of articles about self-control in *Psychological Science* from 1995 through 2016. But inquiry on this timely topic stretches back thousands of years (Aristotle, trans. 2009; Freud, 1916/1977; James, 1899; Proverbs 25:28; Smith, 1759/1976; Thaler & Shefrin, 1981).

Why is self-control an object of fascination for philosophers, social scientists, policymakers, and pundits alike? Perhaps because failures of self-control often persist even when people recognize them and resolve

to act differently in the future (Norcross & Vangarelli, 1988–1989). From forgoing dessert to exercising regularly to saving for retirement, many people feel as if they are in a perennial battle with themselves. Furthermore, most people predict incorrectly that they will overcome this battle (e.g., Augenblick & Rabin, 2018), even when they recognize that other people’s self-control problems persist (Fedyk, 2017; Pronin, Lin, & Ross, 2002). Finally, temptations—rewards that provide short-term gratification but impede people from long-term goals—are ever more abundant, thanks to convenience stores, one-click shopping, social media, 24/7 streaming video, and other new vices (Akst, 2011).

Not all decisions require self-control. Sometimes decisions are difficult because people feel torn between two equally valuable choices (Shenhav & Buckner, 2014). In addition, self-control is irrelevant when people are simply mistaken about the actual costs and benefits of their choices. In the 1940s, for example, smoking cigarettes was not widely perceived as an unhealthy habit; indeed, tobacco companies then touted the health benefits of

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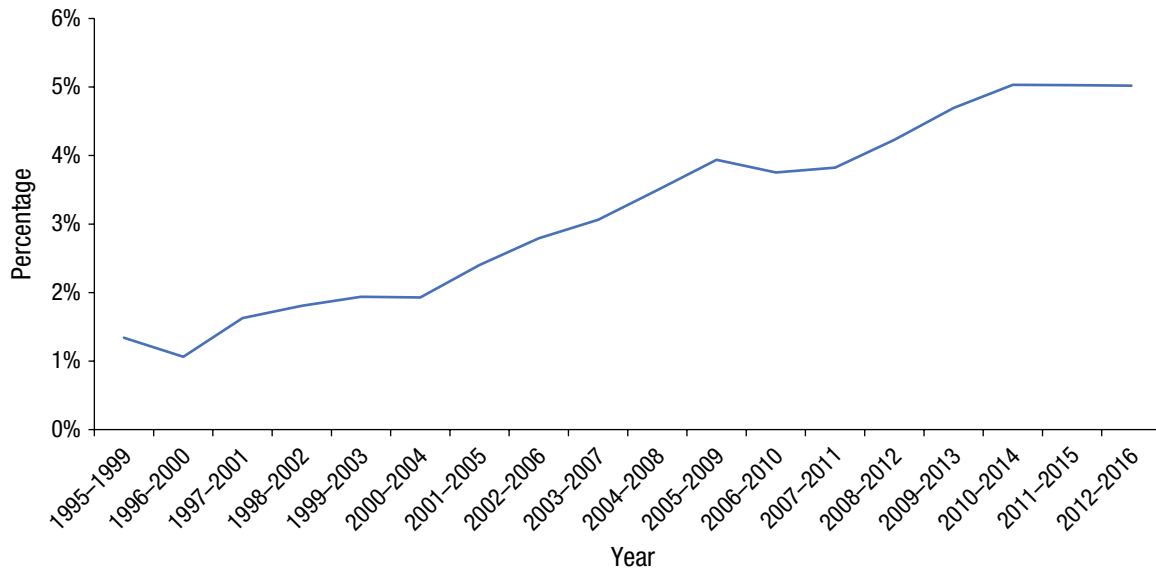


Fig. 1. Three-year running average of percentage of articles in *Psychological Science* that included “self-control” in the text.

smoking. The carcinogenic effects of cigarette smoking are now common knowledge, and 68% of smokers in the United States would like to quit smoking (Babb, 2017).

The special case of self-control conflict entails a tension between *want* and *should*: A “should” behavior (e.g., exercising, eating healthy, going to bed early) is more valuable in the long-run, whereas an alternative “want” behavior (e.g., staying on the couch, eating junk food, staying up late) is more alluring in the moment (Milkman, Rogers, & Bazerman, 2008). When people pursue the option with more enduring value, they experience self-control success; when they pursue the option that is more tempting right now, they experience self-control failure.

Three classes of models in economics and psychological science endeavor to explain when and why self-control conflicts arise. Here we provide a short summary of these three models. For a detailed comparison and contrast of leading intertemporal-choice models, as well as a review of the relevant empirical evidence, see Cohen, Ericson, Laibson, and White (2016) and Ericson and Laibson (2019).

The first class of models features multiple sequential selves with *dynamically inconsistent* preferences¹ (e.g., Ainslie, 2012). Each self exists at a point in time, and each self wants instant gratification followed by a future life characterized by patient behavior, a good work ethic, and the willingness to delay gratification when it is beneficial. According to this approach, decision makers exhibit dynamic inconsistency in their choices insofar as the future tends to be sharply discounted relative to the present. This produces a peculiar pattern whereby choices about the future emphasize patience

(e.g., “Next Tuesday, I want to have salad for lunch!”), but choices made for the present prioritize immediate gratification (e.g., “Right now, I want a cheeseburger!”). Although the decision makers always know what they want to do in the moment, these current preferences contradict their own past plans (Ainslie & Haslam, 1992; Akerlof, 1991; Laibson, 1997; Loewenstein & Prelec, 1992; O’Donoghue & Rabin, 1999). Models in this class tend to use hyperbolic or quasihyperbolic discount functions. Hyperbolic functions tend to be a special case of the general functional form for discount functions proposed by Loewenstein and Prelec (1992), in which events at horizon are discounted (i.e., weighted) with the function: $(1 + \alpha t)^{-\gamma/\alpha}$. Here the parameters α and γ are both positive. The quasihyperbolic (or “present-biased”) model of Laibson (1997) tries to reproduce many of the properties of a hyperbolic discount function in a way that is more tractable for mathematical modelling. The present-biased model gives current utility flows full weight and discounts future utility flows with the function $\beta \times \delta^t$. Here both parameters are weakly bounded between 0 and 1. The present “bias” is captured by the parameterization $\beta < 1$. When $\beta = 1$, the model reproduces the special case of pure exponential discounting, in which preferences are dynamically consistent: That is, early selves and later selves all agree on the best course of action (so there is no self-control problem).

The second class of models posits multiple coexisting selves. This view holds that decision makers behave as if they were a composite of competing selves with different valuation systems and different priorities. One “self” craves instant gratification (e.g., “I want to eat a cheeseburger! Yum!”), whereas another “self” is focused

on maximizing long-term outcomes (e.g., “I want to eat a salad and be healthy!”). Self-control conflicts are the consequence of a present-oriented valuation system disagreeing with a future-oriented valuation system (Fudenberg & Levine, 2006; Loewenstein & O’Donoghue, 2004; Thaler & Shefrin, 1981). In a typical implementation of this framework (e.g., Fudenberg & Levine, 2006), there are two types of selves that play a repeated game: a patient (dynamically consistent) long-run self, which might discount payoffs exponentially, and a sequence of completely myopic short-run selves that care only about immediate payoffs. Thaler and Shefrin (1981) call these selves the “planner” and the “doer,” respectively. Evidence for multiple system models comes from functional MRI (fMRI) studies showing that self-controlled choices were associated with lateral prefrontal areas of the brain, whereas more impulsive choices were associated with the ventral striatum and ventromedial prefrontal cortex (e.g., Figner et al., 2010; McClure, Ericson, Laibson, Loewenstein, & Cohen, 2007; McClure, Laibson, Loewenstein, & Cohen, 2004).

A third class of multiple-attribute models suggests that although the phenomenology of self-control conflicts may suggest a duality—an effortful struggle between present and future selves or between multiple coexisting selves—there is nothing fundamentally different between such conflicts and any other kind of choice (Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, 2017). Instead, attributes of the choices among which people must select are presumed to be heterogeneous, including hedonic reward value, effort costs, the costs and benefits of social signaling, and more. For example, a cheeseburger may be appraised as high in hedonic value but low in long-term-health value. A salad, in contrast, may be lower in hedonic value but higher in long-term-health value. Rather than warring systems of preferences, this view of self-control conflict posits multiple streams of information, each of which represents different attributes of people’s choices. Neurobiological evidence favoring the multiple-attribute model includes fMRI studies in which areas of the brain previously considered part of a present-oriented decision-making system (e.g., ventral striatum) were associated with both delayed and immediate rewards (Kable & Glimcher, 2007).

Regardless of their underlying mechanics, self-control conflicts are an everyday challenge, and people’s failures to act in their long-term interest are commonplace. Why? Succeeding at self-control requires people to do more than decide to forego what they want in order to do what they should. As Mischel (2007) recognized at the beginning of his career, intention and action are not always identical: “After the choice to delay has been made, the good intention formed and

declared at least to oneself, what allows it to be realized?” (p. 265). In the preschool delay-of-gratification paradigm that Mischel later developed, children are offered a smaller treat (e.g., one marshmallow) right away or a larger treat (e.g., two marshmallows) if they can wait. Although nearly all children decide to wait for a larger, later treat rather than enjoy a smaller treat right away, how long children can follow through on this resolution varies dramatically (Duckworth, Tsukayama, & Kirby, 2013; Mischel, Shoda, & Rodriguez, 1989).

In this review, we provide a theoretical framework for organizing the myriad strategies that have been shown empirically to reduce self-control failures. We argue for the distinction between situational and cognitive strategies, as well as the distinction between strategies deployed by the individual (i.e., self-initiated self-control strategies) and those deployed by third-parties (i.e., nudges initiated by policymakers, employers, etc.). We summarize policy-relevant intervention research in both psychological science and economics with the goal of inspiring research-supported policies and programs for decreasing failures of self-control. Finally, we conclude with a discussion of the relative advantages and disadvantages of each approach.

Strategic Interventions to Reduce Failures of Self-Control

From early childhood, human beings have some capacity to directly suppress one urge in favor of a goal-congruent rival urge (Eisenberg, Smith, & Spinrad, 2011), a feature of the behavioral repertoire that relies on executive function and is supported by the most recently evolved areas of the human brain (Cohen, 2005; McClure et al., 2004). The vernacular term *will-power* is used to describe this straightforward, brute-force approach to doing what is in one’s best interest when an alluring alternative beckons (Mahoney & Thoresen, 1972). Though the capacity to directly modulate impulses continues to improve throughout adolescence and early adulthood (De Luca et al., 2003), self-control failures are common at any age (Baumeister, Heatherton, & Tice, 1994).

Likewise, public policies that prescribe internal fortitude for resisting immediate gratification tend to disappoint. Consider, for example, the “Just Say No” campaign, inspired by then First Lady Nancy Reagan’s three-word response to a schoolgirl who asked what she should do if someone offered her drugs. The subsequent Drug Abuse Resistance Education (DARE) program implemented by a majority of U.S. school districts in the 1980s has been shown in some studies to have had unintended negative effects (Werch & Owen, 2002)

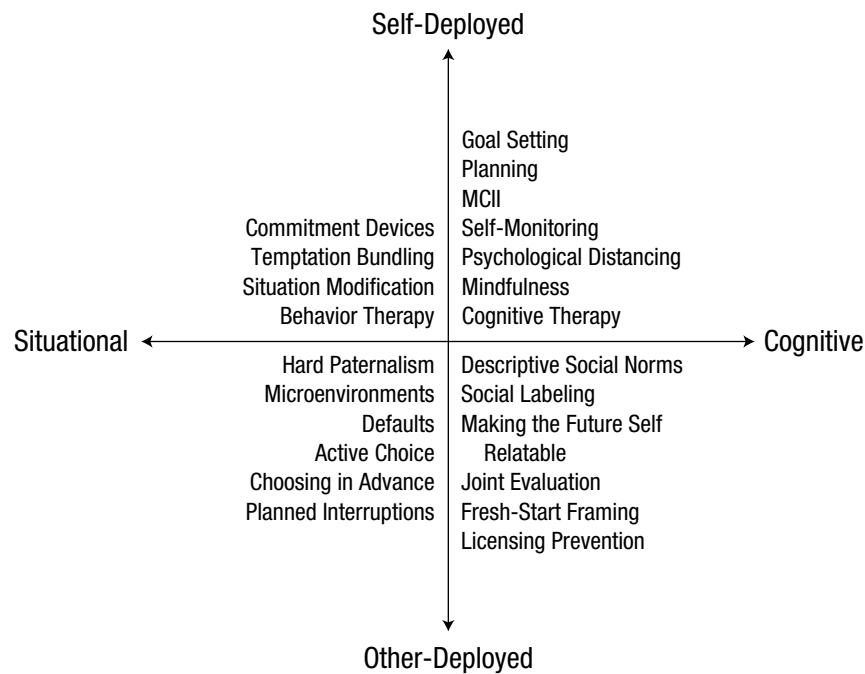


Fig. 2. Illustrative examples of approaches aimed at reducing self-control failures. Approaches are classified as situational versus cognitive and self-deployed versus other-deployed. MCI = mental contrasting/implementation intentions.

and in meta-analyses to have had no measurable benefit for youth alcohol, drug, and tobacco use (West & O’Neal, 2004).

We propose a classification of approaches that takes more strategic aim at failures of self-control. As shown in Figure 2, our classification distinguishes between approaches that modify one’s *situation* and approaches that modify one’s *cognitions*, depending on whether they target the objective situation or, in contrast, one’s mental representation of the environment. The phenomenology of resisting temptation—typically experienced as effortful, tiring, and unpleasant (Hagger, Wood, Stiff, & Chatzisarantis, 2010; Inzlicht, Bartholow, & Hirsh, 2015; Inzlicht, Schmeichel, & Macrae, 2014; Kurzban, Duckworth, Kable, & Myers, 2013)—naturally directs our attention to cognitive strategies for solving this problem. However, situational strategies can be especially efficient insofar as they can be executed long before impulses have grown strong enough to be noticed (Duckworth, Gendler, & Gross, 2016).

Figure 2 further differentiates between strategies that are *self-deployed* and those that are *other-deployed*. In the former, individuals take deliberate action to improve their decisions; in the latter, individuals may be oblivious to the actions that other parties initiate on their behalf. Self-deployed strategies require some amount of “sophistication,” or conscious awareness of the possibility of future self-control conflicts (Laibson, 1997;

Strotz, 1955). For example, although weekly cognitive or behavior therapy relies on the skills and attention of a therapist, it nonetheless requires the client’s cooperation and consent. In contrast, rearranging a cafeteria so that healthy options are within easy reach requires neither. A similar distinction—between self-deployed “boosts” and other-deployed “nudges”—has been made by Hertwig and Grüne-Yanoff (2017). The crucial difference is self-awareness: To be effective, a boost requires recognizing one’s self-control problem, but a nudge does not.

Note that self-awareness about self-control can be unreliable. On Monday, people may valiantly battle their impulses to overeat, but on Wednesday, they may deny, even to themselves, the need to reign in their diet, only to begin the cycle anew the following week. Likewise, on the timescale of months or years, it is common for addicts to cycle in and out of conscious awareness of their problems (Prochaska, DiClemente, & Norcross, 1992). Although metacognitive awareness surely varies, not only across time but also among decision makers (O’Donoghue & Rabin, 1999), we are concerned in this review with any behavior with which many (but not necessarily all) decision makers struggle (but not always in earnest) to act in their best interest, despite momentary temptations that lead them to act otherwise.

Like any framework, our 2×2 classification simplifies at the expense of nuance. What makes categorization

so tricky? One reason is that situational interventions often influence decision making via cognitive mechanisms (Duckworth, Gendler, & Gross, 2016). For instance, turning your phone off to resist wasting time on social media is a self-deployed situational strategy that in turn encourages you to ignore, or even forget about, what your friends may be posting online. Relatedly, a cognitive intervention such as self-monitoring (i.e., paying attention to healthy versus unhealthy behavior) can be facilitated by a situational affordance such as a food journal or pedometer.

Furthermore, the distinction between self-deployed and other-deployed interventions reflects how these approaches are *typically* implemented. It is possible that a strategy that we have categorized as self-deployed could be other-deployed and vice versa. A teenager, for example, might independently decide to turn off the phone, or his or her parent might encourage him or her to do so. Conversely, if you listen to a podcast about the benefits of tackling behavior change at moments that feel like a “fresh start” (Dai, Milkman, & Riis, 2014), you may take it on yourself to begin a new exercise program on your birthday, but your employer may make use of the same information to advertise gym discounts on New Year’s Day. And, finally, real-world interventions are very often a concatenation of diverse elements representing distinct categories of strategies. Weight Watchers, for example, coaches dieters to use an array of self-deployed situational and cognitive strategies and, in addition, sponsors in-person meetings, communicates social norms, and provides a phone app to track eating and exercise.

Despite these complexities, a classification of strategies aimed at reducing self-control failures illuminates commonalities and distinctions among approaches developed in diverse theoretical traditions. For example, the adjacency in Figure 2 of commitment devices and hard paternalism reveals a through line: Both are situational interventions that change the objective costs and benefits of self-controlled versus impulsive choices. At the same time, their placement in separate quadrants is also revealing: Commitment devices are self-deployed, requiring the individual’s self-awareness of future fallibility, whereas hard paternalism is other-deployed and in many cases is justified by lack of self-awareness on the part of individual decision makers.

Empirical Research on Interventions That Reduce Failures of Self-Control

Beginning in the top-left quadrant of Figure 2 and then proceeding clockwise, we describe interventions designed to decrease self-control failures. With an eye toward policy recommendations, our review emphasizes

interventions that have been tested in field settings. However, we also identify a few promising interventions for which empirical support derives primarily from laboratory research. Using the same metric as the original publications, we include effect sizes for field-tested interventions and, where available, meta-analytic estimates. By convention, many of the publications we review use the terminology “small,” “medium,” and “large” to refer to mean differences (d) of 0.2, 0.5, and 0.8 SD , respectively (Cohen, 1992). For analysis-of-variance models, η^2 is often reported, in which case the corresponding effect-size conventions are .01, .06, and .14, respectively (Richardson, 2011). When numeric effect-size estimates are unavailable but authors describe effects as “small,” “medium,” or “large,” we follow suit, noting recent critiques that these rules of thumb are both arbitrary and unrealistic, particularly with respect to behavioral outcomes in real-world settings (Bosco, Aguinis, Singh, Field, & Pierce, 2015; Hill, Bloom, Black, & Lipsey, 2008; Kraft, 2018). Wherever relevant, we highlight contradictory results and competing perspectives.

It is beyond the scope of this review to identify and critique the methodological limitations of each study that we reference. We urge the reader to proceed with two general cautionary comments in mind. First, almost all of the experiments reviewed here were published before contemporary concerns about reproducibility in social science research. We believe more precise and accurate estimates of effect sizes for diverse intervention approaches will emerge once norms and procedures are established for preregistration, reporting of null effects, multiple attempts at replication, and a priori power analyses (which generally call for larger samples than typical in the published literature; see Shrout & Rodgers, 2018). Second, we restrict our review to published studies. Consider as context a metasynthesis of 62 separate meta-analyses of interventions for change in health behaviors such as smoking and physical activity (B. T. Johnson, Scott-Sheldon, & Carey, 2010). When 100% of studies for meta-analyses came from scientific journals (as opposed to being unpublished), the estimated effect of interventions (d) was 0.26, but when only 45% of studies were published in journals, the average effect of interventions was 0.01.

Self-deployed interventions

Situational interventions that are typically self-deployed. In this section, we summarize research on situational interventions that are typically self-deployed. These entail a decision maker’s deliberate change of his or her environment to create incentives, obstructions, and affordances favoring long-term goals over short-term temptations. Accordingly, they require that people have

the power to modify objective features of their social or physical circumstances and therefore may not always be feasible. For instance, students who want to study in the library may not be able to transport themselves there, and employees who wish there were no donuts in the break room may lack the authority to remove them.

Commitment devices. People tend to make more self-controlled choices when deciding about the future (e.g., ordering lunch for tomorrow) than the present (e.g., ordering lunch for today; Milkman, Rogers, & Bazerman, 2009, 2010; Read & van Leeuwen, 1998; VanEpps, Downs, & Loewenstein, 2016a, 2016b). Although more choice is typically assumed to be better than less choice, in principle, sophisticated decision makers can improve their future happiness by voluntarily eliminating options they would otherwise have available in the future. These self-imposed constraints improve welfare, because they prevent (or dissuade) the person from undertaking a self-defeating future action (Brocas, Carrillo, & Dewatripont, 2004; Laibson, 1997; Rogers, Milkman, & Volpp, 2014; Schelling, 1992). For example, a person might intentionally delete a game from an iPad to avoid wasting time playing that game in the future. Likewise, a person might download software that constrains the amount of time available for freely surfing the Web. Of course, not all decision makers take advantage of commitment devices when offered the opportunity (Bryan, Karlan, & Nelson, 2010), and commitment devices do not always work (Laibson, 2015; Robinson, Pons, Duckworth, & Rogers, 2018).

Nevertheless, substantial empirical evidence documents the benefits of making commitment devices available. For example, in one early field experiment, providing study subjects with the opportunity to pre-commit to deadlines (compared with having no deadlines) for a series of proofreading assignment submissions with a penalty for late submissions improved performance (Ariely & Wertenbroch, 2002). Another early field experiment found savings rates can be increased by offering a commitment savings account to the customers of a bank in the Philippines. This account allowed customers to withdraw their savings only after a self-selected date or after reaching a savings goal. The 1-year savings rates of customers offered this account (which paid the same interest rate as a standard account) were 81% higher than those of customers who were offered a standard account (Ashraf, Karlan, & Yin, 2006).

Commitment devices have proven particularly valuable for improving health decisions. In one experiment, smokers hoping to quit were offered the opportunity to deposit money in a savings account, but if they failed a urine test for nicotine and cotinine after 6 months, they lost the money to charity (Giné, Karlan, & Zinman, 2010). Smokers offered the commitment account were

3 percentage points more likely to pass their urine test than smokers who were not offered access to this commitment device. Commitment devices have also been shown to increase healthy food purchases (Schwartz et al., 2014). All participants in one study were enrolled in a program that provided 25% cash-back bonuses on healthy food purchases. Customers offered the opportunity to forfeit their reimbursement if they failed to increase their healthy purchases by 5 percentage points over the next 6 months subsequently increased healthy food purchases by 3.5 percentage points during the same period. Commitment devices can also increase exercise. Employees offered an opportunity to put money on the line that they would forfeit if they did not visit the gym at least once every 2 weeks over the next 8 weeks increased their gym visits by 25% (Royer, Stehr, & Sydnor, 2015).

Temptation bundling. Temptation-bundling devices, a twist on standard commitment devices, give people an opportunity to couple indulgent activities, such as watching mindless television shows or eating unhealthy food, with self-controlled behaviors such as exercising or catching up on overdue manuscript reviews (Milkman, Minson, & Volpp, 2014). By committing to enjoy a given instantly gratifying activity *only* when simultaneously engaging in a behavior requiring self-control, temptation bundling devices can help people muster the resolve needed to make healthier decisions. In theory, the best temptation bundles allow people to benefit from complementarities between simultaneous experiences (e.g., exercising is more fun when watching an engaging television show because time flies on the treadmill and no guilt is associated with binge-watching lowbrow TV).

Given that only one field study has directly tested the benefits of temptation bundling, more work is needed. However, this study showed substantial initial increases in self-controlled decisions from allowing people to enjoy tempting audio novels only when exercising (Milkman et al., 2014). In Week 1 of the intervention, participants in the treatment group exercised 55% more than those in the control group. These benefits lasted for several weeks but ended when the gym closed over Thanksgiving.

Situation modification. The flip side of bundling complementary and not-so-bad temptations with desired behaviors is removing deleterious temptations from view. In two field studies, high school and college students, respectively, were introduced to the idea of “removing temptations from sight rather than trying to resist them directly” (Duckworth, White, Matteucci, Shearer, & Gross, 2016, p. 335). Compared with students randomly assigned to use “willpower” or given no strategy at all, treated

students in both studies reported better study quality and also more effective achievement of their study goals in the following week ($d_s = .56$ to $.63$; Duckworth, White, et al., 2016). As hypothesized, diminished feelings of temptation partially explained the benefits of situation modification. While promising, these studies relied on self-reported measures of short-term goal accomplishment, which suggests the need for longitudinal studies with objectively verified outcomes and longer follow-up periods.

Behavior therapy. The tradition of behavior therapy for addiction and other impulse control problems dates to the 1950s and 1960s (O'Donohue, Henderson, Hayes, Fisher, & Hayes, 2001; Thoma, Pilecki, & McKay, 2015). Behavior therapy takes its name and inspiration from behaviorism, a century-old movement in psychology defined by its assumption that the behavior of animals, including humans, could be explained entirely without reference to thoughts, feelings, or any other cognitive phenomena (Watson, 1913). (In contrast, psychodynamic therapy, which originated with Freud, 1917/1977, assumes behavior to be the consequence of unobservable mental events—e.g., unconscious impulses.) Accordingly, behavior therapists work with their clients to identify objective stimuli in the environment that trigger or reinforce behaviors. For instance, a smoker trying to quit might relapse when triggered by friends smoking at a party. The behavior of smoking might then be reinforced by nicotine-induced feelings of pleasure as well as social acceptance.

Behavioral approaches to treating substance abuse include recommending the avoidance of situations that contain triggers and reinforcers. Likewise, extrinsic rewards (e.g., praise from loved ones, payments for “clean” blood or urine tests) can be used to reinforce healthy behavior. Often, behavior therapy begins with what is called a *functional analysis of contingencies* between the environment and behavior (Magidson, Young, & Lejuez, 2014). The therapist helps the client specify a problematic behavior (e.g., excessive drinking) as well as a healthier alternative behavior (e.g., jogging) and their associated triggers, rewards, and negative consequences. Specific techniques, including relapse prevention (Marlatt & Gordon, 1985) and motivational interviewing (W. R. Miller & Rollnick, 2002), can increase the odds of transitioning to alternative behaviors that meet the same functional needs previously served by unhealthy behaviors. Between sessions, the client puts these plans into action. For instance, an alcoholic trying to regulate his or her mood might work with a therapist to develop a jogging routine—including plans to avoid or create triggers and consequences appropriately.

As noted below, in cognitive-behavioral therapy (CBT), behavior-therapy techniques are almost always intertwined with cognitive-therapy techniques (Thoma

et al., 2015). This structural confounding is deliberate insofar as these techniques are likely complementary (Mahoney & Thoresen, 1972; Meichenbaum, 1977). Several studies support the independent benefits of “pure” behavior therapy (e.g., K. M. Carroll & Onken, 2005; Cottraux et al., 2001; Ekers, Richards, & Gilbody, 2008), and the fundamental premise that behavior is influenced by past and present cost and benefit contingencies is widely accepted (Roediger, 2004). There has been renewed interest in the potential of teaching behavior-therapy techniques outside the clinical setting (Kazdin, 2012; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014; Rachlin, Green, Vanderveldt, & Fisher, 2018).

Cognitive interventions that are typically self-deployed. Self-deployed cognitive interventions enable people to change the way they think, making long-term choices more appealing or actionable and short-term temptations less so. Rather than manipulate the objective physical or social elements of a situation, these interventions target mental representations.

Goal setting. Goals are mental representations of what people hope to accomplish. Across dozens of field studies, setting specific, difficult goals has been shown to help people achieve higher performance than exhortations to “do your best” (Locke & Latham, 2002). A recent meta-analysis of the effect of goal setting on behavior change estimated a benefit (d) of 0.34, with heightened efficacy for goals that are challenging, set publicly, and made with a group (as opposed to individual goals; Epton, Currie, & Armitage, 2017). Goal setting is effective in part because goals direct attention and energy toward a desired behavior. In addition, failing to achieve the reference point set by the goal feels like a loss, and losses loom larger than gains, creating enhanced motivation to persist (Heath, Larrick, & Wu, 1999).

It can be helpful to break distal goals into smaller, more proximal subgoals (Carver & Scheier, 1990). Accomplishing these subgoals leads to small wins, which foster a sense of progress and boost self-efficacy (Amabile & Kramer, 2011; Nunes & Drèze, 2006; Stock & Cervone, 1990). Setting intermediate deadlines with tangible financial consequences may also reduce procrastination (Ariely & Wertenbroch, 2002). Attention to accomplishments is especially helpful in bolstering the motivation of less committed or less experienced individuals (Fishbach, Koo, & Finkelstein, 2014), if the focus remains on achieving a superordinate goal rather than on attaining subgoals per se (Fishbach, Dhar, & Zhang, 2006).

In one illustrative study, some elementary school children were instructed to complete one math module

during each of seven math training sessions (subgoal condition); others were instructed to complete seven math modules by the end of seven sessions (distal goal). The former group outperformed the latter group by about 40% on a posttest of math skill (Bandura & Schunk, 1981). However, it is not clear whether this was a goal effect or a deadline effect. Setting intermediate deadlines also raises productivity because it reduces procrastination (Ariely & Wertenbroch, 2002).

Directing attention to proximal subgoals is not always measurably more beneficial than directing attention to distal superordinate goals (Kirschenbaum, 1985), perhaps because setting distal goals encourages the spontaneous formulation of subgoals. For example, dieters were randomly assigned by Bandura and Simon (1977) to adopt either distal goals (weekly limits of food consumption) or proximal goals (limits for each of four time periods in a day). The majority of participants in the distal condition spontaneously adopted proximal goals, and those who did not subsequently lost no weight. In contrast, dieters who were assigned to set proximal goals reduced their food intake and lost more than a pound per week.

More recent research has focused on the benefits of a goal-commitment strategy called *mental contrasting* (MC; Oettingen, 2012). This technique entails imagining in vivid detail a positive outcome of attaining a goal and then bringing to mind a negative obstacle that presently stands in the way. A growing literature affirms the benefits of MC (Oettingen & Stephens, 2009). For example, MC was shown to increase self-reported physical activity at 7-month follow-up, $d = 0.87$ (Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013) and improved self-reported healthy eating and physical activity (η^2 s ranging from .07 to .09; Johannessen, Oettingen, & Mayer, 2012). At least two mechanisms explain the benefits of MC on goal attainment. First, the juxtaposition of a desired future with an obstacle that obstructs its realization energizes the individual to take action (Oettingen et al., 2009). Second, this juxtaposition can provoke spontaneous planning (Oettingen & Gollwitzer, 2010).

Planning. Goal commitment is necessary but not sufficient for accomplishing goals. After committing to a goal, the attainment of that goal has been shown to be a function of the specificity of plans (i.e., *when*, *where*, and *how* a person will take action; P. M. Gollwitzer, 1999; Leventhal, Singer, & Jones, 1965). A certain type of plan, called an *implementation intention*, links an anticipated cue with a desired action. Such if-then implementation intentions have been shown to create mental associations that are automatically enacted and psychologically costly to break (P. M. Gollwitzer & Sheeran, 2006; Rogers,

Milkman, John, & Norton, 2015). Implementation intentions reduce procrastination and forgetfulness and support perseverance when carrying out difficult actions (Oettingen & Gollwitzer, 2010).

Making plans has been shown to increase self-controlled choices, including exercising (Arbour & Martin Ginis, 2009; Milne, Orbell, & Sheeran, 2002), completing assignments (P. M. Gollwitzer & Brandstätter, 1997), getting a flu shot ($d = 0.09$; Milkman, Beshears, Choi, Laibson, & Madrian, 2011), and getting a colonoscopy ($d = 0.04$; Milkman, Beshears, Choi, Laibson, & Madrian, 2013). A meta-analysis of 94 independent tests found that making if-then plans increased goal attainment (average $d = 0.65$); benefits were similar across age groups, life domains, and types of obstacles (P. M. Gollwitzer & Sheeran, 2006). Although the majority of studies in this meta-analysis involved laboratory tasks, field studies have also shown benefits of planning prompts. For example, such prompts boosted flu vaccination rates by 4 percentage points when included in reminder mailings (Milkman et al., 2011) and increased voter turnout by 1 percentage point when included in get-out-the-vote phone scripts (Nickerson & Rogers, 2010).

Although there is strong evidence for the efficacy of planning prompts as an effective strategy for changing one-time behaviors, less is known about the long-term benefits of such interventions. A recent review by Hagger and Luszczynska (2014) identified only four controlled field trials of planning interventions targeting sustained behavior change in the domain of health. Three of four trials found sustained effects, but all incorporated components in addition to planning. One large longitudinal field experiment that deployed planning prompts in an attempt to promote gym attendance found null effects over the two weeks after the intervention (Carrera, Royer, Stehr, Sydnor, & Taubinsky, 2018). In contrast, implementation intentions decreased fat intake by 4 percentage points among adults asked to eat a low-fat diet for a month (Armitage, 2004). In sum, more research is needed to establish the long-term benefits of planning interventions for self-control.

Mental contrasting and implementation intentions. MC has been paired with implementation intentions (II) in recent studies. After articulating a goal, an individual mentally contrasts the imagined positive outcome (“What would be the best result of accomplishing this wish?”) with the obstacle that stands in the way (“What might prevent me from accomplishing this wish?”). Finally, the individual makes a plan (“What’s an effective way to tackle this obstacle?”). This combination (MCII) has been shown to support self-control better than either creating implementation intentions or engaging in mental contrasting alone (Adriaanse et al., 2010; Kirk, Oettingen, &

Gollwitzer, 2013). Mental contrasting increases readiness to make if-then plans and, in addition, prompts the identification of obstacles that can then be addressed with if-then plans (Oettingen & Gollwitzer, 2010).

A few longitudinal field studies have demonstrated the benefits of MCII. For example, MCII has been shown to increase self-reported physical activity at 16 weeks after intervention ($d = 0.47$; Stadler, Oettingen, & Gollwitzer, 2009) and 3 months after intervention ($d = 0.77$; Christiansen, Oettingen, Dahme, & Klinger, 2010). MCII has also been used to improve academic outcomes. Compared with classmates randomly assigned to a placebo control condition, fifth graders trained in MCII earned higher report card grades ($\eta^2 = .07$), came to school on time more reliably ($\eta^2 = .05$), and were rated by their teachers as superior in classroom conduct ($\eta^2 = .07$; Duckworth, Kirby, Gollwitzer, & Oettingen, 2013). Note, however, that after one marking period, these improvements in academic outcomes diminished to nonsignificance, suggesting the need for additional support and reinforcement.

Self-monitoring. Many self-controlled behaviors must be enacted consistently over time to yield significant benefits (Rachlin, 2004). For example, resisting dessert, studying, going for a run, or saving a few dollars for retirement all pay dividends for long-term well-being only if repeated again and again. This presents a challenge, because attention to goals can lapse. New Year's resolutions, for example, are at the top of one's mind in early January but quickly lose their urgency. Moreover, people may not be fully aware of how much their snacking, Web surfing, couch sitting, impulse shopping, and other bad habits undermine long-term goals.

Self-monitoring is the intentional and consistent observation of one's own behavior (Snyder, 1974). The potential benefits of self-monitoring are especially well-documented in the domain of weight loss. For example, one early study found that dieters who consistently monitored their food intake lost more weight than those who did not (Baker & Kirschenbaum, 1993). A more recent systematic review confirmed a consistent relationship between self-monitoring and weight loss, although this review noted that cross-sectional correlational studies are much more common than randomized clinical trials and that more studies using objective outcome measures are needed (Burke, Wang, & Sevick, 2011). With that caveat in mind, we note that self-monitoring has been shown to help alcoholics drink less ($ds > 0.5$ over 10 weeks; Hester & Delaney, 1997) and to help students improve academically ($\eta^2 = .05$ on math test performance; Schmitz & Perels, 2011; for a review, see Zimmerman & Paulsen, 1995). A recent meta-analytic review identified a benefit of self-monitoring interventions on goal attainment ($d = 0.40$); the benefits were greater

benefits if the monitoring was public ($d = 0.55$) versus private ($d = 0.19$) and if the monitoring was recorded physically ($d = 0.43$) rather than not recorded ($d = 0.29$; Harkin et al., 2016).

Psychological distancing. People are most attracted to temptations when they are available in the here and now (Rachlin, 2004). Accordingly, each of the four dimensions of psychological distance—spatial, temporal, social, and hypothetical—functionally provides mental separation from otherwise alluring temptations (Trope & Liberman, 2010). In other words, the more a temptation is *not here, not now, not for me, or not real*, the weaker its allure. Conversely, psychological distance tends to promote the pursuit of more valued goals, the benefits of which are often more abstract than the gratifications of the present moment (Fujita & Carnevale, 2012).

Laboratory research has demonstrated the capacity of both children and adults to construe their situations in more psychologically distanced terms and the concomitant benefits for self-control (Kross & Ayduk, 2017; Pronin, Olivola, & Kennedy, 2008; Trope & Liberman, 2010; White & Carlson, 2016). For example, in the preschool delay-of-gratification paradigm, in which children are rewarded if they can resist the temptation to eat a marshmallow sitting in front of them, children encouraged to think of marshmallows as “round and puffy like clouds” can wait more than twice as long as children encouraged to think of their “chewy sweet taste” (Mischel & Rodriguez, 1993, p. 115). Likewise, both children and adults who process emotionally upsetting events in the third person (using their name or a third-person pronoun) rather than the first person (“I”) demonstrate superior emotion regulation (Kross et al., 2014; Kross et al., 2017; Nook, Schleider, & Somerville, 2017; Streamer, Seery, Kondrak, Lamarche, & Saltsman, 2016; White, Kross, & Duckworth, 2015). Psychological distancing has also been posited as an active ingredient of both mindfulness and cognitive therapy (Kross & Ayduk, 2017; also see Beck, 1970; Beck, Rush, Shaw, & Emery, 1979; Overholser, 1995; Shepherd, Coifman, Matt, & Fresco, 2016).

Field research on psychological distancing is scant, and this is even more true for longitudinal intervention studies with objectively measured outcomes. One exception is a recent intervention study of married couples, all of whom were encouraged to write about disagreements for 7 min at three different points in their second year of marriage (Finkel, Slotter, Luchies, Walton, & Gross, 2013). Prompted to “think about this disagreement with your partner from the perspective of a neutral third party who wants the best for all involved” for just 21 min in a year, couples maintained consistent levels of self-reported marital satisfaction over the next year. In contrast, a control group of

couples experienced typical declines in self-reported marital satisfaction during the same period. More recently, Ranney, Bruehlman-Senecal, and Ayduk (2016) developed an online training for temporal distancing (taking the perspective of one's future self) and self-distancing (taking the perspective of a third-person observer). Compared with no training, either type of training led to greater self-reported well-being ($\eta^2 = .08$) and lower self-reported distress ($\eta^2 = .04$) 12 days later. Although these benefits for self-control over emotion are promising, more research is needed to establish the generalizable benefits and boundary conditions of psychological distancing interventions.

Mindfulness. Mindfulness refers to nonjudgmental awareness of present experience (Bishop et al., 2004). Although rooted in a 2,500-year-old Buddhist tradition of scholarship and practice, mindfulness is now a popular secular practice (Analayo, 2003; Creswell, 2017). For example, the mindfulness-based stress reduction program created by Kabat-Zinn (1982, 1990) includes 10 weeks of weekly group classes with a trained teacher and daily homework. At least three mechanisms of mindfulness may explain its benefits for self-control: reduced craving (Papies, Barsalou, & Custers, 2011; Westbrook et al., 2012; Witkiewitz, Bowen, Douglas, & Hsu, 2013), reduced mind wandering (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013), and the decoupling of cravings from behavior (Brewer, Elwafi, & Davis, 2013).

A meta-analysis of randomized, placebo-controlled trials indicates that meditation training can reduce stress-related mental-health conditions, including anxiety ($d = 0.38$ at 8 weeks) and depression ($d = 0.30$ at 8 weeks; Goyal et al., 2014). Evidence from a smaller number of random-assignment field studies suggests that mindfulness may ameliorate outcomes associated with self-control (Creswell, 2017; Galla, Kaiser-Greenland, & Black, 2016), including addiction (Bowen et al., 2014), blood glucose stabilization (difference in fasting glucose of 2.31 mg/dl, Mason et al., 2016), and emotion regulation and aggression (Schonert-Reichl et al., 2015). A recent meta-analysis of random-assignment field trials found that mindfulness training reduces impulsive eating ($d = -1.13$) and increases physical activity ($d = 0.42$; Ruffault et al., 2017). Note that mindfulness interventions did not change body mass index (BMI) between 3 days and 3 months postintervention, but moderation analyses indicated that longer follow-up periods were significantly associated with greater changes in BMI. In general, more research is needed to establish the long-term benefits of practicing mindfulness.

Cognitive therapy. More than 50 years ago, Beck (1970) and Ellis (1962) pioneered cognitive therapy; these psychotherapists identified distorted thinking as the underlying

pathology in an array of psychological problems. In contrast to behavior therapy, cognitive therapy is particularly concerned with mental states, including subjective beliefs about the self and the world, that are presumed to give rise to behavior. Both Beck and Ellis trained as psychodynamic analysts; each ultimately rejected the Freudian approach of frequent, unlimited, and unstructured sessions aimed at uncovering the contents of the client's unconscious mind. Instead, both Beck and Ellis aimed to help clients identify and correct maladaptive and inaccurate thoughts in a more direct, time-limited, and structured way.

Typically, cognitive therapy comprises weekly sessions with a therapist and, in addition, therapist-assigned "homework" completed between sessions. With therapist serving as teacher and coach, clients are trained first to notice negative automatic thoughts (e.g., "I can't stand this craving for a cigarette! I must smoke!"), then to interrogate thoughts for accuracy and realism ("Is it really true that I can't endure this craving? What if my child's life depended on my not smoking now? Is it more accurate to say this craving is very painful?"), and finally to engage in the development of more realistic and accurate thoughts ("I crave a cigarette, and it will be difficult, but not impossible, to resist smoking now").

As noted above, cognitive therapy is almost always discussed in the context of CBT, which combines cognitive therapy and behavior therapy (Thoma et al., 2015). Today, CBT is one of the most influential and well-studied approaches to psychotherapy, and its efficacy has been confirmed in hundreds of separate clinical trials and dozens of meta-analyses (Beck & Dozois, 2011; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Of particular relevance to self-control are CBT's small-to medium-sized effects ($ds = 0.2-0.5$) for addiction and substance use disorder and medium to large effects ($ds = 0.5-0.8$) for anger and aggression (Hofmann et al., 2012) and for gambling (Hedges's $g = .58$ at 6-month follow-up; Gooding & Tarrier, 2009). Although the melding of these approaches was intentional rather than accidental (Meichenbaum, 1977) and the efficacy of the cognitive components versus the behavioral components of CBT are not easily parsed in most clinical trials, within-session cognitive changes have been shown to be related to short-term symptom relief as well as positive long-term outcomes (see Lorenzo-Luaces, German, & DeRubeis, 2015).

Other-deployed interventions

Cognitive interventions that are typically other-deployed. We now turn to cognitive interventions that are typically initiated by outsiders (e.g., a policymaker or employer). Like the interventions in the section above, other-deployed cognitive interventions also change how

an individual thinks—but are typically difficult to self-initiate. Why? One reason is that, as with the placebo effect, conscious awareness that an intervention is taking place may undermine its effect. In addition, some of the approaches described in this section are logistically difficult for people to carry out on their own. Finally, some interventions need to be initiated externally because the targets of the intervention would not choose to initiate the intervention on their own (e.g., because they do not know it could be done or are overwhelmed by other day-to-day priorities).

Descriptive social norms. When people learn that the majority of their peers are engaging in a certain behavior, they are motivated to shift their behavior in the direction of that norm for at least two reasons. First, they assume that information is conveyed by the crowd: Maybe their peers know something they do not? Second, it is socially uncomfortable, and even ostracizing, to deviate from the crowd (Asch, 1956). More generally, a meta-analysis identified a medium to large association ($r = .44$) between descriptive social norms and an individual's behavioral intentions, particularly for health-risk behaviors such as smoking and drinking (Rivis & Sheeran, 2003).

Field experiments have shown that carefully designed cues can change perceptions of the prevalence of peer behavior. In one study, hotel patrons were 8 percentage points more willing to reuse their towels when they were told that 75% of other patrons had done so (Goldstein, Cialdini, & Griskevicius, 2008). In a massive field study run by the company OPower, being informed about the energy consumption of one's neighbors in similar homes was shown to promote energy conservation, leading to reliable 2% year-over-year reductions in energy usage (Allcott, 2011). Moreover, these reductions in energy use persist over multiple years, and some substantial portion may even be permanent, particularly because of physical capital changes (e.g., installing energy-efficient appliances; Allcott & Rogers, 2014; Brandon et al., 2017).

Marketing campaigns based on descriptive social norms are common; nearly half of surveyed universities in Wechsler et al. (2003) had adopted some form of this strategy for reducing binge drinking. However, descriptive social norms can backfire if upward social comparisons discourage, rather than heighten, motivation to change. For example, in one field experiment, information about the high rates at which peer employees were contributing to their 401(k) retirement plans actually decreased individual savings rates (Beshears, Choi, Laibson, Madrian, & Milkman, 2015) by creating discouragement among low earners who perhaps felt unable to “keep up with the Joneses.” In an experiment with students in an online course that used peer

assessment, exposure to exemplary peer performances increased the likelihood that students would subsequently drop out of the course; students apparently felt the kind of excellence they had observed would be unobtainable for them (Rogers & Feller, 2016). Social norm interventions can also backfire for “above-average” individuals in the absence of *injunctive* social norms conveying information about desirable behavior. For instance, in a field study of household energy conservation, receiving information about average neighborhood usage actually increased consumption among households who were previously consuming at a low rate (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Note that the addition of an injunctive message congratulating them on low usage levels eliminated this effect.

Social labeling. An identity is a way of defining “who I am,” and social identities, in particular, are categorical affiliations with a social group (“people like me”; Oyserman, 2007). These identities come with beliefs (“what people like me believe”) and behavioral norms (“how people like me behave”; Akerlof & Kranton, 2000). Any one individual is in possession of multiple identities. One can identify, for example, as a woman, as an Asian American, as a leader, as a liberal, as an exerciser, as a mother, and so on. However, only a subset of these identities may be active at a given moment or in a particular context. For instance, at home on the weekend, an individual may identify as a mother but at work during the week may identify as a leader. Of particular relevance to self-control, scripted identity-congruent behaviors tend to be carried out without complete consideration of expected costs and benefits (March, 1994), which by definition locally favor more impulsive rather than more self-controlled choices. Thus, social labeling—prompting a particular social identity—can encourage self-control by circumventing more deliberate cost-benefit calculations and instead encouraging identity-congruent behavior.

In one early field study, children who were told that they were neat and tidy people were less likely to litter and more likely to clean up than children who were told that they should be neat and tidy or children in a no-treatment control (R. L. Miller, Brickman, & Bolen, 1975). In a more recent field study conducted in college dormitories, posted flyers promoted responsible drinking (Berger & Rand, 2008). In the social labeling condition, flyers linked alcohol consumption to a distinct social group—graduate students—whereas in the control condition, flyers focused solely on the negative health effects of alcohol. Two weeks later, freshmen exposed to the social labeling flyers reported consuming 50% less alcohol than freshmen in the control condition. Social labeling may be particularly effective

when decision makers are mentally distracted: In one study, only when under cognitive load (i.e., asked to keep a six-digit number in memory) did adults labeled as ecologically conscious consumers make more environmentally friendly but more expensive shopping choices than adults simply urged to be more ecologically conscious or adults in a no-treatment control group (Cornelissen, Dewitte, Warlop, & Yzerbyt, 2007).

Making the future self relatable. One source of self-control failure is an inability to empathize with a future self (Bartels & Rips, 2010). Interventions that make the future self more relatable have shown some promise as a means of increasing self-control. For instance, in a series of laboratory studies of savings decisions, exposing participants to age-progressed renderings of their future selves led participants to allocate up to twice as much money to hypothetical retirement savings accounts (Hershfield et al., 2011). In other laboratory studies, to make participants' future selves feel closer, researchers asked them to judge how easily they could generate 2 (rather than 10) reasons why their identity would remain stable over 12 months. Generating two reasons is easy, giving participants in this condition the impression that they are relatively close to their future selves (compared with participants in the 10-reason arm of the study). This led to more patient purchasing decisions and lower measured discount rates (Bartels & Urminsky, 2011). Likewise, participants in a laboratory study who wrote letters to their future selves (an intervention designed to increase connectedness) were less inclined toward hypothetical delinquent behaviors (e.g., buying desirable stolen goods; van Gelder, Hershfield, & Nordgren, 2013). Viewing age-progressed renderings of their future selves (instead of seeing a rendering of their current selves) also reduced the rate at which participants in a laboratory study cheated on a quiz to earn additional money (van Gelder et al., 2013).

Only a few field experiments have explored the benefits of connecting to future selves. In one small field experiment, high school students who exchanged text messages for a week with age-progressed avatars of their future selves reported marginally less engagement in impulsive, delinquent behaviors, including skipping school, drinking, and smoking ($\eta^2 = .04$; van Gelder, Luciano, Kranenborg, & Hershfield, 2015). Another study of high school students showed that priming overlap between current and adult identities increased report card grades 3 months later ($d = 0.31$) compared with priming students to imagine these identities as distinct (Study 3 in Nurra & Oyserman, 2018). However, 6 months later, the benefits of this brief manipulation were not evident, which suggests the need for boosters over time. Relatedly, a more in-depth intervention

comprising twice-weekly workshops over a 7-week period to increase the overlap between students' current social identities and their future academic identities improved academic outcomes over a 2-year follow-up, including small to medium increases in GPA, 2.25 more days in school per semester, and an increase in time spent on homework of nearly an hour per week (Oyserman, Bybee, & Terry, 2006).

Joint evaluation. Laboratory studies suggest the potential for increasing self-controlled choices by presenting options for evaluation jointly (e.g., the options are placed side by side on a screen, or two or more job candidates are considered simultaneously) rather than one at a time. Joint evaluation encourages decision makers to thoughtfully evaluate the costs and benefits of each option in a deliberative manner, whereas separate evaluation (i.e., considering options one at a time in isolation) promotes more emotional, instinctive, and impulsive choices (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998; Hsee, Zhang, Wang, & Zhang, 2013).

Some research (though not all) suggests that gender discrimination in the workplace may be an impulsive act: People realize they should not discriminate, but discrimination remains a natural, innate response (Bertrand, Chugh, & Mullainathan, 2005; Greenwald, McGhee, & Schwartz, 1998). A recent laboratory study showed less gender bias in hiring other study participants to solve math problems when those other participants were evaluated jointly rather than separately (Bohnet, van Geen, & Bazerman, 2016). Likewise, Magen, Dweck, and Gross (2008) showed that when the "hidden zero" (e.g., "\$5 now or \$6.25 in 26 days") of choosing short-term gratification is made explicit (e.g., "\$5 right now and \$0 in 26 days vs. \$6.25 in 26 days and \$0 right now"), individuals are more likely to choose larger, later rewards. This research suggests that when policymakers have an opportunity to present a set of choices jointly (e.g., going to the gym vs. playing video games), such joint decision making may promote more self-controlled and rational decisions.

Because most research on joint versus separate decision making has been conducted in laboratory settings, more work is needed to measure how effective joint evaluation interventions can be in policy-relevant settings.

Fresh-start framing. Both laboratory and field research suggests that there are predictable moments when people are especially motivated to make self-controlled decisions (Dai et al., 2014; Dai, Milkman, & Riis, 2015). One class of such moments arises at the beginning of new cycles (e.g., the start of a new week or year, following a birthday or holiday). These so-called fresh-start moments

facilitate the attainment of long-term goals because they help people feel disconnected from their past failures, which elevates their current self-image and confidence (Dai, Milkman, & Riis, 2015).

Correlational evidence shows that self-controlled acts (e.g., searches for the term “diet” on Google, gym visits, and the creation of goals on one popular goal-setting Web site) increase naturally on fresh-start dates (Dai et al., 2014). Interventions can be designed to explicitly leverage fresh starts as a means of promoting self-controlled decisions. For instance, noting that an otherwise unremarkable date corresponds to the start of a new cycle (e.g., the first day of spring, the start of your university’s summer break) increases the rate at which laboratory study participants choose that date to receive a reminder about pursuing their goals (Dai, Milkman, & Riis, 2015). Likewise, participants in a field experiment who were invited to start saving for retirement in the future were more interested in signing up to save when the future savings opportunity was labeled as following their birthday, saving 30% more than others over a 9-month follow-up period as a result (Beshears, Dai, Milkman, & Benartzi, 2016).² By emphasizing fresh starts on the calendar as opportunities to make self-controlled decisions, a small but growing body of evidence suggests it may be possible to encourage more self-controlled choices.

Licensing prevention. Licensing (also known as self-licensing) refers to making more indulgent choices in the present (e.g., a slice of chocolate cake now) as a consequence of anticipating making self-controlled choices in the future (e.g., a salad tomorrow) or recalling making self-controlled choices in the past (e.g., passing on French fries yesterday; De Witt Huberts, Evers, & De Ridder, 2014). Thinking about virtuous decisions bolsters self-concept, thereby buffering against negative self-attributions associated with more impulsive choices (Khan & Dhar, 2006; Prinsen, Evers, Wijngaards, van Vliet, & de Ridder, 2018).

Most research on licensing has been conducted in the laboratory. For example, in one early experiment, participants asked to imagine volunteering in the past made more indulgent choices (e.g., designer jeans versus a vacuum cleaner) in the present (Khan & Dhar, 2006). Likewise, when study participants were led to believe they had exerted more effort in an initial task, they subsequently consumed more junk food (De Witt Huberts, Evers, & De Ridder, 2012). In another study, lowbrow, indulgent movies were favored over highbrow films when study participants believed they were making the first in a series of movie-rental decisions and thus anticipated a future opportunity to watch the highbrow movies (Khan & Dhar, 2007).

Evidence for self-licensing suggests that policymakers could potentially facilitate more self-controlled decisions by highlighting past or anticipated future indulgences at the moment of choice. However, we are not aware of field research that has explored the efficacy of this technique. Moreover, the potential ill effects of such interventions (e.g., precipitating overindulgence by heightening negative self-attributions) remain unknown.

Situational interventions that are typically other-deployed. Finally, we turn to interventions that rely on policymakers to create incentives, penalties, affordances, or constraints that reduce failures of self-control. Because these strategies are deployed by an outside party, they do not necessarily require decision makers to be sophisticated (i.e., aware of their self-control problems). Indeed, rather than improve the self-control capacity of decision makers, these strategies change the availability of options and/or their associated costs and benefits.

Hard paternalism. Many public policies are paternalistic insofar as they aim (regardless of whether they meet the mark) to help people avoid self-defeating behavior. For example, Social Security is paternalistic in the sense that it tilts the after-tax income profile in a way that advantages consumption during retirement relative to consumption during working life. If people have trouble saving enough for their own good, Social Security is a (partial) corrective (e.g., Feldstein, 1985).

Behavioral economists have emphasized the distinction between hard paternalism and soft paternalism (Thaler & Sunstein, 2003). Hard paternalism encompasses bans, licensing, penalties, taxes, incentives, and fees—policies that constrain individual autonomy by changing the economic calculus of a decision. Soft paternalism, in contrast, comprises (benevolent) attempts to change “behavior in a predictable way without forbidding any options or significantly changing their economic incentives. In contrast to hard paternalistic policies, interventions classified as soft paternalism preserve autonomy insofar as they are both “easy and cheap to avoid” (Thaler & Sunstein, 2009, p. 6). Before turning our attention to a variety of strategies that can be considered forms of soft paternalism, we consider circumstances that recommend hard-paternalistic policies.

It is widely accepted that, in some cases, hard paternalism is socially optimal. For example, taxing or even banning (private) physiologically addictive activities, such as cigarette smoking, may be socially optimal if people have self-control problems such as present bias (e.g., Gruber & Köszegi, 2001; see also O’Donoghue & Rabin, 2006). In the presence of externalities (e.g., the

deleterious effects of second-hand cigarette smoke on innocent bystanders), it may be socially optimal to penalize or even ban certain behaviors. However, even in the case of pure *internalities*—actions that are only self-defeating and are *not* detrimental to other people—there may be justification for strictly paternalistic policies. For example, there is evidence that cigarette taxes actually raise the subjective well-being of smokers by encouraging them to reduce consumption or quit all together (Gruber & Mullainathan, 2006).

Hard paternalism has been deployed in many domains. Examples include forced savings (e.g., Social Security—see Beshears et al., 2016; Feldstein, 1985), bans on addictive substances (e.g., heroin and other opioids—see Carter & Hall, 2007), bans on cell-phone use in schools (Beland & Murphy, 2016), incentives for energy conservation (Arimura, Li, Newell, & Palmer, 2012; Ito, 2015), speed cameras (Jones, Sauerzapf, & Haynes, 2008; Tang, 2017), and safety laws (e.g., seat-belt laws—see Hausman & Welch, 2010). Nevertheless, hard paternalism is controversial because it denies people liberty or agency (Thaler & Sunstein, 2008). On the other hand, Bubb and Pildes (2014) have argued that hard paternalism is the logical policy implication of many of the decision-making biases documented in behavioral economics.

Microenvironments. The past decade has seen extraordinary interest in deliberate modification of decision makers' microenvironments (Marteau, Hollands, & Kelly, 2015). Whereas macroenvironments describe large-scale forces such as city design or legal infrastructure, microenvironments refer to physical aspects of people's immediate surroundings. In theory, it is possible to alter the properties or placement of objects in the microenvironment to encourage self-controlled behavior in any domain, but a review of the published literature by Hollands et al. (2013) found that 70% of empirical and review articles have targeted healthier eating, 19% have targeted increased physical activity, and 11% have targeted decreased tobacco and alcohol use.

Typically, microenvironment interventions are carried out unobtrusively (i.e., without public announcement). For example, corner stores in low-income communities that were randomly selected to place fruit and vegetables near the front increased sales of produce to customers receiving federal welfare support (Thorndike, Bright, Dimond, Fishman, & Levy, 2017). Other interventions have compared treatment with a preceding no-treatment baseline. For example, Thorndike, Sonnenberg, Riis, Barraclough, and Levy (2012) completed a two-phase intervention in a hospital cafeteria: Compared with baseline, "traffic light labeling" (red = unhealthy, yellow = less healthy, green = healthy) of items in Phase

1 increased green purchases by 4.5% and decreased red purchases by 9.2%. In Phase 2, rearranging water bottles to be located at eye level in the refrigerated section, as well as in five baskets near food stations, increased bottled-water sales by 25.8% and decreased regular soda purchases by 5.9%. Effects were sustained for all categories of food and beverages over a 2-year follow-up period (Thorndike, Riis, Sonnenberg, & Levy, 2014).

Since the pioneering studies showing that convenience can change food choices (e.g., Wisdom, Downs, & Loewenstein, 2010), there has been a virtual explosion of microenvironment experiments. Recently, meta-analyses are beginning to yield more concise estimates of effect sizes as well as insight into moderators and boundary conditions. For example, Holden, Zlatevska, and Dubelaar (2016) conclude from 56 laboratory and field studies that smaller plates reduce consumption when food is either self-served ($d = 0.70$) or reduced in proportion to plate size and served by a someone else ($d = 0.48$) but not when same-size portions are served on smaller plates ($d = 0.03$). Likewise, manipulating plate size is more effective when diners are unaware of the manipulation ($d = 0.76$) than when they are aware ($d = 0.31$). However, in most cases, systematic reviews of microenvironment interventions reveal a nascent literature: Most published studies suffer serious design limitations, including underpowered samples, selective attrition, confounds, and questionable analytic plans (Nørnberg, Houlby, Skov, & Pérez-Cueto, 2016; Skov, Lourenco, Hansen, Mikkelsen, & Schofield, 2013).

Defaults. In many domains, passivity and procrastination prevent people from making good choices. Samuelson and Zeckhauser (1988) call this the *status quo bias*. When inertia can be a barrier to making optimal decisions, the default option (i.e., the choice that a decision maker receives in the absence of making an active choice) takes on particular importance. Switching the default option to optimize outcomes can make an enormous difference in societal outcomes and is arguably the most widely known public-policy innovation to emerge from the field of behavioral economics (E. J. Johnson & Goldstein, 2003; Madrian & Shea, 2001; Thaler & Sunstein, 2008). Crucially, like other forms of soft paternalism, default interventions preserve the autonomy of individual decision makers, who at no material cost can choose an alternative option if they dislike the default.

How do defaults work? Status quo bias is generated by a plurality of complementary mechanisms. Defaults are often perceived as the recommended choice (McKenzie, Liersch, & Finkelstein, 2006). In addition, moving away from the default feels like a loss relative to an established reference point, making defaults

particularly sticky because losses loom larger than gains (E. J. Johnson & Goldstein, 2003). Decision makers may be content to choose a default option without much deliberation because they optimistically believe that in the future, they will have time to revisit their choice and change it as needed. Finally, decision makers may intend to move away from the default, but procrastinate in doing so, thereby making the default sticky (e.g., because of present bias—see G. D. Carroll, Choi, Laibson, Madrian, & Metrick, 2009, and Ericson, 2017).

In a seminal study of the power of defaults, Madrian and Shea (2001) showed that for new employees with 3 to 15 months of tenure, autoenrollment into a 401(k) savings plan raised participation from 37% to 86% of the workforce. This result highlighting the power of defaults has been replicated in numerous other studies (e.g., Beshears, Choi, Laibson, & Madrian, 2008). For instance, default policies have increased organ donation, a personal decision that benefits the population and is widely endorsed in public opinion polls. As E. J. Johnson and Goldstein (2003) found in an international data set, defaults produce a 16.3% increase in organ donors, whereas Gimbel, Strosberg, Lehrman, Gefenas, and Taft (2003), using a broader set of countries, estimated a 56.5% increase. Using a 10-year panel including data from 22 countries, Abadie and Gay (2006) concluded that defaults increase organ donation rates by 25% to 30%, even when controlling for other influences.

Active choice. Unlike defaults, active-choice interventions require people to make an affirmative choice among a set of options, indicating explicitly which one they prefer. In other words, individuals cannot opt out of making a decision and are therefore forced to think, at least briefly, about the option they prefer, which can lead to more reasoned selections (rather than choosing the path of least resistance—i.e., passively adopting a default). Active-choice interventions are particularly apt when there is no one-size-fits-all, socially optimal default or when defaulting decision makers into a particular option is unethical. Active choice may also be ideal when the decision maker must carry out some kind of effortful follow-up action (e.g., actually getting to the clinic for the flu shot one has signed up for). Why? One reason is that actively making a choice, as opposed to passively being opted into a choice, enhances postdecisional goal commitment (Cioffi & Garner, 1996). Of course, one limitation of active-choice interventions is that they will produce a socially efficient outcome only if the decision maker chooses well, which may require knowledge, self-awareness, or self-regulation that the decision maker lacks to begin with.

G. D. Carroll and colleagues (2009) found that an active-choice 401(k) enrollment system raised the

enrollment rate by 28 percentage points compared with when employees were hired under an opt-in enrollment system. Enhancing active choice by highlighting the advantages of one option and/or the limitations of others can be even more effective than offering decision makers a neutral forced choice, a justifiable tactic when policymakers are confident that one option is generally superior to others (Keller, Harlam, Loewenstein, & Volpp, 2011). In one field study, enrollment in an automatic prescription-drug-refill program was 32% in an enhanced active-choice condition (which highlighted that not choosing the automatic-refill option would necessitate filling the prescription themselves each time) compared with only 16% when enrolling in the automatic refill program required opting in (Keller et al., 2011). Beshears et al. (2016) found that an (unenhanced) active-choice enrollment system produces an almost even split between adoption of home delivery of medication for chronic conditions and pharmacy pick-up of such medication (among those making an active choice). They report that when pharmacy pick-up is the default delivery channel for such medication, only 6% of eligible patients opt into home delivery.

Choosing in advance. Another strategy that encourages more self-controlled decisions is to prompt decision makers to select a choice well before it will take effect. Because people are more patient when choosing for the future rather than choosing for immediate consumption (Laibson, 1997; Loewenstein & Prelec, 1992; Prelec, 2004), this strategy encourages more self-controlled decisions.

Laboratory research has shown that self-controlled decisions are more typical when study participants choose in advance rather than immediately before a choice will take effect (Read, Loewenstein, & Kalyanaraman, 1999; Read & van Leeuwen, 1998; Rogers & Bazerman, 2008). Field research has corroborated these findings. One recent field experiment, for example, found that when employees were required to order lunch at their corporate cafeteria several hours before mealtime, their choices were approximately 5% less caloric (VanEpps, Downs, & Loewenstein, 2016a). Likewise, when a customer places an online grocery order for more delayed delivery, there is also a tendency to purchase a healthier basket of groceries (Milkman et al., 2010). And movies rented online for future mail delivery reflect more high-brow tastes compared with what the very same renters elect to watch and return first when making consumption choices in the heat of the moment (Milkman et al., 2009).

This *choosing-in-advance* technique has also been shown to promote more self-controlled choices when it comes to savings and charitable giving. One study of a program called “Save More Tomorrow” showed that inviting people to begin saving for retirement in the

future (specifically, following their next raise) can boost savings rates significantly more than simply encouraging retirement savings now—from 8.8% of salary to 13.6% (Thaler & Benartzi, 2004). Likewise, a program called “Give More Tomorrow” showed that allowing employees to begin making contributions to charity at a 2-month time lag increased donations by 11% and 32% in two separate field studies (Breman, 2011).

Planned interruptions. Building interruptions into choice environments can prevent mindless overindulgence (e.g., eating a pint of ice cream before you realize what you’ve done) and instead force more deliberate decision making. For example, laboratory experiments have shown that partitions can slow the consumption of cookies or chocolates and reduce gambling (Cheema & Soman, 2008). In a field experiment in rural India, households invited to set aside a portion of their wages using two envelopes each week, rather than one envelope, increased savings rates over 14 weeks by 70% (Soman & Cheema, 2011). Note, however, that drawing attention to decision making can backfire: In some cases, dieters eat as much, if not more, from small packages as from large ones (Scott, Nowlis, Mandel, & Morales, 2008).

Just as planned interruptions can boost self-controlled decisions, scheduling time for rest may reduce self-control failure by preventing fatigue (Vohs et al., 2008). In one field study of hospital caregivers, researchers found that using hand sanitizer on entering and exiting a patient’s room declined precipitously (by a regression-estimated 8.7 percentage points, on average) over the course of a single work-shift and that this decline was sharper during busier shifts (Dai, Milkman, Hofmann, & Staats, 2015). The fact that hand sanitizing rebounded at the start of each new shift is consistent with the idea that breaks can promote self-controlled choices. A study of Israeli parole-board decisions found that the percentage of favorable rulings decreased from approximately 65% to nearly 0% within one session but rebounded to about 65% after a break (Danziger, Levav, & Avnaim-Pesso, 2011). Although provocative, these observational studies leave open the possibility of unobserved confounds as explanations for changes in decision making. For example, Glöckner (2016) has pointed out, in the case of Israeli parole board decisions, that cases are unlikely to be randomly distributed across a session, and because favorable rulings take longer than unfavorable rulings, judges may schedule favorable cases earlier in sessions.

Conclusion

In this article, we have discussed an array of empirically supported strategies for reducing failures of self-control. We hope that this review, with its emphasis on

field-tested interventions, will prove a useful orientation for policymakers. As an organizing principle, we have chosen to ignore the boundaries of theoretical traditions. Instead, each of the four categories of strategies in Figure 2 include contributions from subfields in both psychological science and economics. This interdisciplinary classification suggests a sort of “convergent evolution” of ideas. For example, psychological distancing, mindfulness, and cognitive therapy all enable individuals to change their mental representations in adaptive ways. Likewise, both commitment devices and behavior therapy encourage individuals to change their environment in ways that reduce the availability of unhealthy temptations. See Table 1 for examples of each of the strategies described in this review, applied for illustrative purposes to the public-health challenge of healthy eating.

Our classification also makes salient the trade-offs inherent in different policy approaches. For example, situational strategies may be ideal for physical temptations (e.g., junk food) that can be avoided, hidden, or made inconvenient, particularly when such situation modification is costly to reverse (e.g., reversal requires returning to the grocery store to purchase more of the snacks originally bought in packaging that included only a single serving). However, when temptations are internal (e.g., anger, daydreaming), cognitive strategies may be more relevant. Of course, a downside of cognitive strategies, particularly those that are self-deployed, is that they are easily reversed. Likewise, self-deployed strategies put a greater “burden” on the individual but, once mastered, can in theory be applied across domains (Hertwig & Grüne-Yanoff, 2017). Other-deployed strategies, in contrast, may be easier for a policymaker to carry out but do not build the capacity of individuals to exercise self-control (or self-knowledge).

Optimal strategies depend not only on their likelihood of success but also on their ease of execution. For instance, although a policymaker hoping to reduce obesity might prefer situational strategies (e.g., incentives for weight loss), finding a reliable, scalable, and cost-effective way to deploy them might prove difficult (e.g., policing accurate reporting of weight loss so it can be incentivized would be challenging). This might lead instead to a preference for cognitive strategies, which often can be deployed through simple marketing campaigns. The anticipated costs relative to the anticipated benefits are always important to weigh and will often point to solutions in different quadrants of our classification.

Our review of the self-control literature reveals five key areas in which more research is needed:

1. Because the vast majority of empirical studies emerge from one or another theoretical tradition,

Table 1. How Strategies for Reducing Self-Control Failure Might Be Applied to Increasing Healthy Eating

Strategy	Example
Self-deployed situational strategies	
Commitment devices	Decision maker commits to eat a serving of fruit and vegetables at dinner every night, asks spouse to serve as a referee, and puts money on the line that will be forfeited to spouse in case he or she fails to meet this commitment.
Temptation bundling	Decision maker listens to a favorite music album only when cooking dinner from scratch (rather than eating fast food).
Situation modification	Decision maker stocks up on bags of Halloween candy for trick-or-treaters—but only candy that she does not like.
Behavior therapy	Decision maker works with a therapist, learning to identify triggers that result in junk food binges (e.g., deadlines at work) and also alternatives (e.g., taking a walk) that can meet the same needs (e.g., stress relief).
Self-deployed cognitive strategies	
Goal setting	Decision maker decides: “I will eat a fruit or vegetable with every meal!”
Planning	Decision maker plans: “If it is 8 a.m., then I will look in the refrigerator for some fruit to have with my breakfast.”
Mental contrasting with implementation intentions	Decision maker thinks: “The best outcome of eating healthy is that I will have more energy. The obstacle that stands in the way is that I don’t have time to go shopping. My plan is: ‘If it is Saturday morning, then I will take a nice walk to the grocery store to buy fresh fruit that I’ll then eat.’”
Psychological distancing	Decision maker reframes situation using third-person perspective: “Angela is hungry and has a choice between a bag of potato chips and an apple. Which should she choose?”
Mindfulness	Decision maker introspects: “I notice that I’m craving potato chips. I accept that I have this urge. I may or may not act on it.”
Cognitive therapy	Decision maker works with a therapist, learning to ask, “What thoughts lead me to snack on potato chips in the afternoon? Do I think, ‘I can’t resist junk food. I have no self-control at all!’ And is that a reasonable thought? Or am I exaggerating?”
Other-deployed situational strategies	
Hard paternalism	Lawmaker issues city-wide soda tax and prohibits sale of junk food within 1 mile of public schools.
Microenvironments	Grocery stores use “traffic light labeling” to indicate healthy (green) versus unhealthy (red) choices and strategically place healthy choices where they are more convenient.
Defaults	Employer makes the default lunch provided at all meetings a healthy salad, but allows employees to opt out of salad and into other menu options through an easy-to-use online portal.
Active choice	When ordering supplies for the following week, employers ask employees to actively choose between break room snacks that are healthy (e.g., fresh fruit) or unhealthy (e.g., donuts).
Choosing in advance	School cafeterias ask students to select their preferred lunch entrees one week in advance.
Planned interruptions	Snack manufacturers offer sets of five 20-calorie chocolates, each wrapped individually, instead of one, 100-calorie chocolate bar.
Other-deployed cognitive strategies	
Descriptive social norms	Employer shares statistics from recent company survey showing that 80% of employees say they eat fresh fruit daily.
Social labeling	Physician counsels a struggling dieter as a committed “health enthusiast” and praises their commitment to their new eating plan.
Making the future self relatable	During a checkup, physician shows young adults age-adjusted photos of themselves so they can imagine what middle age will be like and prompts them to make wise dietary choices from now on to benefit their future self.
Joint evaluation	Cafeteria offers a daily special as well as a healthy option each day and features side-by-side nutrition information on both choices, leading diners to think through the pros and cons of the two choices.
Fresh-start framing	Employer sends email reminders about healthy options in the cafeteria on New Year’s and after employees’ birthdays noting that it is a great time to kick-start a healthy habit.
Self-licensing prevention	Employer uses data from the company cafeteria to remind employees of their junk food purchases in the previous month.

almost no research directly compares interventions from diverse traditions. Likewise, meta-analyses (e.g., Benartzi et al., 2017) are generally handicapped by lack of comparability across samples (e.g., American schoolchildren versus Dutch retirees). There is therefore a need for direct comparisons of the efficacy, scalability, and cost effectiveness of different approaches to reducing self-control failures.

2. We know very little about how these interventions complement or substitute for one another. It would be useful if we could just pile up low-cost interventions to produce larger and larger joint effects. However, in research on the behavior of rickshaw drivers in Chennai, India, a population for whom excessive drinking is likely a problem, Schilbach (in press) reports intriguing crowd-out effects when he offered rickshaw drivers two different commitment devices: a lockbox for their savings and a conditional³ payment for passing a breathalyzer test during the work day. Participants showed a high degree of willingness to adopt either (or both) of these precommitment strategies, but the joint effect of these two precommitment interventions on savings was about the same as each intervention on its own. On the other hand, the strategy of planning prompts has been shown to enhance the benefits of mindfulness training (Galla, Baelen, Duckworth, & Baime, 2016). More research is needed to identify how and when intervention approaches complement rather than substitute for one another.
3. More research is needed on self-control interventions targeting automatic processes unrelated to valuation. Very often, people are capable of acting in their own best long-term interest, not because they have appropriately weighted the expected costs and benefits of the options, but rather thanks to adaptive gist thinking (Reyna & Wilhelms, 2017), personal rules (Ainslie & Haslam, 1992; Prelec & Herrnstein, 1991), or habits (Carden & Wood, 2018; Galla & Duckworth, 2015). Understanding how gist thinking, personal rules, and habits can be improved is therefore of great interest.
4. More research is needed on how to support the development of executive function—the higher-order cognitive-control processes, including response inhibition, task switching, and working memory, that collectively make goal-directed behavior possible (Diamond, 2013). Although carefully designed policies can reduce the burden on individual willpower, the fact remains

that the exercise of self-control, even when done artfully, requires executive function (Figner et al., 2010). Thus, there is tremendous value in understanding the long-term effects of adversity on executive function, particularly in childhood and adolescence (Blair & Raver, 2015) as well as the proximal effects of poverty, racism, and scarcity on self-controlled decision making (Duckworth, Kim, & Tsukayama, 2012; Mullainathan & Shafir, 2013). We also encourage further investigation of how executive function depends on good nutrition (Raine, Portnoy, Liu, Mahomed, & Hibbeln, 2015), sleep (Diestel, Rivkin, & Schmidt, 2014; Schilbach, Schofield, & Mullainathan, 2016), aerobic exercise (Hillman, Erickson, & Kramer, 2008), and schooling as well as other common experiences (Diamond, 2013; Piquero, Jennings, Farrington, Diamond, & Gonzalez, 2016; Zhang et al., 2018).

5. More research is needed to test the robustness, effect size, and cost-effectiveness of each of the interventions discussed in this review. We look forward to well-designed replication studies, including preregistered, randomized controlled field trials and, ideally, such design features as long follow-up periods, large and representative samples, objectively verifiable outcomes, and procedures that avoid differential attrition between treatment and control groups. In addition, broad measures of behavior need to be studied so that we do not declare success because study participants improve in a targeted domain but fall back in other (untargeted) domains, generating no net effect (or even perverse effects) once the full picture is understood. For example, Adams and colleagues (2018) used a nudge to successfully increase the use of automatic credit card payments, but found that an untargeted behavior—manual payments—was degraded. They report that their nudge has only the “semblance of success” because over the long-run, there is no improvement in overall financial health. Although we are optimistic about the science of behavior change and a related policy agenda, we caution researchers to anticipate more setbacks and negative findings than the first few decades of research might lead one to expect.

As indicated in Figure 1, there is no shortage of self-control research. Nevertheless, there is an urgent need for a cumulative and applied science of self-control—one that incorporates insights from theoretical traditions in both psychological science and economics. We hope this review is a step in that direction.

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Notes

1. Preferences are dynamically inconsistent when the preferences held at one point in time conflict with the preferences held at some other moment.
2. It is worth noting, however, that one study of medication-adherence reminders found no benefits of fresh-start framing, although it is unclear whether this was a failure of reminders overall or of fresh-start framing specifically (Dai et al., 2017).
3. The study participants are given a *choice* between a conditional payment and an unconditional payment. Choosing the conditional payment over the unconditional payment is equivalent to making a precommitment.

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