Beyond Willpower: Strategic Solutions for Reducing Self-Defeating Behavior

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Self-defeating behavior is a singularly timeless—and timely—topic in both psychology and economics. Self-control failures contribute to an enormous number of pressing policy challenges, from improving educational achievement (Duckworth & Seligman, 2017) and increasing retirement savings (Benartzi & Thaler, 2013) to tackling the obesity epidemic (Van Epps et al., 2016). Scholarly attention to self-control has grown dramatically over the last two decades, as shown in Figure 1, which depicts the percentage of articles in *Psychological Science* about self-control from 1995 to 2016. But the literature on this topic stretches back thousands of years (Proverbs 25:28; Plato, 370 BCE; James, 1899; Freud, 1916; Smith, 1759; Schelling, 1978; Thaler & Shefrin, 1981).

[INSERT FIGURE 1]

Why has the topic of self-control continued to play an important role in the analysis of human psychology? In part, because of the stubbornness of self-defeating behavior: often, unwise personal choices persist even after we recognize the error in our ways. From forgoing dessert to exercising regularly to saving for retirement, many of us feel as if we're in a perennial battle with ourselves. What's more, most people counter-factually predict that they will overcome this battle in the near future (e.g., Augenblick & Rabin, 2017), even as they recognize that other people's self-control problems will persist (Fedyk 2017; Pronin, Olivola, & Kennedy, 2007). Finally, temptations—rewards that have short-term gratification but distract or impede us from long-term goals—are harder to avoid than ever, thanks to convenience stores, social media, designer drugs (e.g., "street" opioids), and other vices that did not exist for our forebearers.

What precedes self-defeating behavior is a self-control dilemma; an internal goal conflict in which an individual recognizes one option (especially when viewed at a distance) as more

valued than another more immediately compelling option. When an individual adjudicates this goal conflict by pursuing the more enduringly valued option, he or she has successfully exercised self-control. On the other hand, when an individual pursues the more tempting option, he or she has failed to exercise self-control and instead engages in self-defeating behavior.

The most straightforward approach to resolving a self-control dilemma is to suppress the impulse to gratify immediate urges and/or to elevate the more enduringly valued goal. The vernacular term "willpower" describes the capacity to directly override one action tendency and privilege another. The ability to intentionally modulate such responses is more advanced in our species than in any other. Accordingly, this feature of our behavioral repertoire relies on the most recently evolved areas of the human brain (Cohen, 2005).

Exhortations to use willpower thus constitute the most obvious—albeit least sophisticated—public policy approach to reducing self-defeating behavior. However, recent advances in the science of self-control have illuminated more efficient policy solutions. In particular, we now know a great deal about the situational and cognitive precursors to the urge for instant gratification. Well before willpower is required, for example, it is possible to strategically avoid temptations altogether or to frame choices in ways that make temptations less alluring (Duckworth, Gendler & Gross, 2016).

We have three objectives in this article. First, we provide a theoretical taxonomy for understanding diverse *strategic* approaches to reducing self-defeating behavior. We highlight one dimension that distinguishes situational vs. cognitive strategies, acknowledging that most interventions are a hybrid of the two. We also highlight a second dimension that distinguishes strategies deployed by the individual (i.e., self-initiated self-control strategies) and those deployed by third-parties (e.g., nudges initiated by policymakers, employers, etc.).

Second, we aim to synthesize policy-relevant empirical research in both psychology and economics with the goal of identifying varied approaches to decreasing self-defeating behavior.

Finally, we conclude with a discussion of the relative advantages and disadvantages of each approach. We argue that strategic interventions designed to reduce self-defeating behaviors are more desirable than simply exhorting individuals to rely on sheer willpower.

Strategic Interventions to Reduce Self-Defeating Behavior

From early childhood, all individuals have some capacity to directly suppress one urge while directly augmenting a goal-congruent rival (Duckworth & Steinberg, 2015). Unfortunately, willpower—directly modulating responses in accordance with enduringly valued goals —can feel exhausting (Hagger, Wood, Stiff, Chatzisarantis, 2010; Kurzban, Duckworth, Kable, & Myers, 2013), and failures to do so are common. Likewise, public policies that essentially exhort people to resist immediate gratification tend to be ineffective. Consider, for example, the "just say no" campaign, launched from 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 meta-analyses to have no measurable impact on youth alcohol, drug, and tobacco use (West & O'Neal, 2004).

We propose a classification of four types of interventions that do not rely primarily on willpower and instead *strategically* help people reduce self-defeating behavior. Our classification distinguishes between approaches that modify a person's *situation* versus her *cognitions*, depending on whether the target of the intervention is the objective, physical situation or, in contrast, the subjective mental representation of the environment. We further differentiate between strategies that are *self-deployed* versus *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 take on their behalf. A similar distinction—between boosts and nudges—has been made by Hertwig and Grune-Yanoff (2017): Whereas self-deployed strategies are executed by individuals with intention, other-deployed strategies do not require the explicit cooperation of individuals and, indeed, are often executed without individual's conscious awareness or consent.

Figure 2 highlights four illustrative examples that can be categorized within this framework. Note that most examples don't fit easily into one of these four boxes, but are instead better understood as hybrid cases.[1] There is arguably a continuum of self- versus other-deployment. And, arguably, all situational changes influence decision making via cognitive mechanisms (Duckworth, Gendler, & Gross, 2016).

[INSERT FIGURE 2]

Let's begin with self-deployed cognitive approaches, which are often initiated spontaneously and sometimes gently suggested by others. These strategies shift the way an individual subjectively *interprets* a given situation in order to make long-term choices more appealing and actionable, and short-term temptations less so. Such self-deployed cognitive interventions do not target the objective situation itself, but rather the way a decision maker subjectively experiences or interprets her situation. Examples include goal setting and planning, actively distracting oneself from temptations, and thinking about long-term goals in ways that enhance their salient benefits.

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[1]The distinction between self-deployed and other-deployed interventions reflects how they are typically implemented: by the individual herself or by other parties on her behalf. In many cases, a strategy categorized as self-deployed could be deployed by others, and vice versa.

Moving to other-deployed cognitive interventions, we define these as strategies an outsider, such as a policymaker or employer, could deploy to shift the way an individual interprets her situation. Examples include establishing a social norm of good behavior (e.g., the norm that alcohol is not ordered at a business lunch) and prompting people to make decisions requiring self-control at times when their willingness to exert willpower is known to be high (e.g., when they are well-rested and nutritionally satiated).

In another approach to favorably resolving a self-control dilemma (second row of Figure 2), a decision maker voluntarily changes her environment to reduce the likelihood of self-defeating behavior by creating incentives, obstructions, and affordances that favor long-term goals over short-term temptations. Examples of such interventions include people purchasing small (rather than large) packages of junk food at a premium to prevent their own future overindulgence, installing apps on their computers to limit the time they spend on social media, and deleting a video game from an iPad because they find that they can't control their own usage. We will refer to this class of approach as self-deployed, situational interventions.

Finally, we move across the bottom row of Figure 2 to other-deployed situational interventions. In this category, a third party, such as a policymaker, employer, or family member, takes actions that motivate less self-defeating behavior from the individual. Such interventions create situations whose incentives and affordances reduce the burden on individual willpower. Examples include imposing taxes on cigarettes, outlawing heroin, and auto-enrolling employees into savings plans.

Some of the interventions in these four categories have been tested in the field, while others have been tested only in the laboratory. This distinction is important, as interventions that are effective in highly controlled, sometimes contrived laboratory settings may not be effective

in uncontrolled, policy-relevant environments. In this article, as we synthesize past research on interventions that decrease self-defeating behavior, we primarily describe interventions that have been studied in field settings, but as appropriate, we also describe promising interventions that have primarily been tested in the laboratory.

Empirical Research on Interventions that Reduce Self-Defeating Behaviors

In this section, we review research about different interventions that have proven effective for reducing self-defeating behaviors. We relate these interventions back to Figure 2 but note that many of them fall into multiple categories.

Cognitive interventions.

Cognitive interventions that are typically self-deployed.

As described previously, self-deployed cognitive interventions allow an individual to change the way he or she subjectively interprets a given situation in order to make long-term choices more appealing and actionable, and short-term temptations less so. We begin with the purest examples of self-deployed cognitive interventions, then move to increasingly hybrid approaches that can be self- or other-deployed.

Goal setting and planning. Setting specific (versus general) and feasible (versus impossible) goals helps people make more self-controlled choices (Locke & Latham, 2002). Mental contrasting is one technique that facilitates this process. In sequence, an individual identifies a goal and then contrasts the positive outcome of attaining that goal with the obstacle that currently stands in the way (Oettingen, 2012). Particular emphasis is given to obstacles within the individual's control; however, one possible outcome of mental contrasting is that the individual recognizes that external obstacles make the goal infeasible—in which case, the individual appropriately discards the goal. In one study, elementary school students taught

mental contrasting outperformed classmates randomly assigned to a placebo control condition on a quiz a week later (Gollwitzer, Oettingen, Kirby, Duckworth, & Mayer, 2011). Other studies have shown the benefits of this technique for increasing physical activity among overweight, middle-aged men (Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013) and improving healthy eating and physical activity among college students (Johannessen, Oettingen, & Mayer, 2012).

Goal commitment is necessary but not sufficient for goal-directed action. After setting a goal that cannot be immediately accomplished, follow-through is facilitated by making specific plans regarding when, where, and how a person will take action (i.e., implementation intentions, Leventhal, Singer, & Jones 1965; Gollwitzer, 1999). Advance planning reduces procrastination as well as forgetfulness, and also supports the enactment of difficult actions. Thinking through the when, where, and how of an intention creates a commitment that is memorable, can be automatically enacted, and is psychologically costly to break (Gollwitzer & Sheeran, 2006; Rogers, Milkman, John, & Norton, 2015). Prompting people to make plans has been shown to increase self-controlled decisions, such as the decision to exercise (Arbour & Martin Ginis, 2009; Milne, Orbell, & Sheeran, 2002), to meet deadlines (Bagozzi, Dholakia, & Basuroy, 2003), to get a flu shot (Milkman, Beshears, Choi, Laibson, & Madrian, 2011), to get a colonoscopy (Milkman, Beshears, Choi, Laibson, & Madrian, 2013). A meta-analysis of close to 100 studies found a medium-sized effect of making plans on goal attainment across age groups, life domains, and types of obstacles (Gollwitzer & Sheeran, 2006).

Recently, the goal-setting technique of mental contrasting has been paired with the planning technique of implementation intentions and shown to support self-control better than either component alone (Adriaanse et al., 2010; Kirk, Oettingen, & Gollwitzer, 2013). A series of

field studies has demonstrated the particularly powerful benefits of this sequence. For example, fifth graders taught to set goals and make plans earned higher report card grades, came to school on time more often, and were rated by their teachers as superior in classroom conduct (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013). Notably, these benefits were measured over one marking period but diminished to non-significance the following marking period, suggesting the need for additional support and reinforcement. This technique has also been shown to increase physical activity for several months post-intervention (Stadler, Oettingen, & Gollwitzer, 2009; Christiansen, Oettingen, Dahme, & Klinger, 2010).

Self-monitoring. Most 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, as attention to goals typically lapses over extended periods of time. New Year's resolutions, for example, are at the top of one's mind in early January but quickly lose their urgency. Moreover, we may not be fully aware of our snacking, web surfing, couch sitting, impulse shopping, and other bad habits that undermine long-term goals.

Self-monitoring is the intentional and consistent observation of one's own behavior (Kanfer, 1970). The 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 & Kirshcnbaum, 1993). A more recent systematic review confirmed a consistent relationship between self-monitoring and weight loss, though this review noted that correlational studies are much more common than randomized clinical trials and that 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 (Hester, 1995) and to help students improve academically (Schmitz & Perels, 2011; Zimmerman & Paulson, 1995).

Psychological distancing. Several decades of laboratory research have demonstrated the capacity of children and adults to evaluate their situation in more versus less psychologically distanced terms (Kross & Ayduk, 2017; Trope & Liberman, 2010). Temptations are most potent when there is no psychological distance separating us from their alluring features. In other words, we are most likely to succumb to indulgences we later regret when they are available in the present moment. There are four dimensions of distance: space, time, social, and hypotheticality. In other words, the more a temptation is *not here*, *not now*, *not for me*, or *not real*, the less tempting it is.

A large body of laboratory studies has found that psychological distance tends to facilitate resistance to temptation and, instead, to promote the pursuit of more valued goals, whose benefits are typically psychologically distant (Fujita & Carnevale, 2012). For instance, when preschoolers are encouraged to delay consumption of a tempting marshmallow in order to earn a second treat, children encouraged to think of the marshmallows as "fluffy white clouds" are able to wait more than twice as long as children encouraged to think of how "sticky and sweet" they are (Mischel & Rodriguez, 1993). 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, 2017; White, Kross, & Duckworth, 2017; Streamer et al., 2016; Nook, Schleider, & Somerville, 2016). Psychological distancing has also been posited to be one of the active ingredients

responsible for the efficacy of mindfulness and cognitive therapy (Kross & Ayduk, 2017; also see Beck, 1970; Ingram & Hollon, 1986; Bernstein et al., 2015).

Field research on psychological distancing is scant, and this is even more true for longitudinal intervention studies with objectively measured outcomes. One recent study investigated the benefit of psychological distancing in couples who were encouraged to write about disagreements for seven minutes 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 minutes in a year, these couples maintained consistent levels of marital satisfaction over the next year. In contrast, a control group of couples experienced normative declines in marital satisfaction during the same period. More recently, Ramney and colleagues (2016) developed online training for temporal distancing (taking the perspective of one's future self) and self-distancing (taking the perspective of a third-person observer), and found the training produced greater self-reported well-being and lower self-reported distress as compared to a no-training control group. While these benefits for self-control over emotion are promising, more research is needed to establish the efficacy and boundary conditions of psychological distancing training.

Mindfulness. Mindfulness refers to non-judgmental awareness of present experience (Bishop et al., 2004). Now a secular practice, mindfulness has its roots in a 2,500-year Buddhist tradition of scholarship and practice (Creswell, 2017). Most prominently, the mindfulness-based stress reduction (MBSR) program founded by Kabat-Zinn (1982, 1990) includes two months of weekly group classes with a trained teacher, daily homework, and a day-long mindfulness retreat. Until recently, mindfulness training has been used primarily as a treatment to reduce

mental health problems, including anxiety and depression, and distress associated with chronic pain (Goyal et al., 2014; Hofmann et al., 2010). Emerging evidence from random-assignment field studies now suggests that mindfulness can also target outcomes associated with self-control (Galla, Kaiser-Greenland, & Black, 2016), including reductions in addiction (Bowen et al. 2014), improvements in healthy eating and weight loss (Mason et al., 2015), and academic achievement (Schonert-Reichl et al., 2015). At least two psychological mechanisms of mindfulness have been identified that might support improvements in self-control: reduced craving (Friese & Hofmann, 2016; Papies, Barsalou, & Custers, 2011; Westbrook et al., 2012) and decoupling craving from behavior (Brewer et al., 2011; Witkiewitz, Bowen, Douglas, & Hsu, 2013). Though promising, mindfulness practice itself requires self-control, which is why other self-control strategies, including goal setting and planning, may be required for many individuals to benefit from it (Galla et al., 2016).

Making the future self more relatable. One source of self-control failure is an inability to empathize with the future self who will suffer the downstream consequences of our impulsive decisions (Bartels and Rips, 2010). Interventions that make the future self more relatable have shown promise as a means of increasing self-control. For instance, in a series of laboratory studies of hypothetical savings decisions, exposing participants to age-progressed renderings of their future selves increased self-controlled decisions (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 two (rather than ten) reasons why their identity would remain stable over twelve months. Generating two reasons is easy, giving participants in this arm the impression that they are relatively close to their future self (as compared to participants in the ten-reason arm of the study). This led to more patient purchasing decisions and lower measured

discount rates (Bartels & Urminsky, 2011). Similarly, participants in a laboratory study who wrote letters to their future selves (an intervention designed to increase connectedness) made more self-controlled decisions about opportunities to engage in delinquent behaviors (e.g., buying desirable stolen goods; van Gelder, Hershfield, & Nordgren, 2013). Viewing age-progressed renderings of their future selves also reduced the rate at which participants in a laboratory study cheated on a quiz in order to earn additional money – an impulsive behavior (van Gelder, Hershfield, & Nordgren, 2013). Finally, in a small field experiment, high-school students who exchanged text messages for a week with an age-progressed avatar of their future selves reported less subsequent engagement in impulsive, delinquent behaviors such as skipping school, drinking, and smoking (van Gelder et al., 2015). Together, these studies offer early evidence, primarily from the laboratory, that finding ways to relate to or connect with one's future self can increase self-controlled decisions.

Cognitive therapy. Cognitive therapy (CT) was pioneered over 50 years ago by Beck (1970) and Ellis (1962), who identified distorted cognitions as the underlying pathology in an array of psychological problems, including depression and anxiety. Currently, cognitive therapy is most often discussed in the context of cognitive-behavioral therapy (CBT), which refers to a broad class of techniques that help a patient's thinking become more accurate and adaptive and, in addition, elements of behavioral therapy, described below. Today, CBT is among the most pervasive, influential, and well-studied approaches to psychotherapy, whose efficacy has been documented in hundreds of separate meta-analytic studies (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012).

Of particular relevance to self-control is the efficacy of CBT for substance use, dieting, and criminal behaviors. Although CBT generally has been shown to be effective in these

domains, the efficacy of the cognitive versus behavioral components is difficult to parse. This is because CBT therapists combine cognitive and behavioral strategies in treatment. Indeed, the melding of cognitive and behavioral approaches is intentional, not accidental, because each approach is posited to complement the other (Meichenbaum, 1997).

Cognitive interventions that are typically other-deployed.

Certain cognitive interventions have proven effective in promoting self-controlled decisions. They typically involve an outsider (e.g., a policymaker, friend, or family member) intervening to shift the way an individual interprets her situation to facilitate more self-controlled decisions. For the sake of continuity with the section above, we begin by discussing interventions that can be hybrids and conclude with the purest examples of other-deployed interventions.

Licensing prevention. Laboratory research has shown that our (malleable) perceptions of past decisions and anticipated future decisions shape our exertion of self-control in the present (Khan & Dhar, 2007). If we anticipate making self-controlled choices in the future or recall making them in the past, we feel licensed to indulge now. On the other hand, anticipating future self-control failures or recalling past ones can produce more exertion of self-control in the present. In one laboratory experiment, participants asked to imagine volunteering in the future made more indulgent purchases in the present (Khan & Dhar, 2006). In another laboratory study, low-brow, indulgent films were favored over highbrow movies at a higher rate 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). These and other laboratory studies exploring the licensing phenomenon suggest that policymakers could potentially facilitate more self-controlled decisions by reminding people of past or anticipated future indulgences at the moment of choice.

Fresh start framing. Research in both the laboratory and field suggests that there are predictable moments when people are especially motivated to make self-controlled decisions (Dai, Milkman, & Riis 2014, 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 et al., 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 website) 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 et al., 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 (Beshears et al., 2017).[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.

Joint evaluation. A series of influential laboratory studies point to the potential of increasing self-controlled choices by presenting options for evaluation jointly (i.e., in the

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[2] It is worth noting, however, that one study of medication adherence reminders found no benefits of fresh start framing, though it is unclear if this was a failure of reminders overall or of fresh start framing specifically (Dai et al., 2017).

company of one another) rather than one at a time. Joint evaluation focuses decision makers on thoughtfully evaluating the costs and benefits of each option, while separate evaluation (i.e., considering options one-at-a-time in isolation) promotes more emotional, instinctive, and impulsive choices (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998). For instance, donations to charities that serve important causes (e.g., supporting skin cancer research) that are less viscerally appealing than other charities (e.g., those that save baby polar bears) tend to receive more support in laboratory experiments when evaluated side by side than one at a time (Kahneman & Ritov, 1994). To the extent that gender discrimination in the marketplace is an impulsive act, it is encouraging that research shows less gender bias in hiring potential employees to solve math problems in a laboratory study when employees are evaluated jointly rather than separately (Bohnet, van Geen, & Bazerman, 2015). Likewise, Magen, Dweck, and Gross (2008) showed that when the "hidden zero" of choosing short-term gratification is made more salient ($5 right now and $0 in 26 days, or $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 versus playing video games), such joint decision-making may promote more self-controlled decisions. This is related to the discussion of choice-bundling that follows later in this paper.

Descriptive Social Norms. When we learn that the majority of our peers are engaging in a behavior, we are motivated to shift our behavior in the direction of that norm for two reasons. First, we assume there is information conveyed by the crowd: Maybe our peers know something we don't that is leading them to act this way? Second, it is socially uncomfortable to be atypical, and it can result in ostracism and other negative outcomes (Cialdini & Trost, 1998). Consistent with this theory, extensive past research in the laboratory and the field has shown that describing

the average behavior of peers as more self-controlled promotes more self-controlled decisions (Cialdini & Trost, 1998). For instance, in one field experiment, researchers found that hotel patrons were more willing to re-use their towels when they learned the majority of other patrons had done so (Goldstein, Cialdini & Griskevicius, 2008). In addition, in both a small field experiment conducted by scientists and a massive study run by the company OPower, being informed that the majority of one's peers consume less energy than you do was shown to promote energy conservation, leading to reliable 2% reductions in energy usage year-over-year (Schultz, Nolan, Cialdini, Goldstein & Griskevicius, 2007; Allcott, 2011). Peer pressure may be a useful tool for motivating self-controlled decisions because it reshapes people's beliefs about such decisions, teaching them that exerting willpower is not insurmountably hard and is socially desirable.

Situational interventions.

Situational interventions that are typically self-deployed.

In this section, we summarize past research about situational interventions that are typically self-deployed. As described previously, these interventions help a decision maker voluntarily change her situation in order to facilitate self-controlled decisions. We begin with the purest examples of self-deployed situational interventions and proceed by describing increasingly hybrid approaches that can be self- or other-deployed.

Commitment devices. People tend to make more self-controlled choices when deciding about the future than the present. This provides a potential opportunity for individuals to improve their own future outcomes by constraining the options that they will have in the future. Commitment devices are tools that allow decision makers to limit the feasible options that future selves face, and/or to penalize (financially or otherwise) certain undesirable future behaviors. In

other words, commitment devices allow people to alter the situation, incentives, and/or options available to their future selves.

Extensive research in the field and laboratory has documented the benefits of commitment devices. One early experiment demonstrated that providing students with the opportunity to pre-commit to deadlines for homework assignments with a grade penalty for late submissions improved performance on the final assignment in a class (Ariely & Wertenbroch, 2002). Another early field experiment found savings benefits from offering a commitment savings account to the customers of a bank in the Philippines. This account only allowed customers to withdraw their savings after reaching a self-selected date or savings goal. The one-year savings rates of customers offered this account (which paid the same interest rate as a standard account) were 81% higher than those of otherwise identical customers who were only offered a standard account (Ashraf, Karlan & Yin, 2006).

Commitment devices have proven particularly valuable for improving health decisions. In one field experiment targeting smoking, a randomly selected group of smokers hoping to quit were offered the opportunity to deposit money in a savings account for six months that they would have to return if they failed a urine test for nicotine and cotinine at the end of this time period. Among smokers offered the commitment account, 13.5% successfully passed their urine test, while only 10% who hoped to quit but weren't offered access to this commitment device passed the test (Giné, Karlan & Zinman, 2010). In another study of a South African grocer that offered customers a 25% monthly reimbursement on healthy food, a randomly assigned subset of customers were offered the opportunity to forfeit their monthly reimbursement if they didn't increase their healthy purchases by five percentage points over the next six months. The

opportunity to sign-up for this commitment device increased healthy food purchases by 3.5 percentage points (Schwartz et al., 2014).

Commitment devices can also increase physical exercise. Employees offered an opportunity to put money on the line that they would forfeit if they didn't visit the gym at least once every two weeks over the next eight weeks visited the gym 25% more than employees in a control group (Royer, Stehr & Sydnor, 2015). Finally, pre-committing to use smaller plates and glasses has been shown to curtail food and beverage consumption (Wansink & Cheney, 2005). Together, these many field studies provide robust evidence that allowing an individual to change her own (future) situation by signing up for a commitment device is a powerful way to improve outcomes. By merely providing access to such situational modification tools, policymakers can promote more self-controlled decisions.

Temptation bundling devices. Temptation bundling devices, a twist on standard commitment devices, "allow people to pre-commit to coupling instantly gratifying activities (e.g., watching lowbrow television, getting a pedicure, eating an indulgent meal) with engagement in a behavior that provides long-term benefits but requires the exertion of willpower (e.g., exercising, reviewing a paper, spending time with a difficult relative)" (Soll, Milkman & Payne, 2015, pg. 938). 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 one study showed substantial increases in self-controlled decisions from allowing people to enjoy tempting audio-novels only when exercising (Milkman, Minson & Volpp, 2014). These benefits lasted for several weeks, but then apparently ended when the gym where the study was conducted closed over Thanksgiving; participants may have lost interest in their audio novels. Providing access to temptation bundling devices may be a way that policymakers can facilitate more self-controlled decisions.

Teaching situation modification. 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" (p. 335). As compared to students randomly assigned to use "willpower" or given no strategy at all, treated students in both studies were better able to achieve their study goals the following week (Duckworth, Gendler, & Gross, 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. More research on the benefits of teaching people to modify their situations is needed.

Behavioral therapy. The tradition of behavioral therapy for addiction and other impulse control problems (e.g., overeating, smoking) begins with Skinnerian behaviorism. Behaviorism posits that stimuli in the environment trigger, reward, and/or punish behaviors. For instance, substance use can be triggered by the sight of friends smoking marijuana at a party, rewarded by acceptance from peers and drug-induced feelings of pleasure, and negatively reinforced (i.e., rewarded through the relief of punishment) with reduction in peer pressure.

Behavioral approaches to treating substance use can 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. As noted above, in cognitive behavioral therapy, behavioral techniques are usually intertwined with techniques emphasizing the influence of internal cognitions on behavior. Nevertheless, a small number of studies confirm that behavioral elements improve addiction as well as a variety of clinical syndromes associated with addiction (Lejuez, Hopko, Acierno, Daughters, & Pagoto, 2011) and gambling (Gooding & Tarrier, 2009).

Situational interventions that are typically other-deployed.

Finally, we turn to a review of research about interventions that are typically other-deployed and rely on policymakers to create situations whose incentives and affordances reduce the burden on individual self-control required to resist temptation. Because many interventions can be self- or other-deployed, we move from a discussion of interventions that are typically other-deployed but could be self-deployed and conclude with the purest examples of other-deployed interventions.

Choice bundling. It is only when considering the pattern of our choices over time and their cumulative long-term effects that a single decision to defer gratification makes sense (Rachlin, 2004). Choice bundling capitalizes on this fact by bundling future choices with immediate choices (Ainslie & Monterosso, 2003). For example, Kirby and Guastello (2001) offered college students the choice between smaller-sooner and larger-later rewards (either money vs. more money later, or pizza now vs. more pizza later). When given the option in a set of five choices, a third of students who initially chose to receive smaller sooner amounts of money or pizza subsequently switched to preferring larger, delayed amounts. This intervention is closely related to the commitment mechanisms discussed earlier.

Breaks. Another strategy that may help soft paternalists promote self-controlled decisions is scheduling time for rest. In one field study of hospital caregivers, researchers found that the self-controlled act of hand-sanitizing upon entering and exiting a patient's room declined precipitously over the course of a single work-shift and that this decline was speedier during busier shifts (Dai, Milkman, Hoffmann, & Staats, 2015). The fact, however, that hand sanitizing rebounded at the start of each new shift is consistent with the idea that breaks can promote self-controlled choices. Another study of Israeli parole board decisions found that the leniency of decisions decreased over time within a day, but rebounded after breaks (Danzinger, Levav & Avnaim-Pesso, 2011). Together, these findings suggest that preventing decision fatigue by providing adequate rest for decision makers may be a useful way for policymakers to facilitate self-controlled decisions.

Planned interruptions. Building interruptions into choice environments can also facilitate more self-controlled decisions. People are more likely to make self-controlled decisions when a tempting good that it is easy and enjoyable to keep consuming (e.g., money, chocolate) is divided or packaged into smaller consumption units (Cheema & Soman, 2008; Soman & Cheema, 2011). Such interruptions eliminate mindless consumption, facilitate slower and more thoughtful decisions, and therefore increase the likelihood of self-controlled choices. Laboratory experiments have shown that partitions slow the consumption of cookies, chocolates, and gambles (Cheema & Soman, 2008). A field experiment in rural India showed that social workers who helped households place a portion of wages earmarked for saving into two envelopes each week rather than into one envelope increased savings rates over 14 weeks by 70% (Soman &

Cheema, 2011).[3] Policymakers may want to build interruptions into choice environments to improve decision quality.

Choose in advance. One strategy that soft paternalists can use to encourage more self-controlled decisions is to prompt decision makers to select and lock in a choice well before it will take effect. Because we are more patient when choosing for the future (Prelec & Loewenstein, 1991; Laibson, 1997), this strategy encourages more self-controlled decisions. 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, 2016). When the same customer places an online grocery order for more delayed delivery, there is also a tendency to purchase a healthier basket of groceries (Milkman, Rogers & Bazerman, 2010). Movies rented online for future delivery by mail also reflect more highbrow tastes as compared to what the very same renters elect to watch and return first when making consumption choices in the heat of the moment (Milkman, Rogers and Bazerman, 2009).

Laboratory research likewise 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 & Van Leeuwen, 1998; Read, Loewenstein & Kalyanaraman, 1999; Rogers & Bazerman, 2008). Two large studies of consequential decisions in the field have deployed this choose-in-advance technique to promote more self-controlled choices. 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 (Thaler & Benartzi, 2004). Another study of a

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[3] This intervention is also closely related to the concept of mental accounting (Thaler, 1985).

program called "Give More Tomorrow" showed similar benefits for encouraging people to commit to begin making charitable donations in the future rather than immediately (Breman, 2011). Together, this research suggests that inviting decision makers to make decisions about the future is a tactic that policymakers can use to promote more self-controlled choices.

Defaults. In many domains, passivity and procrastination prevent people from making good choices. Samuelson and Zeckhauser (1988) call this status quo bias. In such settings, the default option takes on particular importance. When the "choice architect" switches the default to a socially desirable outcome, passive actors simply follow the default, which can make an enormous difference in societal outcomes (Madrian & Shea 2001; Johnson & Goldstein 2003; Thaler & Sunstein 2008). For example, Madrian and Shea (2001) show that for new employees with 3-15 months of tenure, auto-enrollment into a 401(k) savings plan raises participation from 37% to 86% of the workforce. This result has been replicated in numerous other studies (e.g., Choi et al 2002).

Active choice. In some settings, there is no option that works well for everyone (or even for an overwhelming majority of the population). For example, it is counterproductive for some households to participate in a 401(k) plan. For instance, a household with low income should not raise their retirement savings beyond what is already being saved on their behalf in the Social Security system. Likewise, a household with credit card debt where earners work for employers without a retirement savings matching program would be better off paying off credit card debt than contributing to an employer-sponsored retirement savings plan. In situations where there is no one-size-fits-all socially optimal default, it may make sense to require that households actively express their preferences through a so-called "active choice" intervention. Such interventions only make sense when households are able to meaningfully express their

preferences (e.g., households need to have insight about what is in their best interest). Carroll and colleagues (2009) characterize the types of situations in which an active choice is socially optimal (e.g., relative to having a default option). They show that an active choice 401(k) enrollment system raises the enrollment rate by about 30 percentage points for low-tenure employees (compared to a default of non-participation), which is less than the 50 percentage-point increase that is generated by auto-enrollment. Active choices have also been used successfully to encourage patients on chronic medication to use home delivery instead of retail-pharmacy pick-up (Keller, Harlam, Loewenstein, & Volpp, 2011; Beshears et al., 2017).

Hard paternalism. In some settings, hard paternalism is socially optimal. Naturally, in the presence of externalities -- e.g., second-hand cigarette smoke -- it will be socially optimal to constrain or restrict smoking behavior. However, even in the case of pure *internalities* – actions which are only self-defeating and *not* detrimental to other people – there may still be scope for strictly paternalistic policies. Such policies may include bans, licensing, penalties, taxes, and fees. For example, taxing or even banning (private) addictive activities, like cigarette smoking, may be socially optimal if people have self-control problems like present bias (e.g., Gruber & Koszegi 2001). There is some evidence that such 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 a wide domain of applications, including forced savings (e.g., Social Security – see Beshears et al 2017), bans on addictive substances (e.g., heroin and other opioids), and safety laws (e.g., seatbelt laws). Nevertheless, it remains controversial, even among behavioral economists who document decision-making errors (see Thaler & Sunstein 2008; Bubb & Pildes 2014).

Conclusions and Directions for Future Research

In this paper, we review an array of empirically supported strategic approaches for reducing self-defeating behaviors, with an emphasis on field-tested interventions. We hope this will prove a useful reference for policymakers contemplating the best way to solve pressing policy challenges in this area. In our view, strategic approaches are generally more efficient and effective than instructing decision makers to rely on sheer willpower. Moreover, failures of willpower are common, which explains why both adults and children across cultures rate self-control among their least developed strengths (Peterson, 2006).

We describe a two-dimensional classification of interventions for reducing self-defeating behaviors. One dimension of this classification distinguishes between self-deployed and other-imposed approaches. Self-deployed approaches support individuals in making more self-controlled choices (e.g., self-initiating goal setting or choosing to commit oneself to some future course of action), while other-deployed approaches are initiated by another party (e.g., conveying the social norm that most people are engaging in a given self-controlled behavior or establishing an auto-enrollment regime with the option to opt out).

The second dimension of our proposed classification distinguishes between cognitive and situational strategies. Cognitive strategies attempt to modify a decision maker's subjective mental representation of reality (e.g., by making the future self more relatable). Situational strategies involve modifying a decision maker's objective circumstances (e.g., by changing the default option).

This classification illuminates similarities between seemingly unrelated potential policy approaches to reducing self-control failures. Strategies developed within distinct theoretical traditions—and, thus, whose findings rarely cross-fertilize—can share common mechanisms. For example, psychological distancing, mindfulness, and cognitive therapy all enable individuals to

change their mental representations in adaptive ways. Likewise, both commitment contracts and behavioral therapy encourage individuals to change their physical environment in ways that reduce the salience or availability of temptations.

Our classification also makes salient the tradeoffs inherent in different policy approaches. For example, situational strategies are 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., needing to go back out to the grocery store to buy another package of the cookies you threw away). However, when the self-control challenge is inherently cognitive in nature (e.g., controlling anger or preventing 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" upon the individual to execute, but once mastered, whether cognitive or situational, they can in theory be applied across domains. Other-deployed strategies, on the other hand, are more paternalistic and can even limit personal liberty. Still, these limitations are often outweighed by their benefits. In particular, when failures to exercise self-control (1) produce negative externalities (e.g., smoking in hospitals, on planes, and in restaurants; drunk driving), (2) have extreme negative personal consequences (e.g., failing to save for retirement), or (3) entail consequences that are not easy to anticipate or understand (e.g., addiction to opioid painkillers), more paternalistic policies may be warranted.

Optimal strategies depend not only on a strategy's likelihood of success but also on ease of execution. For instance, while a policymaker hoping to reduce obesity might prefer to offer situational strategies (e.g., commitment devices supporting weight loss), finding a reliable way to

deploy them might prove difficult in many settings (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.

Interestingly, almost no research has directly compared the efficacy of different types of

interventions to one another. Each study is typically a silo, and meta-analyses (e.g., Benartzi et

al., 2017) are generally handicapped by the lack of comparability across contexts where past

research was conducted (e.g., with American schoolchildren versus Dutch prospective retirees).

Future work that more directly compares the effectiveness of leading approaches to reducing

self-defeating behavior in important policy contexts (e.g., savings promotion, exercise

promotion) would be highly productive. In particular, researchers should develop a general cost-

benefit framework that can provide a domain-general way of measuring the net social return of

different behavior change interventions.

Another important direction for future work would be to test interventions aimed at

durably improving executive function (i.e., willpower). Our primary argument in this review is

that strategic approaches are generally advantageous, but the fact remains that self-deployed

strategies in particular require *some* amount of executive function. Thus, there is value in

understanding (1) the healthy development of the prefrontal cortex and how to promote it; (2) the

deleterious effects of adversity and uncertainty on self-control, particularly in childhood and

adolescence (Blair & Raver, 2015; Duckworth, Kim, & Tsukayama, 2012) as well as the

proximal effects of poverty, racism, and scarcity on self-controlled decision making

(Mullainathan & Shafir, 2013); and (3) the potential benefits of nutrition (Raine et al. 2015),

sleep (Diestel, Rivkin, & Schmidt, 2014), aerobic exercise (Hillman, Erickson, & Kramer, 2008), and practice (Diamond, 2013; Piquero, Jennings, Farrington, Diamond, & Gonzalez, 2016).

Importantly, our review suggests that we are not short on research testing approaches to reducing self-defeating behavior (consistent with the recent growth in academic research on self-control depicted in Figure 1). Instead, we are short on research unifying the tremendous knowledge that has been accumulated on this topic. Future research that offers theories for synthesizing and understanding how this vast array of findings fit together would be of great value.

References

Adriaanse, M. A., Oettingen, G., Gollwitzer, P. M., Hennes, E. P., de Ridder, D. T. D. and de
    Wit, J. B. F. (2010), When planning is not enough: Fighting unhealthy snacking habits by
    mental contrasting with implementation intentions (MCII). *European Journal of Social*
    Psychology, *40*, 1277–1293. https://doi.org/10.1002/ejsp.730

Ainslie, G., & Monterosso, J. R. (2003). Building blocks of self-control: Increased tolerance for
    delay with bundled rewards. *Journal of the Experimental Analysis of Behavior*, *79*(1), 37-
    48. https://doi.org/10.1901/jeab.2003.79-37

Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, *95*(9-
    10), 1082-1095. https://doi.org/10.1016/j.jpubeco.2011.03.003

Ariely, D., & Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control
    by precommitment. *Psychological Science*, *13*(3), 219-224. https://doi.org/10.1111/1467-
    9280.00441

Arbour, K. P., & Ginis, K. A. (2009). A randomised controlled trial of the effects of
    implementation intentions on women's walking behaviour. *Psychology & Health*, *24*(1),
    49-65. https://doi.org/10.1080/08870440801930312

Ashraf, N., Karlan, D., & Yin, W. (2006). Tying Odysseus to the mast: Evidence from a
    commitment savings product in the Philippines. *The Quarterly Journal of Economics*,
    121(2), 635-672. https://doi.org/10.1162/qjec.2006.121.2.635

Augenblick, N., & Rabin, M. (2017). Belief movement, uncertainty reduction, & rational
    updating. *UC Berkeley-Haas and Harvard University Mimeo*.

Bagozzi, R. P., Dholakia, U. M., & Basuroy, S. (2003), How effortful decisions get enacted: The

    motivating role of decision processes, desires, and anticipated emotions. *Journal of*

    Behavioral Decision Making, 16: 273–295. https://doi.org/10.1002/bdm.446

Baker, R. C., & Kirschenbaum, D. S. (1993). Self-monitoring may be necessary for successful

    weight control. *Behavior Therapy*, *24*(3), 377-394. https://doi.org/10.1016/s0005-

    7894(05)80212-6

Bartels, D. M., & Rips, L. J. (2010). Psychological connectedness and intertemporal choice.

    Journal of Experimental Psychology: *General, 139*(1), 49-69.

    https://doi.org/10.1037/a0018062

Bartels, D. M., & Urminsky, O. (2011). On intertemporal selfishness: How the perceived

    instability of identity underlies impatient consumption. *Journal of Consumer Research*,

    38(1), 182-198. https://doi.org/10.1086/658339

Bazerman, M. H., Tenbrunsel, A. E., & Wade-Benzoni, K. (1998). Negotiating with yourself and

    losing: Making decisions with competing internal preferences. *Academy of Management*

    Review, *23*(2), 225-241. https://doi.org/10.5465/amr.1998.533224

Beck, A. T. (1970). Cognitive therapy: Nature and relation to behavior therapy. *Behavior*

    Therapy, *1*(2), 184-200. https://doi.org/10.1016/s0005-7894(70)80030-2

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., ... &

    Galing, S. (2017). Should governments invest more in nudging?. *Psychological Science*,

    0956797617702501. https://doi.org/10.1177/0956797617702501

Benartzi, S. & Thaler, R. H. (2013). Behavioral economics and the retirement savings crisis.

    Science, 339(6124), 1152-1153. https://doi.org/10.1126/science.1231320

Beshears, J., Choi, J., Clayton, C., Harris, C., Laibson, D., & Madrian, B. C. (2017, August). Optimal illiquidity. Paper presented at the annual meeting of the Retirement Research Consortium, Washington, DC.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., ... & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical psychology: Science and Practice*, *11*(3), 230-241. https://doi.org/10.1093/clipsy.bph077

Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology, 66*(1), 711-731. https://doi.org/10.1146/annurev-psych-010814-015221

Bohnet, I., van Geen, A., & Bazerman, M. (2016). When performance trumps gender bias: Joint vs. separate evaluation. *Management Science*, *62*(5), 1225-1234. https://doi.org/10.1287/mnsc.2015.2186

Breman, A. (2011). Give more tomorrow: Two field experiments on altruism and intertemporal choice. *Journal of Public Economics*, *95*(11-12), 1349-1357. https://doi.org/10.1016/j.jpubeco.2011.05.004

Brewer, J. A., Mallik, S., Babuscio, T. A., Nich, C., Johnson, H. E., Deleone, C. M., . . . Rounsaville, B. J. (2011). Mindfulness training for smoking cessation: Results from a randomized controlled trial. *Drug and Alcohol Dependence, 119*(1–2), 72-80. https://doi.org/10.1016/j.drugalcdep.2011.05.027

Bubb, R., & Pildes, R. H. (2014). How behavioral economics trims its sails and why. *Harvard Law Review*, *127*, 1593-1678.

Burke, L. E., Wang, J., & Sevick, M. A. (2011). Self-monitoring in weight loss: A systematic review of the literature. *Journal of the American Dietetic Association, 111*(1), 92-102. https://doi.org/10.1016/j.jada.2010.10.008

Carroll, G. D., Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2009). Optimal defaults and active decisions. *The Quarterly Journal of Economics*, *124*(4), 1639-1674. https://doi.org/10.1162/qjec.2009.124.4.1639

Cheema, A., & Soman, D. (2008). The effect of partitions on controlling consumption. *Journal of Marketing Research*, *45*(6), 665-675. https://doi.org/10.1509/jmkr.45.6.665

Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2002). Defined contribution pensions: Plan rules, participant choices, and the path of least resistance. *Tax Policy and the Economy*, *16*, 67-113. https://doi.org/10.1086/654750

Christiansen, S., Oettingen, G., Dahme, B., & Klinger, R. (2010). A short goal-pursuit intervention to improve physical capacity: A randomized clinical trial in chronic back pain patients. *Pain*, *149*(3), 444-452. https://doi.org/10.1016/j.pain.2009.12.015

Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The Handbook of Social Psychology* (pp. 151-192). New York: McGraw-Hill.

Cohen, J. (2005). The vulcanization of the human brain: A neural perspective on interactions between cognition and emotion. *The Journal of Economic Perspectives*, *19*(4), 3-24. https://doi.org/10.1257/089533005775196750

Creswell, J. D. (2017). Mindfulness interventions. *Annual Review of Psychology*, *68*(1), 491-516. https://doi.org/10.1146/annurev-psych-042716-051139

Dai, H., Mao, D., Riis, J., Volpp, K. G., Relish, M. J., Lawnicki, V. F., & Milkman, K. L. (2017). Effectiveness of medication adherence reminders tied to "fresh start" dates: A randomized clinical trial. *Jama Cardiology*, *2*(4), 453-455. https://doi.org/10.1001/jamacardio.2016.5794

Dai, H., Milkman, K. L., Hofmann, D. A., & Staats, B. R. (2015). The impact of time at work and time off from work on rule compliance: The case of hand hygiene in health care. *Journal of Applied Psychology*, *100*(3), 846-862. https://doi.org/10.1037/e573552014-092

Dai, H., Milkman, K. L., & Riis, J. (2014). The fresh start effect: Temporal landmarks motivate aspirational behavior. *Management Science*, *60*(10), 2563-2582. https://doi.org/10.1287/mnsc.2014.1901

Dai, H., Milkman, K. L., & Riis, J. (2015). Put your imperfections behind you. *Psychological Science*, *26*(12), 1927-1936. https://doi.org/10.1177/0956797615605818

Danziger, S., Levav, J., & Avnaim-Pesso, L. (2011). Extraneous factors in judicial decisions. *Proceedings of the National Academy of Sciences*, *108*(17), 6889-6892. https://doi.org10.1073/pnas.1018033108

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168. https://doi.org/10.1146/annurev-psych-113011-143750

Diestel, S., Rivkin, W., & Schmidt, K.-H. (2014). Sleep quality and self-control capacity as protective resources in the daily emotional labor process: Results from two diary studies. *Journal of Applied Psychology, 100*(3), 809-827. https://doi.org/10.1037/a0038373

Duckworth, A., Gendler, T. S., & Gross, J. J. (2014). Self-control in school-age children. *Educational Psychologist, 49*(3), 199-217. https://doi.org/10.1080/00461520.2014.926225

Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science*, *11*(1), 35-55. https://doi.org/10.1177/1745691615623247

Duckworth, A. L., Kim, B., & Tsukayama, E. (2012). Life stress impairs self-control in early adolescence. *Frontiers in Psychology, 3*, 608. https://doi.org/10.3389/fpsyg.2012.00608

Duckworth, A. L., Kirby, T. A., Gollwitzer, A., & Oettingen, G. (2013). From fantasy to action: Mental contrasting with implementation intentions (MCII) improves academic performance in children. *Social Psychological and Personality Science, 4*(6), 1-9. https://doi.org/10.1177/1948550613476307

Duckworth, A. L., & Seligman, M. E. (2017). The Science and Practice of Self Control. *Perspectives on Psychological Science*, *12*(5), 715-718.

Duckworth, A. L., & Steinberg, L. (2015). Unpacking self-control. *Child Development Perspectives*, *9*(1), 32-37. https://doi.org/10.1111/cdep.12107

Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York: Citadel Press.

Finkel, E. J., Slotter, E. B., Luchies, L. B., Walton, G. M., & Gross, J. J. (2013). A brief intervention to promote conflict reappraisal preserves marital quality over time. *Psychological Science*, *24*(8), 1595-1601. https://doi.org/10.1177/0956797612474938

Freud, S. (1916-1917/1977). *Introductory lectures on psychoanalysis*. New York, NY: W. W. Norton & Company.

Friese, M., & Hofmann, W. (2016). State Mindfulness, Self-Regulation, and Emotional

    Experience in Everyday Life. *Motivation Science, 2*(1), 1-14.

    https://doi.org/10.1037/mot0000027

Fujita, K., & Carnevale, J. J. (2012). Transcending temptation through abstraction. *Current*

    Directions in Psychological Science, 21(4), 248-252.

    https://doi.org/10.1177/0963721412449169

Galla, B. M., Baelen, R. N., Duckworth, A. L., & Baime, M. J. (2016). Mindfulness, meet self

    regulation: Boosting out-of-class meditation practice with brief action plans. *Motivation*

    Science, 2(4), 220-237. doi:10.1037/mot0000045

Galla, B. M., Kaiser-Greenland, S., & Black, D. S. (2016). Mindfulness training to promote self

    regulation in youth: Effects of the Inner Kids program. In A. K. Schonert-Reichl & W. R.

    Roeser (Eds.), *Handbook of Mindfulness in Education: Integrating Theory and Research*

    into Practice (pp. 295-311). New York, NY: Springer.

Giné, X., Karlan, D., & Zinman, J. (2010). Put your money where your butt is: A commitment

    contract for smoking cessation. *American Economic Journal: Applied Economics*, *2*(4),

    213-235. https://doi.org/10.1037/e596022012-001

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using

    social norms to motivate environmental conservation in hotels. *Journal of Consumer*

    Research, 35(3), 472-482. https://doi.org/10.1086/586910

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American*

    Psychologist, 54(7), 493-503.

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A

    meta-analysis of effects and processes. *Advances in Experimental Social Psychology, 38*,

    69-119. https://doi.org/10.1016/s0065-2601(06)38002-1

Gollwitzer, A., Oettingen, G., Kirby, T. A., Duckworth, A. L., & Mayer, D. (2011). Mental

    contrasting facilitates academic performance in school children. *Motivation and Emotion*,

    35(4), 403-412. https://doi.org/10.1007/s11031-011-9222-0

Gooding, P., & Tarrier, N. (2009). A systematic review and meta-analysis of cognitive-

    behavioural interventions to reduce problem gambling: hedging our bets?. *Behaviour*

    Research and Therapy, *47*(7), 592-607. https://doi.org/10.1016/j.brat.2009.04.002

Goyal, M., Singh, S., Sibinga, E. S., & et al. (2014). Meditation programs for psychological

    stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine,*

    174(3), 357-368. doi:10.1001/jamainternmed.2013.13018

Gruber, J., & Köszegi, B. (2001). Is addiction "rational"? Theory and evidence. *The Quarterly*

    Journal of Economics, *116*(4), 1261-1303. https://doi.org/10.1162/003355301753265570

Gruber, J., & Mullainathan, S. (2006). Do cigarette taxes make smokers happier?. In *Happiness*

    and Public Policy (pp. 109-146). Palgrave Macmillan UK.

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the

    strength model of self-control: A meta-analysis. *Psychological Bulletin*, *136*(4), 495-525.

    https://doi.org/10.1037/a0019486

Hershfield, H. E., Goldstein, D. G., Sharpe, W. F., Fox, J., Yeykelis, L., Carstensen, L. L., &

    Bailenson, J. N. (2011). Increasing saving behavior through age-progressed renderings of

    the future self. *Journal of Marketing Research*, *48*(SPL).

    https://doi.org/10.1509/jmkr.48.spl.s23

Hester, R. K. (1995). Behavioral self-control training. In R. K. Hester & W. R. Miller (Eds.), Handbook of alcoholism treatment approaches: *Effective Alternatives* (pp. 148-159). Needham Heights, MA: Allyn & Bacon.

Hertwig, R. & Grune-Yanoff, T. Nudging and boosting: Steering or empowering good decisions. (2017). *Perspectives on Psychological Science*, 1-14.

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: Exercise effects on brain and cognition. *Nature Reviews Neuroscience, 9*(1), 58-65. https://doi.org/10.1038/nrn2298

Hofmann, S. G., Asnaani, A., Vonk, I. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research, 36*(5), 427-440. https://doi.org/10.1007/s10608-012-9476-1

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169-183.

Ingram, R. E., & Hollon, S. D. (1986). Cognitive therapy for depression from an information processing perspective. In R. E. Ingram (Ed.), *Personality, psychopathology, and psychotherapy series. Information processing approaches to clinical psychology* (pp. 259-281). San Diego, CA: Academic Press.

James, W. (1899). Talks to teachers on psychology and to students on some of life's ideals. New York, NY: Holt.

Johannessen, K., Oettingen, G., & Mayer, D. (2012). Mental contrasting of a dieting wish improves self-reported health behaviour. *Psychology & Health*, *27*(Sup2), 43-58. https://doi.org/10.1080/08870446.2011.626038

Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives?. *Science, 302*(5649)*, 1338-1339.

    https://doi.org/10.1126/science.1091721

Kahneman, D., & Ritov, I. (1994). Determinants of stated willingness to pay for public goods: A

    study in the headline method. *Journal of Risk and Uncertainty*, *9*(1), 5-37.

    https://doi.org/10.1007/bf01073401

Kanfer, F. H. (1970). Self-monitoring: Methodological limitations and clinical applications.

    Journal of Consulting and Clinical Psychology, *35*(2), 148-152.

    https://doi.org/10.1037/h0029874

Keller, P. A., Harlam, B., Loewenstein, G., & Volpp, K. G. (2011). Enhanced active choice: A

    new method to motivate behavior change. *Journal of Consumer Psychology*, *21*(4), 376-

    383. https://doi.org/10.1016/j.jcps.2011.06.003

Khan, U., & Dhar, R. (2006). Licensing effect in consumer choice. *Journal of Marketing*

    Research, *43*(2), 259-266. https://doi.org/10.1509/jmkr.43.2.259

Khan, U., & Dhar, R. (2007). Where there is a way, is there a will? The effect of future choices

    on self-control. *Journal of Experimental Psychology: General*, *136*(2), 277.

    https://doi.org/10.1037/0096-3445.136.2.277

Kirby, K. N., & Guastello, B. (2001). Making choices in anticipation of similar future choices

    can increase self-control. *Journal of Experimental Psychology: Applied*, *7*(2), 154-164.

    https://doi.org/10.1037//1076-898x.7.2.154

Kirk, D., Oettingen, G., & Gollwitzer, P. M. (2013). Promoting integrative bargaining: mental

    contrasting with implementation intentions. *International Journal of Conflict*

    Management, *24*(2), 148-165. https://doi.org/10.1108/10444061311316771

Kross, E., & Ayduk, O. (2017). Self-distancing. *Advances in Experimental Social Psychology,* 81-136. https://doi.org/10.1016/bs.aesp.2016.10.002

Kross, E., Bruehlman-Senecal, E., Park, J., Burson, A., Dougherty, A., Shablack, H., ... & Ayduk, O. (2014). Self-talk as a regulatory mechanism: how you do it matters. *Journal of Personality and Social Psychology*, *106*(2), 304. https://doi.org/10.1037/a0035173

Kross, E., Vickers, B. D., Orvell, A., Gainsburg, I., Moran, T. P., Boyer, M., ... & Ayduk, O. (2017). Third-person self-talk reduces ebola worry and risk perception by enhancing rational thinking. *Applied Psychology: Health and Well-Being*, *9*(3), 387-409. https://doi.org/10.1111/aphw.12103

Kurzban, R., Duckworth, A., Kable, J., & Myers, J. (2013). An opportunity cost model of subjective effort and task performance. *Behavioral and Brain Sciences*, *36*(6), 661-679. https://doi.org/10.1017/S0140525X12003196

Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics*, *112*(2), 443-478. https://doi.org/10.1162/003355397555253

Lejuez, C. W., Hopko, D. R., Acierno, R., Daughters, S. B., & Pagoto, S. L. (2011). Ten year revision of the brief behavioral activation treatment for depression: revised treatment manual. *Behavior Modification*, *35*(2), 111-161. https://doi.org/10.1177.0145445510390929

Leventhal, H., Singer, R., & Jones, S. (1965). Effects of fear and specificity of recommendation upon attitudes and behavior. *Journal of Personality and Social Psychology*, *2*(1), 20. https://doi.org/10.1037/h0022089

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist, 57*(9), 705-717. https://doi.org/10.1037//0003-066x.57.9.705

Madrian, B. C., & Shea, D. F. (2001). The power of suggestion: Inertia in 401(k) participation and savings behavior. *The Quarterly Journal of Economics*, *116*(4), 1149-1187. https://doi.org/10.1162/003355301753265543

Magen, E., Dweck, C. S., & Gross, J. J. (2008). The hidden-zero effect. *Psychological Science, 19*(7), 648-649. https://doi.org/10.1111/j.1467-9280.2008.02137.x

Mason, A. E., Epel, E. S., Kristeller, J., Moran, P. J., Dallman, M., Lustig, R. H., ... & Daubenmier, J. (2016). Effects of a mindfulness-based intervention on mindful eating, sweets consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial. *Journal of Behavioral Medicine*, *39*(2), 201-213.

Meichenbaum, D. (1977). *Cognitive-behavior modification: An integrative approach*. New York: Plenum Press.

Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences*, *108*(26), 10415-10420. https://doi.org/10.1073/pnas.1103170108

Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2013). Planning prompts as a means of increasing preventive screening rates. *Preventive Medicine*, *56*(1), 92-93. https://doi.org/10.1016/j.ypmed.2012.10.021

Milkman, K. L., Minson, J. A., & Volpp, K. G. (2014). Holding the hunger games hostage at the gym: An evaluation of temptation bundling. *Management Science*, *60*(2), 283-299. https://doi.org/10.1287/mnsc.2013.1784

Milkman, K. L., Rogers, T., & Bazerman, M. H. (2009). Highbrow films gather dust: Time-inconsistent preferences and online DVD rentals. *Management Science*, *55*(6), 1047-1059. https://doi.org/10.1287/mnsc.1080.0994

Milkman, K., Rogers, T., & Bazerman, M. (2010). I'll have the ice cream soon and the vegetables later: A study of online grocery purchases and order lead time. *Marketing Letters*, *21*(1), 17-35. https://doi.org/10.2139/ssrn.983129

Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. *British Journal of Health Psychology, 7*(2), 163-184. https://doi.org/10.1348/135910702169420

Mischel, W., & Rodriguez, M. L. (1993). Psychological distance in self-imposed delay of gratification. In R. R. Cocking & K. A. Renninger (Eds.), *The development and meaning of psychological distance* (pp. 109–121). Hillsdale, NJ: Erlbaum.

Mullainathan, S., & Shafir, E. (2013). *Scarcity: Why having too little means so much*. New York: Times Books.

Nook, E. C., Schleider, J. L., & Somerville, L. H. (2017). A linguistic signature of psychological distancing in emotion regulation. *Journal of Experimental Psychology: General*, *146*(3), 337. https://doi.org/10.1037/xge0000263

Oettingen, G. (2012). Future thought and behaviour change. *European Review of Social Psychology, 23*(1), 1-63. https://doi.org/10.1080/10463283.2011.643698

Papies, E. K., Barsalou, L. W., & Custers, R. (2011). Mindful attention prevents mindless impulses. *Social Psychological and Personality Science, 3*, 291-299. https://doi.org/10.1177/1948550611419031

Park, J., Ayduk, Ö., & Kross, E. (2016). Stepping back to move forward: Expressive writing promotes self-distancing. *Emotion, 16*(3), 349-364. https://doi.org/10.1037/emo0000121

Peterson, C. (2006). *A primer in positive psychology*. Oxford University Press.

Piquero, A. R., Jennings, W. G., Farrington, D. P., Diamond, B., & Gonzalez, J. M. R. (2016). A meta-analysis update on the effectiveness of early self-control improvement programs to improve self-control and reduce delinquency. *Journal of Experimental Criminology, 12*(2), 249-264. https://doi.org/10.1007/s11292-016-9257-z

Prelec, D., & Loewenstein, G. (1991). Decision Making Over Time and Under Uncertainty: A Common Approach. *Management Science*, *37*(7), 770-786. https://doi.org/10.1287/mnsc.37.7.770

Pronin, E., Olivola, C. Y., & Kennedy, K. A. (2008). Doing unto future selves as you would do unto others: Psychological distance and decision making. *Personality and Social Psychology Bulletin*, *34*(2), 224-236. https://doi.org/10.1177/0146167207310023

Rachlin, H. (2004). *The Science of Self-Control*. Cambridge, MA: Harvard University Press.

Raine, A., Portnoy, J., Liu, J., Mahoomed, T., & Hibbeln, J. R. (2015). Reduction in behavior problems with omega-3 supplementation in children aged 8–16 years: A randomized, double-blind, placebo-controlled, stratified, parallel-group trial. *Journal of Child Psychology and Psychiatry, 56*(5), 509-520. https://doi.org/10.1111/jcpp.12314

Ranney, R., Bruehlman-Senecal, E., & Ayduk, O. (2016). Comparing the effects of three online

    cognitive reappraisal trainings on well-being. *Journal of Happiness Studies, 18*(5), 1319-

    1338. https://doi.org/10.1007/s10902-016-9779-0

Read, D., & van Leeuwen, B. (1998). Predicting hunger: The effects of appetite and delay on

    choice. *Organizational Behavior and Human Decision Processes*, *76*(2), 189-205.

    https://doi.org/10.1006/obhd.1998.2803

Read, D., Loewenstein, G., & Kalyanaraman, S. (1999). Mixing virtue and vice: combining the

    immediacy effect and the diversification heuristic. *Journal of Behavioral Decision*

    Making, *12*(4), 257-273. https://doi.org/10.1002/(sici)1099-0771(199912)12:4<257::aid-

    bdm327>3.3.co;2-y

Rogers, T., & Bazerman, M. H. (2008). Future lock-in: Future implementation increases

    selection of 'should' choices. *Organizational Behavior and Human Decision Processes,*

    106(1), 1-20. https://doi.org/10.1016/j.obhdp.2007.08.001

Rogers, T., Milkman, K. L., John, L. K., & Norton, M. I. (2015). Beyond good intentions:

    Prompting people to make plans improves followthrough on important tasks. *Behavioral*

    Science & Policy, 1(2). https://doi.org/10.1353/bsp.2015.0011

Royer, H., Stehr, M., & Sydnor, J. (2015). Incentives, commitments, and habit formation in

    exercise: Evidence from a field experiment with workers at a Fortune-500 company.

    American Economic Journal: Applied Economics, *7*(3), 51-84.

    https://doi.org/10.1257/app.20130327

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk*

    and Uncertainty, *1*(1), 7-59. https://doi.org/10.1007/bf00055564

Schelling, T. (1978). Egonomics, or the art of self-management. *The American Economic Review*, *68*(2), 290-294. Retrieved from https://www.jstor.org/stable/1816707

Schmitz, B., & Perels, F. (2011). Self-monitoring of self-regulation during math homework behaviour using standardized diaries. *Metacognition and Learning*, *6*(3), 255-273. https://doi.org/10.1007/s11409-011-9076-6

Schonert-Reichl, K. A., Oberle, E., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social–emotional development through a simple-to-administer mindfulness-based school program for elementary school children: A randomized controlled trial. *Developmental Psychology, 51*(1), 52-66. doi:10.1037/a0038454

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*(5), 429-434. https://doi.org/10.1111/j.1467-9280.2007.01917.x

Schwartz, J., Mochon, D., Wyper, L., Maroba, J., Patel, D., & Ariely, D. (2014). Healthier by Precommitment. *Psychological Science*, *25*(2), 538-546. https://doi.org/10.1177/0956797613510950

Sheeran, P., Harris, P., Vaughan, J., Oettingen, G., & Gollwitzer, P. M. (2013). Gone exercising: Mental contrasting promotes physical activity among overweight, middle-aged, low-SES fishermen. *Health Psychology*, *32*(7), 802-809. https://doi.org/10.1037/a0029293

Smith, A. (1759/1976). The theory of moral sentiments. London: Oxford University Press.

Soll, J. B., Milkman, K. L., & Payne, J. W. (2015). A user's guide to debiasing. In *The Wiley Blackwell Handbook of Judgment and Decision Making* (pp. 924-951). West Sussex: John Wiley & Sons. https://doi.org/10.1002/9781118468333.ch33

Soman, D., & Cheema, A. (2011). Earmarking and partitioning: Increasing saving by low-income households. *Journal of Marketing Research*, *48*(SPL). https://doi.org/10.1509/jmkr.48.spl.s14

Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2009). Physical activity in women. *American Journal of Preventive Medicine*, *36*(1), 29-34. https://doi.org/10.1016/j.amepre.2008.09.021

Streamer, Lindsey & D. Seery, Mark & L. Kondrak, Cheryl & Lamarche, Veronica & Saltsman, Thomas. (2016). Not I, but she: The beneficial effects of self-distancing on challenge/threat cardiovascular responses. *Journal of Experimental Social Psychology*. *70*. 10.1016/j.jesp.2016.11.008.

Thaler, R. (1985). Mental accounting and consumer choice. *Marketing Science*, *4*(3), 199-214. https://doi.org/10.1287/mksc.4.3.199

Thaler, R., & Benartzi, S. (2004). Save more tomorrow™: Using behavioral economics to increase employee saving. *Journal of Political Economy*, *112*(S1). https://doi.org/10.1086/380085

Thaler, R., & Shefrin, H. M. (1981). An economic theory of self-control. *Journal of Political Economy*, *89*(2), 392-406. https://doi.org/10.1086/260971

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* New York: Penguin Books.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440-463. https://doi.org/10.1037/a0018963

VanEpps, E. M., Downs, J. S., & Loewenstein, G. (2016). Advance ordering for healthier eating? Field experiments on the relationship between the meal order–consumption time delay

and meal content. *Journal of Marketing Research*, *53*(3), 369-380.

https://doi.org/10.1509/jmr.14.0234

van Gelder, J. L., Hershfield, H. E., & Nordgren, L. F. (2013). Vividness of the future self

predicts delinquency. *Psychological Science*, *24*(6), 974-980.

https://doi.org/10.1177/0956797612465197

van Gelder, J. L., Luciano, E. C., Kranenbarg, M. W., & Hershfield, H. E. (2015). Friends with

my future self: Longitudinal vividness intervention reduces delinquency. *Criminology*,

53(2), 158-179. https://doi.org/10.1111/1745-9125.12064

Wansink, B., & Cheney, M. (2005). Super bowls: Serving bowl size and food consumption.

Jama, *293*(14), 1723-1728. https://doi.org/10.1001/jama.293.14.1727

West, S. L., & O'Neal, K. K. (2004). Project DARE outcome effectiveness revisited. *American

Journal of Public Health, 94*(6), 1027-1029. https://doi.org/10.2105/ajph.94.6.1027

Westbrook, C., Creswell, J. D., Tabibnia, G., Julson, E., Kober, H., & Tindle, H. A. (2012).

Mindful attention reduces neural and self-reported cue-induced craving in

smokers. *Social Cognitive and Affective Neuroscience, 8*(1), 73-84.

https://doi.org/10.1093/scan/nsr076

White, R. E., Kross, E., & Duckworth, A. L. (2015). Spontaneous self-distancing and adaptive

self-reflection across adolescence. *Child Development*, *86*(4), 1272-1281.

https://doi.org/10.1111/cdev.12370

Witkiewitz, K., Bowen, S., Douglas, H., & Hsu, S. H. (2013). Mindfulness-based relapse

prevention for substance craving. *Addictive Behaviors, 38*(2), 1563-1571.

https://doi.org/10.1016/j.addbeh.2012.04.001

Zimmerman, B. J., & Paulsen, A. S. (1995). Self-monitoring during collegiate studying: An

invaluable tool for academic self-regulation. *New Directions for Teaching and Learning,*
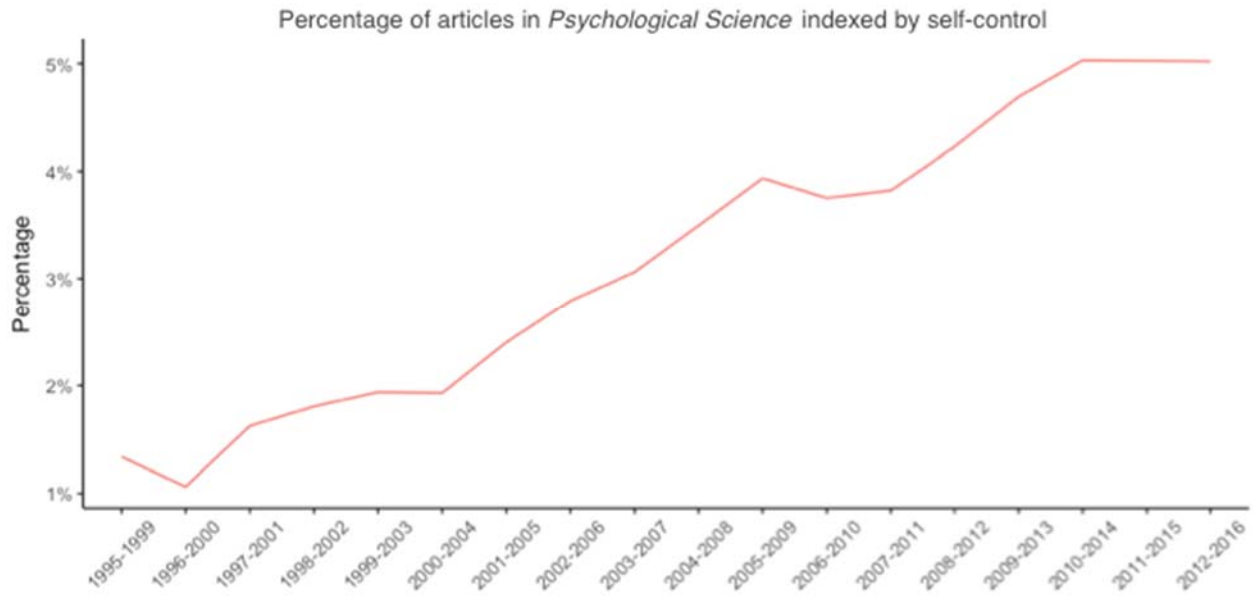
63, 13-27. https://doi.org/10.1002/tl.37219956305

Figure 1. Three-year running average of percentage of articles in *Psychological Science* indexed by self-control.

	Self-deployed	Other-deployed
Cognitive strategies	Goal setting and planning	Descriptive social norms
Situational strategies	Commitment devices	Hard paternalism

Figure 2. Four illustrative examples of interventions that reduce self-defeating behavior,

classified as cognitive or situational and either self-deployed or other-deployed