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Instances in which people fail to act in accordance with what they understand to be the right course of action despite their best intentions are ubiquitous. Dieters eat unhealthy foods, smokers continue to smoke, and the sedentary fail to take the necessary steps to be more physically active. These failures of self-control can lead to poorer health. Research suggests, for example, that more than 50% of mortality from the leading causes of death could be reduced if people simply ate a healthier diet, maintained a reasonable weight, and exercised regularly (e.g., Knoop et al., 2004) – behaviors that all appear to require self-control. Thus, improving health requires understanding self-control. In this chapter, we describe two types of self-control processes: proactive and reactive self-control. We review what research reveals about the psychological mechanisms and behavioral strategies involved in each type and how these ultimately lead to or undermine self-control success.

What is self-control?

Self-control dilemmas present people with motivational conflicts; that is, they present people with competing wants (Fujita, 2011). Dieters, for example, want to lose weight, but they also want to eat the cake in front of them. Smokers want to be healthier but they also want to smoke that cigarette. The difficulty is that the two motivations are in direct opposition – only one can be satisfied in the moment of choice. Thus, people are confronted with a choice dilemma. What distinguishes the two competing wants is their scope: one motivation is broader and more global, whereas the other is narrower and more local. Typically, this difference in scope is reflected in the temporal dimension. For example, the desire to lose weight is more long-term, whereas the desire to eat this cake is short-term. But scope can refer to more than the dimension of time. For example, the consequences and relevance of losing weight are not limited to just health, but also extend to other contexts, such as one’s interpersonal relationships and well-being. By contrast, the consequences and relevance of eating this cake are more restricted and limited. This difference in breadth of consequence and relevance has implications for the value of the choice options presented in a self-control conflict. Because the satisfaction of a broader global motivation impacts a more expansive set of concerns (e.g., weight-loss is not just about health, but about many other things as well), it typically conveys greater value than satisfying...
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A narrower local motivation (e.g., eating cake). Reflecting both these points, the prototypical self-control dilemma is one that pits larger-delayed vs. smaller-immediate outcomes (e.g., Ainslie, 1975; Metcalfe & Mischel, 1999). Successful self-control requires prioritizing the broader global motivation over the narrower local motivation. Any psychological mechanism or behavioral strategy that serves this prioritization process can be viewed as self-control.

Self-control is defined idiographically. That is, what a self-control dilemma is to one person may not be a self-control dilemma to another. For example, eating a piece of chocolate cake is not a self-control failure for a person who is unconcerned about dieting. Similarly, refusing to eat chocolate cake is not an example of self-control success if one does not like chocolate. It is also important to observe that self-control is a motivational problem. If a dieter is misinformed and believes that eating chocolate cake helps one to lose weight, eating this cake does not constitute a self-control failure. Such a problem results from a lack of knowledge, not from the failure to prioritize global over local motivations.

It is common in the literature to refer to the local motivation as “temptation” and the global motivation as “goal.” For example, dieters are described as having weight-loss goals, which are frequently undermined by salient food temptations in their environments. The use of these terms helps to situate self-control research into the robust literature examining the lack of correspondence between what people intend to do and their actual behavior – the so-called intention–behavior gap. Indeed, the failure of people to translate their intentions into behavior is one of the most troubling problems in advancing health promotion and prevention behavior (Mann, De Ridder, & Fujita, 2013). In keeping with this tradition, we use the terms goal vs. temptation interchangeably with the terms global vs. local motivation, respectively, in what follows. The use of the term “temptation,” however, should not imply that a self-control conflict simply entails avoiding temptations. Self-control can be described in both approach (I want that cookie vs. I want to lose weight) and avoidance terms (I do not want to miss that cookie vs. I do not want to gain weight). Although many prototypical self-control conflicts are described in approach–avoidance terms (I want that cookie vs. I want to avoid it), they can also be re-framed in avoidance–approach terms (I do not want to miss that cookie vs. I want to lose weight). As self-control conflicts entail competing motivations, avoiding one motivation implies approaching the other, and vice-versa.

Reactive processes of self-control

When looking for an example of self-control application in our day-to-day life, many of the situations that spring to mind are those in which people reactively attempt to inhibit impulses set into motion by temptations in their immediate environments. This, for example, may describe the dieter who, facing a high-calorie, attractive piece of cake, must resist the urge to eat it, or the smoker who is attempting to quit and, seeing a friend light a cigarette, must resist the urge to smoke. It is thus unsurprising that a great deal of research has focused on this reactive effortful inhibition of impulses as a primary mechanism of self-control (e.g. Heatherton & Baumeister, 1996; Hofmann, Friese, & Strack, 2009; Wegner, 1994). Impulses are thoughts, feelings, or behaviors activated in response to stimuli that advance local over global motivations. These impulses will lead to self-control failure unless they are recognized as unwanted and inhibited. In popular dual-process or dual-systems theories, although the activation of impulses is theorized to occur spontaneously with little awareness or effort (in other words, it is “automatic”), this latter inhibition process is theorized to be consciously initiated and resource-intensive (in other words, it is “deliberative”). Three key lines of evidence support this assertion by showing that: 1) exposure to temptation cues activates impulses to indulge; 2) stronger impulses
increase the likelihood of self-control failure; and 3) lack of cognitive or motivational resources with which to reactively inhibit impulses impairs self-control.

**Exposure to temptation cues activates impulses**

Experimental studies have shown that exposing participants to stimuli relevant to a temptation increases their urge to indulge in the temptation, as well as their subsequent indulgence (Fedoroff, Polivy, & Herman, 1997, 2003; Sayette & Hufford, 1997; Sayette, Martin, Wertz, Shiffman, & Perrott, 2001). For example, Fedoroff and colleagues (1997) exposed restrained and unrestrained eaters to the smell of pizza and subsequently measured their liking of and desire to eat pizza. Restrained eaters, for whom the pizza is a temptation, showed an increase in both liking of the pizza and the desire to eat it after being exposed to its smell. Similarly, Sayette and his colleagues (2001) showed that heavy smokers report stronger smoking urges when exposed to a lit cigarette than when exposed to a roll of tape. Moreover, the activation of these indulgence-affirming responses to temptation cues occurs very rapidly and without conscious intent. For example, when sentences describing actions that have to do with food are quickly presented (within 300 ms) followed immediately by hedonic eating words (e.g. “tasty”), dieters are faster to respond when the food is appetizing than when the food is neutral; non-dieters, by contrast, do not show this effect (Papies, Stroebe, & Aarts, 2007). This suggests a cognitive readiness to evaluate temptations positively after exposure to temptation cues.

**Stronger impulses are associated with self-control failure**

The strength of people’s impulses tends to predict indulgence in temptations. For example, the strength with which people associate smoking to “good” relative to “bad” – known as their implicit attitude – is a predictor of smoking. Multiple studies have found that, for example, people who smoke have more positive implicit attitudes toward smoking than non-smokers and these implicit attitudes can predict the degree of cigarette craving (De Houwer, Custers, & De Clercq, 2006; Huijding & De Jong, 2006; Waters et al., 2007; Wiers & Stacy, 2006). This suggests that one reason why smokers have difficulty in quitting is because they struggle with particularly strong temptation impulses.

Waters et al. (2003) used an Emotional Stroop task to test the degree to which smoking-related stimuli drew the attention of smokers who were trying to quit. In the Emotional Stroop task participants see words presented in different colors and are asked to identify the font color. The presented words are either neutral words or emotional words (in this case, smoking-related words), and the degree with which emotional words hinder responses indicates the amount of attention these words automatically draw from participants. Waters et al. (2003) found that participants who showed a greater attentional bias toward smoking-related words were less likely to successfully quit cigarettes. This suggests that those who experience stronger local motivational impulses – in this case, indexed by a tendency to attend to temptation-related stimuli – are more likely to struggle with self-control.

**Decrement in cognitive and motivational resources impair self-control**

Supporting the assertion that reactive inhibition is a resource-intensive process, research suggests that decrements in the resources needed to inhibit temptation impulses lead to self-control failure. For example, people placed under cognitive load – i.e., when cognitive and attentional
resources are burdened by the demands of a concurrent task – are more likely to choose smaller-immediate over larger-delayed financial rewards (Hinson, Jameson, & Whitney, 2003) and consume foods that undermine their dieting goals (Ward & Mann, 2000). Beyond cognitive resources, research suggests that people may also require sufficient motivational resources for successful self-control. Research in the ego-depletion tradition suggests all acts of self-control draw on a common pool of energy resources. Following one act of effortful inhibition, this pool becomes depleted, leaving fewer resources for subsequent situations – leaving people vulnerable to self-control failure (e.g. Muraven & Baumeister, 2000). Indeed, dieters who were asked to inhibit their emotional expression while viewing a sad movie subsequently consumed more ice cream in an ostensible “taste test” (Vohs & Heatherton, 2000).

Proactive processes of self-control

Based on the three lines of evidence reviewed above, many have concluded that self-control involves the effortful and costly reactive inhibition of urges that arises when one is exposed to a temptation. These accounts detail reactive mechanisms that attempt to weaken or restrain local motivational impulses. However, this conclusion overlooks other research that highlights more proactive processes that decrease the likelihood of encountering temptations in the first place, as well as put into place plans of action that are readily accessible and automatically implemented when temptations are inevitably encountered. These proactive mechanisms are important to understand, because most, if not all, of them require less conscious effort and resources to enact than reactive inhibition. In this way, proactive relative to reactive processes may represent “easy” ways to advance global motivations over competing local motivations, thus promoting self-control.

Strategies to decrease exposure to and opportunity to engage in temptations

Changing the choice environment

Given that temptation cues (e.g., the sight or smell of unhealthy foods for dieters or cigarettes for those trying to quit) in the immediate physical and social context tend to activate the local motivation to indulge in these temptations, avoiding such situations should be beneficial for acting in line with global motivations. For example, a person with the goal to maintain a healthy weight might take a route home that bypasses the hamburger joint where he or she invariably ends up picking up a bacon cheeseburger and extra-large fries for dinner. Indeed, research suggests that those who are more successful at self-control tend to be those who avoid situations that tempt them to indulge (Ent, Baumeister, & Tice, 2015; Gillebaart & De Ridder, 2015). Similarly, part of the developmental trajectory of self-control is learning that self-control is easier if temptations are removed from one’s perception, for example by covering marshmallows that you are not supposed to eat (Mischel & Mischel, 1983).

Even when avoiding a temptation entirely is impossible, self-control can still be made easier if one avoids attending to the tempting stimulus. For example, young children instructed to actively avoid paying attention to a gift and other attention-drawing temptations are better able to resist the temptation than children who are just asked to focus on their task (Patterson & Mischel, 1976). Likewise, simply instructing adults to pay attention to health rather than taste concerns before giving them a choice regarding food consumption increases the amount of healthy foods chosen and decreases the amount of unhealthy foods chosen (Hare, Malmaud, & Rangel, 2011).
**Modifying choice outcomes**

Similar to changing the choice environment, another way in which people may increase the likelihood of advancing global over local motivations is by increasing, in advance, the costs of failure or benefits of success, thus making the local temptation less attractive. Often this is done by pre-committing to a choice set in which self-control failures incur externally introduced rewards or penalties. For example, a person who wants to quit smoking may pre-commit by joining a month-long smoking cessation program where the payment is partially refunded but only for participants who successfully reduce their smoking.

There is empirical evidence to show that people do adopt such pre-commitment tactics, and that they do in fact promote self-control. Research found that people pre-commit to self-imposed deadlines to avoid procrastination (Ariely & Wertenbroch, 2002). In the domain of health, smokers who committed to a 6-month program in which they were required to deposit money into a savings account that would be returned if they passed (but not if they failed) a urine test at the end of the 6 months were less likely to be smoking even 12 months later, compared with smokers who made no such commitment (Giné, Karlan, & Zinman, 2010). In a recent study by Schwartz and colleagues (2014), participants enrolled in a healthy food incentive program who receive a 25% discount on groceries were offered the chance to pre-commit to raising their household baseline of healthy food purchases by 5% monthly for a period of 6 months with the penalty of losing their discount if they failed. Families that chose to pre-commit experienced an increase in percentage of healthy food purchases relative to families that declined the program and also relative to a control group that was only hypothetically offered the pre-commitment. These studies demonstrate that when the option to pre-commit is available, people use it to advance their self-control, and that these strategies facilitate greater adherence to global motivations.

Examining the adaptive way in which pre-commitment to penalties is used, Trope and Fishbach (2000) found that people are more likely to pre-commit when self-control is likely to be harder. In one experiment, participants chose to impose a greater monetary penalty on themselves for failure to abstain from certain appealing foods if abstinence was required for 3 days versus 6 hours. Presumably, abstaining for 3 days is more difficult and thus requires pre-committing to a greater penalty to encourage goal-consistent behavior. Similarly, in another study (Trope & Fishbach, 2000), among participants who put a high value on the results of a very painful vs. painless health examination, those who expected a painful procedure were more likely to postpone receiving a bonus until after the examination than those who expected a painless one. Thus, it appears that people can adaptively use pre-commitment strategies when those are available to protect their global motivations when they expect self-control to be difficult.

**Automatic self-control**

Most research on self-control has assumed that self-control requires processes that are willfully initiated and executed by the person. A growing body of research, however, suggests that self-control may be advanced by processes that are “automatic.” By automatic, we refer to any process that falls under at least one of the four following conditions (Bargh, 1994): i) the process does not require conscious intent to initiate, ii) the process does not require awareness, iii) the process does not require cognitive resources, and iv) once initiated, the process cannot be stopped by the individual.
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Implementation intentions

Research indicates that people can form if–then plans that link a specific situation to a behavior consistent with their global motivations (see Oettingen & Gollwitzer, Chapter 33 of this volume). A dieter, for example, might form the plan “IF I am asked about dessert, THEN I will say no.” Research suggests that although it may take conscious effort to initially generate these plans, the execution of these plans in the critical situation may proceed without conscious awareness and in situations that present cognitive constraints (Gollwitzer & Sheeran, 2006). The utility of implementation intentions has been demonstrated in the field and across various health-related domains including weight-loss and engaging in physical activity (e.g. Bélanger-Gravel, Godin, Bilodeau, & Poirier, 2013), screening for cancer (e.g. Prestwich et al., 2005), and healthy eating (see Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011 for a review). As such, implementation intentions appear to represent a means of advancing self-control that capitalizes on automatic processes.

Bolstering the value of the globally motivated goals relative to locally motivated temptations

Another way to promote self-control is by bolstering the value of the globally motivated goals relative to locally motivated temptations. For instance, faced with the prospect of readily available high-calorie sweets, a dieter might become more resolute in his dieting goals. This sort of counteractive bolstering was demonstrated empirically (Trope & Fishbach, 2000). Participants in the study expected a health exam that would require either 6 hours or 3 days of abstinence from glucose-containing foods. Participants who expected to undergo 3 days of abstinence rated the exam as more useful and more important than those who expected to undergo just 6 hours of abstinence, suggesting bolstering of the value of the health exam. Another way in which a dieter may enhance self-control is by devaluing temptations, temporarily viewing them as less appealing than they normally seem. Myrseth, Fishbach, and Trope (2009), for example, found that prior to making a choice between two snacks, participants rated health bars relative to chocolate bars more positively. Notably, after they made this choice, they indicated that the chocolate bars were just as appealing as the health bars. This unique pattern of results suggests that although people like temptations, when they threaten globally motivated goals (as is the case prior to making a choice), temptations are strategically devalued.

Importantly, research indicates that this counteractive bolstering of globally motivated goals and devaluing of locally motivated temptations can operate automatically. On each trial of an evaluative priming task, participants in a study by Fishbach, Zhang, and Trope (2010) were subliminally presented (or “primed”) with either a goal-relevant (e.g., slim, diet, thin) or temptation-relevant word (e.g., cake, chocolate, chips), followed by a positive or negative word (e.g., love, peace, evil, ugly) that they had to identify as good or bad as quickly as possible. Research suggests that responses to this identification task are faster to the degree that the valence of the “prime” (goal vs. temptation words) matches the positive or negative target words. Dieters were faster to identify negative words when preceded by temptations and positive words when preceded by goal words. As the priming stimuli were presented subliminally – i.e., outside of the participants’ conscious awareness – these results suggest a preconscious readiness to evaluate temptations negatively and goals positively. Thus people appear to engage in counteractive bolstering of the value of globally motivated goals and diminishing of the value of locally motivated temptations, and these processes can occur automatically – without conscious awareness or intention.
Asymmetric temptation-goal associations

Successful goal-pursuit will be more likely to the extent that people focus on globally motivated goals and not locally motivated temptations. Thus, a pattern of cognitive associations whereby local temptations facilitate thinking about global goals, but goals do not reciprocally facilitate thinking about temptations, should be beneficial to self-control (Fishbach, Friedman, & Kruglanski, 2003; Papies, Stroebe, & Aarts, 2008). In demonstration of this idea, Fishbach et al. (2003) found that participants were faster to identify goal-relevant words when they were preceded by subliminal presentation of temptation-related words, yet took longer to identify temptation words when they were preceded by subliminal presentation of goal words. This pattern of responses suggests that whereas temptation words activated thoughts about goals, goal words did not activate thoughts about temptations. Another study demonstrated that this asymmetric association between goals and temptations operates even under conditions of cognitive load. Thus, asymmetric temptation-goal associations appear to represent an automatic cognitive process that supports self-control in that they are efficient and operate outside of conscious awareness and intention.

Construal

Decades of research suggests that what determines people’s thoughts, feelings, and actions are not necessarily the objective features of events, but rather their subjective construal or understanding of those features (Griffin & Ross, 1991). For example, whereas thinking of cake as a “tasty treat” is likely to promote indulgence, thinking of the same cake as a “diet-buster” is likely to promote restraint. Indeed, extensive research indicates that how people construe decisions that entail self-control plays a key role in their decisions.

In an early study, Mischel and Baker (1975) trained young children to reconstrue temptations in a manner that was less likely to provoke impulsive behavior. For example, when presented with a marshmallow, children were asked to imagine that marshmallow as a cloud rather than as a food reward. Children who reconstrued temptations in this way exhibited greater self-control (i.e., restraining from eating the marshmallow) than those who were not trained. Similarly, when children were asked to imagine that a food temptation was not real by visualizing a picture frame around it, they evidenced greater self-control (Moore, Mischel, & Zeiss, 1976). Of particular note, when children were asked to imagine that a picture of a food temptation was real, they evidenced greater impulsiveness. This latter finding clearly demonstrates that what determines one’s self-control is not the objective features of the temptations, but rather one’s subjective construal of those features.

More recently, Fujita and colleagues (Fujita, 2008; Fujita & Carnevale, 2012) have demonstrated the critical role that cognitive abstraction, or high-level construal, plays in self-control. Research suggests that when thinking about distant future events, people tend to construe events by their abstract, global properties (i.e., high-level construal; Trope & Liberman, 2010). By contrast, when thinking about near future events, people tend to construe events by their concrete, local properties (i.e., low-level construal). Given that self-control is enhanced by future-directed thought, Fujita and his colleagues reasoned that promoting construals that are consistent with more distant relative to near future events – that is, high-level rather than low-level construal – should promote self-control. Indeed, a growing body of work supports this assertion. In one study, for example, to encourage more abstract, high-level construal (vs. more concrete, low-level construal), Fujita and Han (2009) had female participants – a population typically concerned with maintaining a healthy weight – generate superordinate category labels
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(vs. subordinate exemplars) for 40 everyday objects (“vehicle” vs. “sedan” for the object “car”). Those in the high-level relative to low-level construal condition were more likely to prefer an apple over a candy bar as a snack. This, together with a number of other findings, suggests that high-level relative to low-level construal enhances self-control.

Critically, research suggests that construal level enhances self-control by promoting proactive rather than reactive processes of self-control. Research indicates that many of the proactive processes we have reviewed earlier – including modifying choice outcomes, bolstering the value of goals over temptations, and asymmetric temptation-goal associations – are more evident when people are engaged in high-level relative to low-level construal. Participants engaged in high-level relative to low-level construal, for example, are more likely to pre-commit to penalties for anticipated self-control failure (Fujita & Roberts, 2010). They are also more likely to engage in “automatic” forms of counteractive devaluation of temptations (Carnevale, Fujita, Han, & Amit, 2015; Fujita & Han, 2009) and evidence asymmetric temptation-goal associations (Fujita & Sasota, 2011). Thus, high-level relative to low-level construal appears to represent an important factor that promotes proactive forms of self-control.

Enduring questions and future directions

Given widespread assumptions about the inhibitory nature of self-control, research has revealed much about the who, when, and how questions of inhibition. That is, research has highlighted individual difference and situational factors that promote vs. impair inhibition, and has illuminated many of the cognitive and motivational mechanisms (see chapters by Berkman; Gillebaart & De Ridder; Milavskaya & Inzlicht; Molden, Scholer, & Hui; and Wagner, this volume). Comparatively less is known about the who, when, and how of proactive self-control. Although the research reviewed above highlights construal level as one important factor, more still needs to be done to explain who is likely to use proactive self-control, under what conditions, and by what mechanisms these processes promote self-control.

Given that proactive self-control tends to require less conscious effort and resources than reactive self-control, it appears to represent a more efficient and robust means of prioritizing global over local motivations. The extent to which proactive self-control processes are in fact used by people in their everyday life is an open and intriguing question. Some evidence suggests that this is the case, such as the finding that high trait self-control is related to the success of more effortless forms of self-control behavior, suggesting that those who are most successful at self-control use proactive self-control strategies (De Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Gillebaart & De Ridder, 2015; Chapter 4 of this volume). Yet, more tests need to be carried out to examine the specifics of who, when, and how proactive self-control is used in real-life settings.

Another area ripe for future research is studying how reactive and proactive mechanisms interact. One possibility is that they are substitutable. That is, it may be the case that those who are most successful at self-control primarily engage proactive processes that render reactive processes unnecessary (Fujita, 2011; Gillebaart & De Ridder, Chapter 4 of this volume). For example, successfully avoiding temptations, generating specific if–then plans, and developing automatic forms of self-control like asymmetric temptation-goal associations may leave people less likely to experience strong temptation impulses, thus obviating the need for any inhibition of those impulses. More also needs to be understood about how the various proactive processes interact with one another. Some may work together. For example, it appears that high-level relative to low-level construal promotes self-control by leveraging many of these processes. On the other hand, successfully engaging in one may reduce the need to engage in the other. For
example, having in place effective automatic temptation-goal associations may reduce the need
to avoid temptations as research suggests that the efficacy of these associations is highest when
people are actually confronted with temptations (Fishbach et al., 2003). By better understanding
how these processes work together (or not), not only will researchers have greater insight into
why some are better at self-control than others, but practitioners may also be able to use such
insights to develop more effective interventions for those who are struggling.

One paradoxical insight that emerges when appreciating both reactive and proactive forms
of self-control is that chronic use of reactive processes may reflect a failure to capitalize on more
efficient, more contextually robust proactive processes. As noted above, effective use of proac-
tive self-control may render reactive self-control unnecessary. Thus, individuals who chronically
must engage in reactive processes to promote self-control are those who may have failed to
engage more effective processes earlier in the progression of self-control. Thus, although inhibi-
tion may promote self-control when all other processes fail, over-reliance on inhibition – a
process susceptible to disruption and fatigue – may ultimately be unsustainable and lead to
breakdowns of self-control. Rather than represent a hallmark of successful self-control, then,
solely relying on reactive processes may actually signal a vulnerability to failure.

Summary

In this chapter, we have explored what self-control is and how it may impact health-related
decision-making and choice. Critically, we have also reviewed the different ways that self-
control is enacted. Consistent with lay intuition, research examining reactive forms of
self-control suggests that self-control is effortful, resource-demanding, and prone to systematic
failure. Research on proactive forms of self-control, however, provides an important counter-
point to these conclusions, suggesting that self-control may at times be efficient, engage without
conscious intention, and be more robust across various contexts. Proactive self-control may
thus represent an “easy” form of self-control that is more effective in helping people overcome
temptation. We encourage and look forward to future research that further explores these two
forms of self-control and their dynamic interplay in promoting people’s long-term global goals,
particularly in the health and well-being context.

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