

CHAPTER 20

Ego Depletion and the Limited Resource Model of Self-Control

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ABSTRACT

People break diets, procrastinate in the face of looming deadlines, imbibe too much alcohol the night before a midterm, struggle to save money, and lash out at loved ones and family members. They do all these things despite their best intentions not to. Why do people engage in such personally, interpersonally, and socially destructive behaviors? This chapter suggests that a major reason why people fail at self-control is because it relies on a limited resource. We define self-control as the capacity to alter one's responses; it is what enables people to forego the allure of short-term pleasures to institute responses that bring long-term rewards. One of the core functions of self-control may be to facilitate culture, which often requires that people curtail selfishness for the sake of effective group functioning. The first part of the chapter gives an overview of how self-control operates, including the possible biological basis of self-control. It covers a substantial body of literature suggesting that self-control operates on a limited resource, which becomes depleted with use. The second part of the chapter reviews the benefits of good self-control and the costs of bad self-control across a large variety of domains, such as consumption, self-presentation, decision making, rejection, aggression, and interpersonal relationships.

Keywords: Self-control, ego depletion, willpower, impulse, motivation

EGO DEPLETION AND THE LIMITED RESOURCE MODEL OF SELF-CONTROL

People break diets, make impulsive purchases, procrastinate in the face of looming deadlines, engage in unsafe sex, and yell at their spouses, children, and friends. They do all these things despite their best intentions to do otherwise. Why are people not very good at controlling their consumption, emotions, and impulses? Or, more specifically, why do people fail at self-control? This chapter features one answer to these questions, based on

the understanding that self-control consumes a limited resource.

We define self-control as the self's ability to override unwanted thoughts, emotions, impulses, and automatic or habitual behaviors. When people are faced with impulses that conflict with longer-term goals, self-control is the capacity that allows the self to stop those unwanted impulses from developing into full-blown behaviors. In this way, self-control allows people to achieve goals that they have set for themselves and to conform to rules and standards imposed by their social environment.

Accumulating research findings suggest that self-control works much like a muscle: It can become fatigued when overused, making subsequent attempts at self-control difficult and making self-control failure probable. Indeed, the limited resource model of self-control states that all acts of self-control draw on the same limited resource and this resource becomes depleted with use (Baumeister & Heatherton, 1996; Baumeister, Heatherton, & Tice, 1994). Resource depletion increases the chance that people give in to unwanted urges, impulses, and desires.

The purpose of this chapter is to provide an overview of how self-control is needed to help people resolve inner motivational conflicts. Whenever a person is pulled between two impulses, motivations, or standards, self-control can be helpful, especially to restrain the self from acting on the impulse that would bring short-term benefits but long-term costs.

The chapter is comprised of two main sections. The first focuses on how self-control helps people resolve motivational conflicts that pit short-term gains against long-term costs or personal pleasures against interpersonal costs. It also describes how self-control operates, including the possible biological basis for self-control. The second part of the chapter presents evidence demonstrating the benefits of good self-control and the costs of bad self-control across a variety of domains. For example, it covers how self-control influences interpersonal relationships, addictive behaviors, and reactions to social rejection.

SELF-CONTROL RESOLVES INNER MOTIVATIONAL CONFLICTS

Self-control is vital to success in life and is regarded as one of the most important parts of the self (e.g., Baumeister, 1998; Higgins, 1996). Research indicates that people with good self-control do better in work and in social life, and they have fewer psychopathological problems than other people with relatively poor self-control (Duckworth & Seligman, 2005; Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990; Tangney, Baumeister, & Boone, 2004). In

contrast, poor self-control is regarded as one of the most important causes of crime (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000) and has also been implicated as a major factor in other problematic behaviors such as impulsive spending and alcohol abuse (e.g., Muraven et al., 2005; Vohs & Faber, 2007).

Whenever two motivations or standards compete against one another, self-control is needed to restrain the unwanted impulse from manifesting itself in to behavior. Such inner motivational conflicts can be characterized as ongoing cost–benefit analyses. Often there are benefits of acting on the emerging impulse, which contributes to why such impulses can be difficult to override. However, the benefits are usually short-term and acting on the impulse can be associated with longer-term costs. A classic example of a motivational conflict is that of a dieter who is offered a piece of cake. The dieter may have the urge to say “yes” because eating cake would bring him or her short-term pleasure. However, the long-term goal of maintaining a fit physique, which is highly valued by Western culture, is also salient, and so the dieter may also be motivated to answer “no.” These two motivations (pleasure of eating vs. goal to maintain physique) are in conflict, and self-control is needed to refrain from saying “yes” and to institute the answer “no.” Motivation to stick to the diet, the social norm of the situation, and the amount of self-regulatory resources available all influence the cost–benefit analysis of motivational conflicts, but it is self-control that is the vital capacity needed to suppress the emerging undesired impulse.

THE IMPORTANCE OF SELF-CONTROL

Good self-control benefits people at the individual level, the interpersonal level, and the societal level. People must override their own selfish impulses to cooperate with others, and adhere to morals, social norms, and other rules more generally. At the individual level, a person with good self-control is able to succeed at school and work, save money for a desired vacation, avoid self-destructive behaviors, and maintain an attractive physique. At the interpersonal level,

good self-control facilitates relationship maintenance behaviors (e.g., Finkel & Campbell, 2001). At the societal level, good self-control helps people refrain from cheating, committing crimes, and engaging in unsafe sex practices. For example, people refrain from stealing because the short-term benefits associated with stealing often do not outweigh the long-term costs, which can include social disapproval and imprisonment. Indeed, poor self-control is often regarded as one of the most important causes of crime in that criminals often lack self-discipline (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000).

People who fail at self-control often claim that their behavior was not under their control (e.g., succumbing to addiction). Scholars, however, argue that most impulses are more or less under our control (e.g., Baumeister & Heatherton, 1996). If a gun were put to a person's head, he or she would probably be able to forego a tempting piece of chocolate cake, refrain from smoking, or refrain from arguing with a spouse. Uncontrollable factors, such as societal forces, environmental primes, and latent motivations all have the ability to arouse the impulse to perform such behaviors, but whether people engage in such behaviors is under their volitional control. Given that people often break diets, fail to quit smoking, and otherwise actively exert energy to engage in behaviors they do not want to, it is clear that people do not always regulate such impulses. That people could likely refrain from engaging in such behaviors if their life were on the line (i.e., they are given sufficient motivation to control the impulse) suggests that most impulses are not irresistible but are actually under people's control. Whether people do restrain impulses, however, depends on factors that reside in both the person (e.g., motivation or trait ability to self-regulate) as well as the situation (e.g., environmental stress factors or prospect of social approval from others). One of the main reasons people fail at self-control is insufficient resources to overcome the impulse (Baumeister & Heatherton, 1996), although people can still self-regulate if they are motivated to do so.

Hoch and Loewenstein (1991) suggested that whether people will consume at any given time

depends on two things: the strength of the urge and the ability (strength) of the self to resist the urge. As we have already mentioned, self-control strength fluctuates. However, the strength of the impulse also varies, and this likely influences the chance of successful self-control.

Recent research suggests that people may feel stronger emotions and urges when they are depleted of their self-control resources as compared to when their self-control resources are intact (Vohs, Mead, & Schmeichel, 2008). For example, participants who were required to exert self-control on an initial task felt more negative emotions and less positive emotions toward a sad film clip than participants who were not required to exert self-control on an initial task.

Additional studies conducted by Vohs et al. (2008) found that increased urges after exerting self-control statistically mediated the negative effect of prior self-control exertion on subsequent self-control attempts (known as ego-depletion). In one study, participants who were required to engage in an initial act of self-control reported a stronger urge to eat cookies available to them (ostensibly as part of a taste test) as compared to participants who were not required to engage in an initial act of self-control. Replicating previous research on ego-depletion, participants who initially exerted self-control ate more cookies than participants who had not initially exerted self-control. Increased urge to eat the cookies after the initial self-control task was further found to mediate the effect of the first self-control task on the number of cookies eaten. Thus, at the end of a long day, not only do people have fewer resources to overcome the urge to consume a tempting snack than at the beginning of the day, but their desire to consume an unhealthy and tempting snack could be stronger as well. The two components that influence the outcome of a self-control conflict—the strength of the urge and the strength needed to overcome the urge—are separate, but they do appear to influence one another. In other words, when an urge becomes stronger, the self probably needs to muster up greater self-regulatory powers to overcome the urge.

HOW SELF-CONTROL OPERATES

There are three main ingredients of self-control: standards, monitoring, and strength. Each ingredient contributes to successful self-control, but each ingredient on its own does not guarantee successful self-control and represents a possible pathway for self-control failure (Baumeister et al., 1994; Carver & Scheier, 1981). We begin by providing a brief overview of the three main components and then describe a fourth ingredient that was recently proposed by Baumeister and Vohs (2007). After providing an overview, we give greater detail on the strength component, which is argued to be one of the main reasons for failed self-control (Baumeister & Heatherton, 1996).

Standards

The first component of self-control is standards. Standards are concepts of desired states, including expectations, values, and goals that a person wants to achieve. If a person has the goal to lose weight, he or she may set a desirable weight as the desired goal. For effective self-control, standards need to be clear and well-defined. If the standards are vague, ambiguous, inconsistent, or conflicting, problems achieving the goal can occur, and failed self-control becomes likely (Baumeister et al., 1994).

Monitoring

The second component of self-control is monitoring of the target behavior, especially in relation to the set standard or goal. Similarly to standards, monitoring can influence the likelihood that one fails at self-control. Good monitoring of the self can facilitate self-control, but poor monitoring can result in self-control failure. For example, eating binges seem to occur when people stop keeping track of what they have eaten (for a review, see Heatherton & Baumeister, 1991). It has even been argued that one of the main functions of self-awareness is to increase monitoring so as to facilitate self-control (Carver & Scheier, 1981). Self-awareness draws attention to standards and goals and may therefore facilitate effective self-control. In contrast, alcohol has been

argued to increase the chance of self-control failure (Baumeister et al., 1994) because alcohol impairs people's ability to monitor themselves (e.g., Hull, 1981).

Strength

In addition to appropriate goal setting and effective monitoring, successful self-control requires active exertion by the self toward achieving those goals. Even when people set appropriate standards and successfully monitor their progress toward their standard, they can still fail at bringing about the desired change because they do not expend the energy necessary to implement the desired behavior (Baumeister & Heatherton, 1996). Evidence indicates that the capacity to exert control over the self is limited in that it relies on a limited energy source or operates like a muscle (Baumeister & Heatherton, 1996; Baumeister et al., 1994; Gailliot et al., 2007). The limited resource model of self-control states that all acts of self-control draw from a common, but finite, pool of resources (Muraven & Baumeister, 2000). Thus, when people exert self-control, the resource becomes depleted and self-control failure becomes more likely than when this resource is intact (e.g., Muraven & Baumeister, 1998; Baumeister et al., 1998; Vohs & Schmeichel, 2003).

For example, in one study, participants were seated in front of a bowl of radishes and a bowl of chocolates (Baumeister et al., 1998). Participants randomly assigned to the depletion condition were told to avoid eating the chocolates and instead eat only the radishes. To comply with the researcher's request, the participants therefore had to suppress any desire to eat the chocolates and force themselves to eat the relatively unpleasant alternative instead. Participants randomly assigned to the no-depletion condition were allowed to eat freely and therefore exerted relatively less self-control than participants in the depletion condition. To assess participants' ability to exert self-control on a subsequent and unrelated task, the researchers measured how long participants persisted on an impossible figure-tracing task. To keep working on the task, even in the face of failure and discouragement, required self-control insofar as

participants were required to override the urge to quit and instead kept working on the task. As predicted, participants who had previously forced themselves to eat the radishes instead of the chocolates quit much sooner on the figure-tracing task than participants who were allowed to eat whatever they wanted. Thus, participants who had to exert self-control to successfully complete the first task had less energy to exert self-control on the second task than participants who did not have to exert self-control on the first task.

Limited resources appear to be needed for the self's executive function, and thus they are used for behaviors that involve effortful control. Overriding impulses, interrupting behavioral sequences, and other acts of self-regulation that require conscious effort will deplete these resources, whereas automatic and straightforward behaviors will consume much less of them. At present, the most likely integration is that behaviors requiring active and effortful guidance by the self deplete the limited resource, whereas relatively habitual, overlearned, automatic, easy, and unconflicted actions do not consume it. The fact that controlled and executive processes are expensive in terms of this limited resource may be an important reason that so much of life follows routines and habits and that people readily automatize patterns of response that occur frequently, because such styles of action conserve resources.

Motivation

Baumeister and Vohs (2007) recently proposed that level of motivation to achieve a goal or meet a standard should be considered a fourth component of self-control. As mentioned previously, impulses such as sleeping and urinating are likely irresistible, given that no level of motivation could prevent them from occurring at some point. However, most impulses are probably not entirely irresistible and motivation conceivably influences whether a person does exert control over the self. That is, even when the self-control muscle tires, making exertion more difficult, it can still be flexed when given sufficient motivation.

Limited Resource Model of Self-Control

Self-regulatory strength fluctuates from person to person and from situation to situation. Early on, researchers recognized that because self-control seemed much like a muscle, the strength of one's self-control probably could gradually increase or decrease over time. Research supports the notion that self-regulating regularly may reduce susceptibility to self-regulatory depletion. In one study, some participants were asked to maintain good posture over the course of 2 weeks, whereas other participants were not asked to engage in a specific act of self-control over the 2 weeks (Muraven, Tice, & Baumeister, 1998). Results indicated that participants who had completed the regular exercises persisted longer on a laboratory persistence task (used to measure self-regulatory performance) than participants who had not completed the regular exercises.

A series of studies by Gailliot, Plant, Butz, and Baumeister (2007) found similar improvement in self-control from regular self-control exercise. Specifically, participants who completed 2 weeks of self-regulatory exercises performed better on (quite different) self-control tasks than participants who did not complete 2 weeks of self-regulatory exercises. Presumably, regularly monitoring and controlling the self improved participants' self-regulatory stamina, such that their self-regulatory strength was not drained as easily (for a review of studies that provide converging evidence, *see* Baumeister et al., 2006).

If self-regulatory strength is similar to a muscle, then there should be ways that the strength is replenished or ways to increase exertion despite exhaustion. Regarding replenishment of resources, one route suggested has been sleep and rest. People are much more likely to break their diets, commit impulsive crimes, or go on alcohol binges later in the evening than, say, in the morning (Baumeister et al., 1994). Presumably, people have exerted self-control throughout the day and have fewer resources remaining at the end of the day compared to the beginning of the day to control such impulsive acts. Perhaps more illuminating is research

indicating that people were more effective at self-control at work if they had rested and recovered after work than if they did not get such rest (Sonnetag, 2003). For example, people who rested after they finished working for the day took more initiative and performed better at their job the next day than those who had not rested after they finished working for the day. Indeed, following a vacation, many people come back to work with renewed energy, saying that they feel refreshed and ready to delve back into work.

Biology of Self-Control

Recent research suggests that self-control may rely on glucose that is available in the bloodstream (Gailliot et al., 2007). Consistent with the theory that self-control depends on and depletes a limited resource, acts of self-control have been shown to reduce the amount of available glucose in the bloodstream and impair subsequent self-control attempts. For example, one study showed that blood glucose level dropped for participants who had to control their attention while watching a video, but it did not drop for participants who watched the video as they normally would (i.e., without trying to regulate their attention). The amount of glucose available in the bloodstream positively predicted performance on a subsequent self-control task: the lower the glucose, the poorer the self-control. The researchers further found that when they restored glucose to optimal levels, self-control decrements were eradicated. In other words, participants who engaged in initial acts of self-control but imbibed a drink that contained sugar performed better on a self-control task than participants who had engaged in an initial act of self-control but did not ingest glucose. Thus, the glucose drink seemed to replenish people's capacity for self-control.

EXECUTIVE FUNCTION OF THE SELF

As previously mentioned, self-control enables individuals to exert volitional control over their lives. The part of the self that allows for this volitional control is referred to as the executive function of the self (see Baumeister, 1998).

In addition to being responsible for enabling people to overcome urges and habits (as in self-control), the executive function of the self also seems to be vital to decision making. Indeed, research indicates that decision making may also draw on the same limited resource as that which self-control draws from (e.g., Baumeister et al., 1998; Vohs et al., 2008). In one study conducted by Baumeister et al. (1998), some participants were asked to give a counterattitudinal speech whereas other participants were asked to take the position on the speech but were led to believe it was ultimately their choice which position they took. Participants who believed they chose to give a counterattitudinal speech persisted for a shorter period of time on a subsequent self-regulatory task as compared to participants who had been told which position to take on the speech. In a different study, participants who made a series of choices subsequently drank less of a healthy but bad-tasting drink than participants who were simply asked to rate the same items without making choices (Vohs et al., 2008). Thus, the act of choosing seems to reduce people's self-regulatory powers temporarily.

Ego depletion also alters the way that people choose, which has implications for people's memory. Previous research on the self-choice effect indicates that individuals have superior memory for items that they chose than for items that have been chosen for them (e.g., Kuhl & Kazén, 1994). However, participants who engage in an act of self-control prior to choosing no longer show increased memory for items they chose (Schmeichel, Gailliot, & Baumeister, 2005). The lack of enhanced memory for items chosen by the self suggests that ego depletion may cause participants to choose in a relatively arbitrary manner, which makes them less likely to remember their choice than if it had been chosen in a more meaningful way.

The executive function also allows people to resist unwanted influence from others. Knowles, Brennan, and Lynn (2004) found that as participants went through a series of political advertisements they became progressively less skeptical of the information presented in the advertisements. This suggests that resisting

persuasive messages depletes people's limited self-regulatory abilities, making it progressively more difficult to resist persuasive messages. More recently, research by Wheeler, Briñol, and Hermann (2007) has indicated that depletion increases the chance that people are easily persuaded. In one study, all participants first formed the habit of crossing out every instance of the letter "e" in a passage of text. Participants were then given a second piece of text. Half of the participants were asked to break their newly formed habit by crossing out the letter "e" according to a new set of rules, whereas the other half of participants continued following the initial instructions. Overriding habits requires active self-control and so participants who were asked to break the habit expended relatively more self-regulatory resources during the second task than participants who simply followed the initial rule. Results indicated that the participants who had to break the habit were more easily persuaded by a weak argument than participants who did not have to break the habit. Therefore, individuals' ability to evaluate and reject a poor argument may be another aspect of the executive function that depends on self-regulatory resources.

INTERPERSONAL INTERACTIONS

From a very young age, children are instructed to wait their turn, bite their tongue, and keep their hands to themselves. Doing these things will often help children get along socially, yet many children struggle to exert the necessary self-control these tasks require. In adult life, getting along socially also often requires individuals to exercise self-control. Adult interactions are facilitated by a wide range of stated and unstated social rules, many of which demand that individuals forego their immediate impulses in favor of long-term social gain. Self-control seems to be essential for establishing and maintaining these good relationships with others.

Self-Presentation

It is almost always beneficial for individuals to present their beliefs, goals, and personality in

such a way that others will like and approve. However, considering and responding to the needs of a social audience can sometimes be a difficult process. Research has shown that effortful self-presentation taxes people's self-regulatory resources (Vohs, Baumeister, & Ciarocco, 2005). For example, participants who were asked to present themselves as competent and likeable to a skeptical audience were subsequently less able to control their emotions than participants who were told to "act naturally." Additional studies have demonstrated that individuals may present themselves in a less than optimal fashion when they are low on self-regulatory resources. For example, participants who engaged in an initial act of self-control scored higher in narcissism than participants who had not engaged in an initial act of self-control. People may automatically think very highly of themselves (e.g., Greenwald & Banaji, 1995; Pelham, Mirenberg, & Jones, 2002), but they typically restrain such egotistical thoughts and present themselves in a more modest light to others. Thus, ensuring that one's behavior is contextually appropriate can be demanding on the self.

Rejection and Ostracism

Unfortunately not all social interactions run smoothly and from time to time people reject offers of friendship. The act of ostracizing other people, however, appears to exact a cost upon the self. Ciarocco, Sommer, and Baumeister (2001) found that participants who were instructed to refrain from speaking to a confederate later spent less time persisting on unsolvable anagrams than participants who were not required to ostracize the confederate. Participants apparently needed to exert self-control to give other individuals the silent treatment.

Being socially rejected by others also impairs self-control. A series of studies by Baumeister et al. (2005) demonstrated that people who experienced an instance of social rejection or exclusion showed poorer performance on a variety of tasks (dichotic listening, drinking a healthy but bad-tasting beverage, and unsolvable puzzles) than participants who were accepted or who were given bad news that was not social. In one study, participants who were

told that no one in their group wanted to work with them later ate more cookies than participants who were told that every member of their group wanted to work with them. The authors argued that rejected people become less motivated to restrain selfish impulses and behaviors given that we typically do so in return for social acceptance. Indeed, recent research indicates that when rejected individuals are given a non-social incentive to control themselves, self-control decrements after social rejection disappear (DeWall, Baumeister, & Vohs, 2007). Positive social relationships are thus one of the primary motivations for exercising self-control. If positive relationships seem unattainable, individuals will be less inclined to self-regulate unless given sufficient motivation to exert self-control.

Esteem Threat

In the course of daily life, individuals are sometimes faced with information that does not reflect well on themselves. People get bad reviews from bosses, endure complaints from spouses, and get poor marks on tests and papers. Research on self-control offers insight into why some people seem to be better at handling criticism and failure than others. For example, Baumeister, Heatherton, and Tice (1993) found that people with high self-esteem who were first given negative feedback performed worse on a subsequent complex self-regulatory task than people with low self-esteem. Research by Hoffman and Mann (2006) further demonstrated that this effect is specific to individuals with defensive high self-esteem. Specifically, successful self-regulatory outcomes require individuals to be able to predict accurately and set goals that are attainable. If a person sets a goal that is too high for himself or herself, the chance of self-regulatory failure increases because he or she may not be able to perform at the level required to achieve the goal. For individuals with defensive high self-esteem, having their ego threatened may cause them to have difficulty setting appropriate goals for themselves, thereby paving the way for failed self-control.

Aggression

As cultural beings, humans reap countless benefits from the knowledge and efforts of other

people (*see* Baumeister, 2005). Aggression, which involves harming or even killing other individuals, poses a huge threat to this interdependent system. Individuals are therefore expected to avoid acting on harmful urges in order to live harmoniously with others. Recent research indicates that controlling aggressive impulses may require self-control. In one study, participants were first asked to write an essay that ostensibly would be evaluated by another participant (DeWall et al., 2007). Participants randomly assigned to the depletion condition were asked to avoid eating a donut that was placed in front of them, whereas participants in the no-depletion condition were asked to avoid eating much less tempting radishes. After this, participants were given very negative feedback from their partner on their essay (“This is one of the worst essays I’ve ever read”) and were then given the opportunity to respond aggressively toward him or her. Participants were given a variety of ingredients, including hot sauce, to make a snack for their partner who purportedly did not like spicy foods. As predicted, participants who were low in self-regulatory resources added significantly more hot sauce to their critical partner’s snack than participants whose self-regulatory resources were intact. Self-control thus helps people restrain aggressive impulses, but when people’s self-regulatory powers are low they have a more difficult time controlling their impulses, so that they respond more aggressively upon provocation (Stucke & Baumeister, 2006; DeWall et al., 2007).

Relationships

Self-control has been implicated in relationship maintenance strategies. People often attribute success to themselves and failure to others (*see* Campbell & Sedikides, 1999), but a harmoniously close relationship often requires people to go against this tendency. Sometimes close relationships require individuals to take a little less of their share of the credit and a little more of their share of the blame than they normally would. Preliminary research has shown that self-control may influence whether individuals in close relationships share both the credit and the blame (Vohs, Finkenauer, & Baumeister, 2008). Specifically, when people are depleted,

they are more likely to blame their partner for failure and to hog the credit for success.

Remaining in one's current relationship often requires an individual to avoid being tempted by other potential mates. Miller (1997) has shown that the longer participants spent looking at pictures of attractive individuals, the more likely their relationship was to break up during the subsequent months. Vohs et al. (2008) predicted that self-control governs whether individuals in relationships prevent themselves from being distracted and tempted by alternative partners. In a laboratory study, participants who had engaged in an initial act of self-control, and were therefore low in self-regulatory resources, spent more time looking at pictures of scantily clad opposite-sex individuals than participants who had not engaged in an initial act of self-control. This effect was only found among participants who were currently involved in romantic relationships (and who therefore presumably had reason to resist exposing themselves to such tempting images). These findings suggest that self-control helps individuals turn away from potential alternative partners to maintain their current relationship.

Although all relationships seem to require a certain amount of self-regulatory resources, certain kinds of interactions require more resources than others. High-maintenance interactions, which are demanding and inefficient, use more self-regulatory resources than low-maintenance interactions, which are effortless and efficient (Finkel et al., 2006). In one study by Finkel et al. (2006), participants were put in a situation with an unhappy confederate who was either receptive or not receptive to the suggestions of the participant. Participants who were forced to interact with the confederate who was not receptive later were less able to overcome physical fatigue when squeezing a handgrip than participants who interacted with the receptive confederate. The extra effort required to interact with a high-maintenance confederate therefore depleted resources that were later needed for self-control.

Interpersonal relationships are a fundamental part of human existence, and self-control helps us fulfill our need to connect with others.

Research suggests that establishing positive first impressions, responding constructively (and not aggressively) to criticism, and maintaining close relationships all require a certain amount of self-control. When self-control is low, interpersonal relationships suffer, and when interpersonal relationships fail (as in rejection), self-control suffers.

Emotion Regulation

Emotions play a large role in informing people about their environment and their choices (for a review, *see* Baumeister et al., 2007). The fact that emotions may serve such a crucial role in human social life may be part of the reason that humans often have such difficulty changing them (*see* Baumeister, 2005). In a variety of studies, researchers have shown that both suppressing emotions (e.g., Baumeister et al., 1998) and exaggerating them (e.g., Schmeichel et al., 2006) consume self-control resources. For example, people who are required to read passages of boring text in an exaggerated manner show decrements in self-control performance on a subsequent task, indicating that instituting emotional responses can consume resources. Conversely, people's ability to control their emotions is impaired if they had previously expended self-control resources (Muraven et al., 1998).

Research by Vohs and Schmeichel (2003) suggests that reappraising one's emotions may not consume as many self-control resources as controlling one's emotions. Participants who were instructed to watch a film "with the detached interest of a medical professional" were as accurate in their time perception as participants who were not asked to control their emotions. However, participants who were asked to suppress their emotional reactions overestimated the amount of time they spent watching an emotional video. Time perception was taken as an indicator of depletion, as it was established that depletion caused people to perceive that time was moving slower than it actually was. Thus, the finding that participants who suppressed their emotions felt that time was moving slower than participants who reappraised their emotions suggests that suppressing emotions

is more taxing on self-control resources than reappraising emotions.

Indeed, recent research suggests that the way in which people reappraise their emotional experience has implications for their subsequent processing of the emotions (*see* Chapter 23). Evaluating an emotional experience in an unattached fashion, which is different from suppressing emotions, leads to abstract and rational thinking (Kross, Ayduk, & Mischel, 2005). In contrast, reappraising a negative event from an immersed perspective tends to enhance negative feelings associated with the event. The way people evaluate emotional experiences may therefore have implications for subsequent attempts at self-control given that abstract construal of events can facilitate people's self-control (Fujita et al., 2006).

Stress

The popular media often caution about the negative effects of stress on individuals' physical health, and research shows that stress can also cause decrements in individuals' ability to exercise self-control. In an early study of self-control, Glass, Singer, and Friedman (1969) found that exposing people to unpredictable noise led to poorer performance on a proofreading task than exposing them to predictable noise. Further, if participants were led to believe that they could stop the noise, they no longer showed subsequent decrements in performance (even though none of them actually did stop the noise). Bad odors (Rotton, 1983), crowding (Evans, 1979; Sherrod, 1974), and electric shock (Glass & Singer, 1972) are all stressors that have also been shown to decrease individuals' self-control abilities. A review of studies that investigated the relationships between stress and addictive behaviors found that coping with stress lead to relapse for a variety of addictive behaviors (for a review, *see* Muraven & Baumeister, 2000).

Addictive Behavior

As discussed earlier, many individuals view certain behaviors as the result of irresistible urges, termed *addictions*. Although these urges are

not, in fact, irresistible, many individuals seem to have extensive difficulty using self-control to overcome overeating, compulsive shopping, and drug and alcohol abuse.

Overeating

Many individuals struggle with overeating. Indeed, weight loss centers across the country are designed to help individuals overcome bad eating habits. Resisting delicious but unhealthy food has been shown to require self-regulatory resources (Baumeister et al., 1998). As self-control is generally used to bring individuals' behavior in line with their values, attitudes toward food play a large role in how ego-depletion affects their eating habits. Research by Hofmann, Rauch, and Gawronski (2007) found that for participants whose self-regulatory resources were intact, the amount of candies they ate reflected their self-reported views toward food. However, for participants who were low in self-regulatory resources, the amount of candies they ate reflected their automatic responses to food, rather than their stated attitude.

Vohs and Heatherton (2000) tested how resisting food would affect chronic dieters. They found that dieters who were invited to "help themselves" to a nearby bowl of unhealthy snacks later ate more ice cream than dieters who had external constraints not to eat the snacks (the experimenter told them not to touch or the snacks were 10 feet away). For nondieters, the distance and availability of the snacks did not affect participants' subsequent self-control. These findings suggest that, for dieters, the internal struggle to resist food consumed self-control resources, thereby impairing subsequent attempts at self-control. Research by Kahan, Polivy, and Herman (2003) also showed that dieters who had to engage in an initial act of self-control ate significantly more than dieters who did not engage in an earlier act of self-control. However, among nondieters, there was no influence of the self-control manipulation on eating. Findings suggest that whereas nondieters do not normally restrict their caloric intake, dieters use self-control to limit their caloric intake, leading them to eat more when resources to exert self-control are low.

Drugs and Alcohol

Restraining from alcohol and drug abuse can also require self-control. Muraven et al. (2005) found that underage drinkers were more likely to break their self-imposed drinking limit on days when their self-control resources had been heavily taxed than on days when their resources had not been heavily taxed. Testing the relationship between self-control and alcohol experimentally, researchers found that participants who had previously engaged in an act of self-control subsequently drank more alcohol preceding a driving test than participants who had not previously engaged in an act of self-regulation (Muraven, Collins, & Nienhaus, 2002). Further, this effect was particularly pronounced for individuals who reported a generally high temptation to drink. This suggests that depletion may have the greatest effects for individuals who are particularly preoccupied with restricting a particular behavior.

Consumer Behavior

Continually resisting temptation has also been shown to cause self-control decrements in individuals' buying behaviors. Hoch and Loewenstein (1991) suggested that resistance could lead to greater temptation. They found that consumers' desire for a product increased after they resisted buying a product. Research has also shown that lowered self-regulatory resources can affect individuals' buying behavior. For example, individuals who were asked to make many decisions (and were therefore depleted) were more likely to splurge on attractive but expensive items than participants who had not been depleted (Bruyneel et al., 2006). Other research has indicated that self-control allows people to refrain from impulsive spending (Vohs & Faber, 2007). When self-control resources are low, people have a difficult time controlling their spending. In one study, participants were asked to read a long passage of boring text aloud. Half of the participants were asked to read the text in a very animated fashion, whereas the other half of participants read the passage in a natural way. As mentioned

earlier, emotional exaggeration has been shown to tax self-regulatory resources (Schmeichel et al., 2006), and so the requirement to inject emotion into reading the passage was likely to consume self-regulatory resources. After the manipulation, participants were given \$10 that they could keep or spend on a variety of snacks. Participants who had to read the passage in an animated fashion later spent more of the money they were given on snacks than participants who were not given any special instructions for reading the passage. This research suggests that self-control plays a large role in allowing individuals to control their spending behaviors, because when individuals are low in self-control, they are likely to spend imprudently or impulsively.

CLOSING REMARKS

Throughout the course of everyday life people inevitably experience myriad conflicting motivations. People often feel the temptation, urge, or impulse to engage in behaviors that bring short-term benefits but long-term costs. Self-control, the capacity to restrain unwanted thoughts, impulses, and desires, is the vital part of the self that allows people to forego such immediate pleasures in the service of their long-term goals. A growing body of evidence suggests that people's ability to exert self-control depends on a limited resource. If the resource is taxed, especially by previous acts of self-control, it becomes more likely that people will give in to their impulses and temptations than if the resource had not been taxed. Although people's self-control strength is a powerful determinant of whether they successfully resolve self-control conflicts, several additional factors, such as standards set by the self and society, motivation to perform the behavior, and personal monitoring, all seem to work in concert with self-control strength to influence behavioral outcomes. The benefits of self-control are reaped at the personal level, interpersonal level, and societal level. It therefore behooves researchers to continue investigating the ways in which people can increase their chance of self-control success.

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