Self-Regulation:

How and Why People Reach (and Fail to Reach) Their Goals

Kathleen D. Vohs

University of Minnesota

Brandon J. Schmeichel

Texas A&M University

Author notes: Kathleen D. Vohs, University of Minnesota, Carlson School of Management, Marketing Department; Brandon J. Schmeichel, Texas A&M University, Department of Psychology. Address correspondence to either Vohs or Schmeichel at: Kathleen Vohs, Marketing Department, Carlson School of Management, 321 19th Ave So., Minneapolis MN 55455 or Brandon Schmeichel, Department of Psychology, Texas A&M University, College Station, TX 77843-4235, respectively. Email: kvohs@csom.umn.edu or bschmeichel@psych.tamu.edu.

The study of self-regulation has blossomed in recent decades. At the same time, people (laypersons and academics alike) seem worse at effectively controlling themselves and one could easily make the argument that people are worse at self-regulating than ever before. Consider a father throwing punches at a hockey referee after a loss; the fact that medicinal noncompliance presents a major impediment to treatment of schizophrenia, adult attentional deficient and hyperactivity disorder, depression, and bipolar disorder; escalating rates of sexually transmitted diseases among people in their 20s; rampant and unnecessary looting in times of national crisis; and lastly consider that by the time an American reaches 65 years of age, she will have watched nine years of television (at a rate of four hours of television watching a day). These situations of course differ in a variety of ways, but they have in common a breakdown in self-control. The destructive and disastrous consequences of a loss of self-control seem all-too-common of late.

Engaging in good self-control can do more than protect people from bad outcomes. On the contrary, good self-control can help people reach positive goals, such as saving more money than is needed for retirement, family planning, flossing regularly, refraining from cursing, running marathons, and being kind and patient to one's spouse. In recognition of the triumphs that can follow from judicious self-control, the new and burgeoning field of positive psychology has recognized self-control as a vital human strength (Baumeister & Vohs, 2004).

With social psychologists concluding that increasing self-esteem has been controversial as an international agenda to objectively better people's lives (Baumeister et al., 2003) and with a new national directive for mental health scientists to demonstrate more observable research outcomes (see the recent National Institutes of Health mandate), the onus is once again on psychologists to reduce societal ills, improve health, and increase well-being. There is no panacea, but if psychologists could help people improve at self-control, society may have a needed salve for its rash of misfortunes.

In this chapter we review current work on self-regulation. We describe theories of self-regulation as well as important practical applications of these theories. We review research on the characteristics of people who are generally good or bad at self-control and take a look at situational factors that contribute to self-control failure. You, the reader, may find yourself drawn toward the study of self-regulation for many of the same reasons that we, the authors, have: Myriad problems involve a collapse of self-control and prudent self-control may well bring about a better life.

Why care about self-regulation?

The remainder of the chapter, we hope, will convince you of the need to study self-regulation. We have foreshadowed a small sample of the vast range of phenomena that have at their core the self-regulation of behavior. We will later detail some of the core elements of self-regulation and also some specific outcomes of poor self-regulation, such as overeating, overspending, and thinking illogically. In this way, we aim to illustrate the centrality of self-regulation. We begin by discussing some of the most serious afflictions that stem, in part, from losses of self-control.

The study of criminality had historically been the province of sociology, but seminal work by Gottfredson and Hirschi (1990) placed psychological processes – namely, self-control – at the heart of criminal actions. More recently, Hirschi (2003) has demonstrated the power of self-control in predicting criminal acts. Hirschi portrays criminals as being biased toward short-term incentives while also ignoring the likelihood of long-term costs. The idea that criminals lack self-control lends insight into the fact that most criminals are not specialized but are in fact criminal handymen (or handywomen) who engage in a variety of criminal acts (as evidenced by their arrest records) (Hirschi, 2003). These perspectives not only illustrate the power of self-control in deterring illegal actions, but also suggest that there are stable underlying characteristics within people that relate to self-control. Individual differences in self-control will be discussed later.

Apart from criminal behavior, consider falling test scores in mathematics and science among U.S. school children. While there are multiple reasons for this trend, the bottom line is that children are not pushing themselves to learn and therefore the United States' rank in international exams among primary and secondary school students has fallen and continues to fall. Children may not inherently know to push themselves to learn, but external incentives (love, rewards, respect) from significant adults have in the past instilled the internal values of hard work and sound education. However, parents increasingly dislike pushing their children to achieve more or work harder at school, especially in topics students may find unenjoyable because they are difficult (such as chemistry or calculus). Witness the barring of red ink to mark exams in New York City public schools as one example of how discipline and the self-control that follows are lacking in modern Western education systems. (Red ink was thought by the school board to be aversive and hurtful, and now purple ink is used to mark papers and exams.) Educators lament that students do not want to push themselves to do better if it hurts their self-esteem (Baumeister et al., 2004). One outgrowth of Western cultural mores implying that reaching goals shouldn't have to feel bad may be that feeling good takes priority over reaching performance standards (see Tice, Bratslavsky, & Baumeister, 2001). For example, procrastination is a clear instance of self-control failure (Tice & Baumeister, 1997) that afflicts some people a great deal of the time and most of us some of the time. Putting off work in order to play may be fun for the moment, but procrastination produces poorer performance in the long run than if the work was started earlier.

Sexual misconduct also has its roots in self-control failure. Every culture has well-known moral and legal standards that specify when, where, with whom, and sometimes what type of sexual activity can take place. Given that every society has external standards and concomitant punishments to govern people's sexual behavior, which suggests that people are relatively unable to regulate their own sexual behavior. Sexual addiction (also known as compulsive sexuality) is a problem that involves excessive sexual activity combined with a subjective feeling of being out of control. Despite the consequences,

including increased rates of sexually transmitted diseases and unintended pregnancies, people with sexual addictions cannot stop their behavior. Nobel-prizing winning economist George Akerlof and colleagues (Akerlof, Yellen, & Katz, 1997) noted that unintended births paradoxically rose after the birth control pill and abortions became widely available, suggesting that available technologies to help with the consequences of sexual intercourse cannot take the place of self-regulated sexual restraint. Recent scandals involving politicians, celebrities, athletes, and clergy remind us all that some people have rather serious difficulties controlling their sexual impulses.

Last, we turn to the issue of money. Put simply, North Americans save way too little for what is good for their financial health. In terms of Gross Domestic Product, money in the form of salaries and wages are at their lowest proportion in multiple decades, whereas consumer spending in proportion to GDP is at record highs (Economist, September 30 2004). The national savings rate in the U.S. is shockingly low – somewhere around -1% (The Economist, April 07 2005), which means that, on average, most people spend more than they save. The financial health of millions of North Americans has been crippled by their voracious consumption. As will be discussed later, impulsive spending can result from a lack of self-regulatory ability (Vohs & Faber, in press).

Self-regulation failure is a root cause of criminality, academic underachievement, compulsive sexuality, and fiscal irresponsibility. Other phenomena could be added to the list; these are only some of the most sensational. For the remainder of the chapter, we review how and why self-regulation succeeds or fails.

Theoretical Issues: What is Self-Regulation?

Self-regulation occurs whenever the self modifies, alters, or otherwise changes itself or its responses. When defining self-regulation, we are reminded of a very bad joke that was popular in the self-help era of the 1980s: Question: How many people does it take to change a lightbulb? Answer:

None. The lightbulb has to want to change itself.

People can of course attempt to regulate the behavior of others: Police officers, dance instructors, therapists, schoolteachers, financial advisors, and lifelong friends could see their roles as being aimed primarily at regulating others' behavior. People also attempt to regulate their own actions. More broadly, almost everyone wants to achieve more and better self-control; very few of us awake in the morning and make a commitment to be less controlled that day.

The terms "self-regulation" and "self-control" are synonymous in our treatment, but there is a distinction that some theorists make. Self-control is sometimes used to refer to conscious, intentional attempts to control behavior, such as when a new year's reveler resolves to stop smoking in the coming year, whereas self-regulation refers to the broader category of conscious and nonconscious control over behavior. The evidence for nonconscious regulation of behavior by external or situational factors is pervasive and incontrovertible, but one may wonder whether the self could engage in nonconscious, but intentional, attempts to change the self. It is still unclear whether truly nonconscious forms of self-control exist, and moreover the aim of the current paper is to outline theory and research on the active, conscious attempts at self-regulation. Therefore we leave research pertaining to the possibility of automatic and nonconscious self-regulation out of the present review.

Another definitional issue surrounds the two major components of a self-regulated act. Each act of volitional self-regulation is composed of an impulse, which has a certain amount of energy to it, and restraint over that impulse. A similar analogy between the strength of an urge and one's ability to override the urge are found in the persuasion literature (Knowles & Linn, 2004). Alpha tactics are persuasion attempts designed to make an offer more attractive, whereas omega tactics are designed at reducing resistance to the negative features of an offer. A person's behavior in a situation that calls for self-control may vary on either of these orthogonal components. For instance, consider a woman at a funeral who appears calm and composed. One could observe her behavior and admire her tremendous

strength at hiding intense emotions. Another may wonder whether the woman was experiencing much emotion at all. Thus, the success of any self-regulatory attempt is a result of the combination of these two components.

Each volitional act of self-regulation contains the result of struggle between a combination of urge strength and restraint strength. Despite tactic acknowledgement of the two components, researchers have neglected to examine whether a given self-regulatory outcome is driven by changes in the urge or the restraint component. More of this analysis is being conducted of late, however. For instance, research on emotional control in the elderly indicates that older people are generally happier than younger people not because their emotions are less intense but rather because they have developed excellent skills to down-regulate negative emotions and up-regulate positive emotions (Mather & Carstensen, 2003). We believe that this theoretical distinction between the strength of the urge and restraints on the urge is of paramount importance and encourage researchers and theorists to incorporate this idea into their tests of regulated responses.

Lastly, the difference between initiating and maintaining self-regulation deserves some attention. Each self-regulatory task has a beginning, when the person initiates a self-change, a midway period, when the person continues regulating, and most likely an end, which represents goal achievement or disengagement from the goal (cf. Wrosch et al., 2003). Most colloquial allusions to self-regulation focus on the initiation aspect, be it starting a diet or quitting smoking or setting up a savings account. This emphasis may simply follow from logic, given that one cannot finally achieve a self-change goal if one never initiates attempts to change. Or it could be because a qualitative shift in the self is required to arrive at the decision to make self-change (see Prochaska, DiClemente, & Norcross, 1992). These lines of thought would suggest that if people would only try to change themselves, they would very well succeed. *Au contraire*: Research suggests that attempting a self-change is only the first step and, moreover, that plenty of people who try to change their behavior ultimately fail because they cannot

maintain self-control. Consider the fact that people who attempt a significant life change typically engage in five-six such attempts before reaching their goal. People who are prone to making New Year's resolutions say that they try more than five years in a row before they succeed at their goal for a period of six months or more. On a given New Year's Eve, among those people who make resolutions and fail, 60% will resolve to attempt the same self-change again next year (Prochaska et al., 1992).

Thus, the difficulty in achieving goals may be due to an inability to continue regulating the self. Recent work tells of the elusive nature of successful self-control maintenance. One influential model of behavior change by Rothman (Rothman, 2000; Rothman, Baldwin, & Hertel, 2004) says that people begin a self-change endeavor because they envision a highly favorable endstate. Dieters picture themselves as slim, desirable, attractive, popular people; new runners picture themselves exuberantly crossing the finish line at a race, and so on. However, whether these goal-setters can achieve their goals after they initiate action is a function of being able to maintain self-regulated behavior. According to Rothman's theory, people endure in their self-regulation attempts because of perceived progress. If people do not see that they have progressed to an acceptable extent, they are likely to stop regulating. Thus, there are different mechanisms involved in determining whether a person will initiate attempts to change the self and whether they will persist in their efforts to do so.

Moreover, empirical research demonstrates the difficulty of continuing a self-control endeavor. Research by Vohs and Schmeichel (2003) showed that failure to maintain a regulated behavior occurs because people perceive the duration of their self-control attempts as lasting significantly longer than they actually do. In other words, when people work to maintain a controlled response, their perception is that a longer length of time has passed than it has in actuality, which leads them to give up self-regulating. Maintenance, it seems, is tricky because people typically start regulating under unrealistic expectations of what they can achieve, and in the process of regulating they experience unsatisfactory progress toward their goal and they feel like they have been regulating for a long period of time. It is

no wonder that self-regulated goal attainment is so difficult.

INGREDIENTS FOR SUCCESSFUL SELF-REGULATION

The study of self-regulation grew exponentially after the seminal work of Carver and Scheier (1981; 1982) on feedback loops. Borrowing from cybernetics, Carver and Scheier described self-regulation in terms of a test-operate-test-exit process. According to this theory, people first establish a standard they want to meet, then test to see if they are already meeting the standard. If they are not, they engage in some unspecified actions designed to meet the goal, and then upon learning with a subsequent retest that they have arrived at the goal state, they exit the regulatory loop. We use this model to detail the three basic ingredients to self-regulation: standards, monitoring, and operations. In addition to process, the content of self-regulation efforts deserves comment. There are five broad domains in which self-control can be exercised (cf. Vohs and Baumeister 2004): modification of emotions (suppression or amplification), mental control (e.g., suppressing unwanted thoughts; Wegner 1994), behavioral guidance (e.g., speed/accuracy trade offs), attentional control, and overcoming incipient urges.

We start with an illustrative example of the process of self-regulation according to the TOTE model and its three basic ingredients. A runner reads that the city's summertime marathon is approaching and she decides she wants to run in it. She knows her goal: the marathon distance is 26.2 miles (42 km). Furthermore, she knows that currently she cannot run that far. Her next step may be to go out and perform a long run to see how far she can run. Once she knows the gap between her current running abilities and her endgoal (being able to run 26.2 miles), she will embark upon a training program that, if done effectively, will enable her to run the marathon distance.

The running example illustrates the importance of having a goal, following a regimen to achieve the goal, and monitoring progress along the way. All these ingredients (plus a little luck and

good weather, at least for this example) are crucial to effective self-regulation; the breakdown of any one component makes goal attainment all the more difficult. Losing sight of the endgoal might undermine the entire enterprise. Failing to monitor one's own abilities might mean that marathon day arrives with the runner woefully unprepared. And a lax approach to the training regimen will guarantee later pain and likely failure. Like neuroscientists who study consciousness by testing patients who have split brains, self-regulation scientists have devoted much effort to studying self-control failures as a method of gaining insight into the underlying structure and processes of self-regulation. Consequently, the majority of this chapter centers on when self-control goes awry.

Standards: What Are People Trying To Achieve?

Standards are the ideals, norms, obligations, or other guidelines that represent the end goal that people seek to meet when they engage in self-regulation. When a person becomes aware of a standard that he or she wants to meet, an assessment is done to check whether the goal is currently being met. If it is, no self-regulation is needed. (In this vein, the fat- and size-acceptance movements are aimed at getting people to change their standards and therefore break the cycle of endless failed self-control efforts.) If the standard is not being met, then there is a discrepancy that needs to be closed and therefore self-regulation is required.

Specific standards better enable people to reach their goals than nebulous standards, for two reasons. One reason is that specific goals suggest ways to reach the goal. The goal of "being a better person" is so broad that it is difficult to know just what to do to become that better person. However, a goal such as "be a more supportive partner" is a more manageable goal because it suggests certain actions, such as "give more compliments," "be sympathetic," and "be a better listener." Having specific steps, especially if they are phrases as conditional statements ("when my partner is in a bad mood, I will be patient"), enables successful goal pursuit (Gollwitzer & Brandstatter, 1997). A second

reason specific goals (or subgoals) lead to greater self-control success is that monitoring is easier when there is a precise endpoint. People who go grocery shopping to get food for a party will better reach their goal of having just the right amounts and kinds of snacks if they make a list. Such a list helps to ensure that everything is the shopper needs will be purchased because of the list allows for monitoring of items that have and have not been put in the shopping trolley.

The types of goals or standards people pursue and their preferred methods of pursuing them jointly determine the effort people invest in their goal pursuits. Regulatory focus theory (Higgins, 1997) has gained strong support as a potent predictor of self-regulatory outcomes because it suggests the fit between goal type and regulatory style influences self-regulatory success. Regulatory focus theory highlights the idea that some goals are gain-related goals (e.g., "I want to get more money"), whereas others are non-loss goals (e.g., "I do not want to lose money") and, moreover, that some people are attuned to achieving gain goals, whereas others are attuned to non-loss goals. These people are labeled as having chronic promotion versus prevention self-guides, respectively. Promotion-oriented people are interested in reaching ideal standards, such as dreams and wishes, and they will work harder and perform better when their goals are framed as opportunities for gain. Prevention-oriented people are interested in taking care of obligations and responsibilities, and they will work harder and perform better when their goals are framed as opportunities to avoid loss. In addition to being chronically promotion- or prevention-oriented, situations can prime one style over another.

Like a certain children's story, standards may be too difficult, too easy, or just right. It is difficult to know, as a researcher, what the "just right" level will be, because it depends on a variety of factors exogenous to the self-control situation. One method of assessing whether people set goals that are too high versus too low is to see which goals produce the best performance. Baumeister and colleagues (Baumeister, Heatherton, & Tice, 1993) did just that in a study of how high and low self-esteem people bet on themselves. Participants first practiced at a video game while the experimenter

recorded their scores. Then the experimenter set a criterion level for the next game at a level just below participants' third-best performance. Now came the part where participants could bet on themselves: Participants could choose to use that goal for the next game, and if they surpassed that goal then they would earn $2. But participants could also choose to set an even higher goal to earn more money, with the caveat that if they did they choose to go higher than the experimenter-determined mark and failed to surpass it, they would earn no money. This method cleverly separated goal setting and goal achievement, which are typically conflated in measures of self-control. The researchers found that compared to high self-esteem participants who were not threatened, when high self-esteem people were given an ego threat in the form of the phrase "if you are the type to choke under pressure or you don't have what it takes, then you may want to play it safe," they achieved objectively fewer rewards (i.e., earned less money) because they set unattainable goals.

Buehler, Griffin, and Ross (1994) provided another example of setting inaccurate goals in their description of the planning fallacy. Put simply, people grossly underestimate the time it will take them to complete a given task, regardless of the fact that other similar activities are known to take longer duration to complete. When a professor is seen leaving school on a Friday afternoon with an armful of books and papers (which presumably she thinks she is going to read over the weekend), she probably is in the strong grip of the planning fallacy. Another reason that people pursue goals that are much too lofty is that they mistakenly believe that more time will exist to pursue those goals in the future than exists in the present (Zauberman & Lynch, 2005).

In contrast to cases in which people set goals that are too ambitious or too distant, people sometimes set goals that are not ambitious enough to motivate them. Beliefs about how self-control works play an important role in these cases. Recent work suggests that laypersons' beliefs about the structure of self-control influence goal-setting (Mukhopadhyay & Johar, 2005), and moreover people who believe that self-control exists in a limited sense (cf. self-regulatory resource theory) set fewer

goals on New Year's Eve. The belief that self-regulation is a limited resource (whether measured or manipulated) leads to impaired ability to reach those few goals among people who are also low in self-efficacy.

Setting goals at an appropriate level of abstraction matters as well. Construal level theory (Trope & Liberman, 2003) states that people are attracted to distant future goals because they promise high-level, abstract rewards; in the near future, however, we evaluate goals in terms of their feasibility. Thus, what motivates people to achieve their goals varies as a function of the fit between the features of the goal (very desirable or very easy to achieve) and temporal distance of the goal (near versus far). People may even lose sight of the risks associated with pursuing a goal if it is set in the far future, whereas goals with lower levels of risk are preferred in the near-future, even if their outcomes are less desirable (Sagristano, Liberman, & Trope, 2002).

Thus, the types of standards or goals people try to achieve exert a powerful influence on self-regulatory efforts. Goals that are specific, goals that fit one's chronic regulatory focus, and goals that are appropriately ambitious all facilitate self-regulatory success. Presumably, goals that combine these three features are especially likely to be met. Conversely, nebulous goals and goals that are hardly worth the effort lead to failed goal attainment.

Monitoring: Are People Aware of What They Are Doing?

One cannot adequately engage in self-regulation without a steady diet of self-assessment. Checking to see where one stands with respect to one's goals is so important that it garners not one but two places in the four-step TOTE model (Carver & Scheier, 1982). Despite its theoretical importance, monitoring has not receive much empirical attention, a gap we call upon psychologists to close (cf. Sedikides, 1993). The field has, however, investigated topics that contribute to an understanding of the monitoring process, but direct evidence is lacking. For instance, we know that monitoring involves

being aware of possible discrepancies between the self and its standards (Duval & Wicklund, 1972), and that losses of self-awareness contribute to self-control failure. Under conditions of aversive self-awareness, such as when people are acutely aware of their faults or their hypocritical inconsistencies, they may aim to blunt their negative emotions with alcohol, drugs, or other similar means of escape from self-awareness. Because of the key role of self-awareness in goal attainment, an escape from self-awareness almost certainly leads to self-control failure. Conversely, to improve goal attainment, there is probably no easier or more efficient method than engaging in more frequent and more accurate monitoring. Thus, it is of practical and theoretical importance that psychologists better understanding the process of monitoring.

One recent examination has shown that engaging in self-control renders people more involved in the 'here and now', in part because of monitoring (Vohs & Schmeichel, 2003). The monitoring that accompanies self-control efforts leads people to be more aware of time passage, which in turn has a deleterious effect on their subsequent performance. Because of an increased attention to time, people perceive that more time has passed than it has in actuality, and this overestimation of time causes people to give up sooner on self-control tasks. Therefore, one caveat about increased monitoring as a route to better self-control is that one needs to monitor one's performance or self-awareness, but not time passage.

One example of how monitoring oneself can improve self-regulated goal attainment comes from work on dieters. Dieters who go grocery shopping when they are hungry buy less food than nondieters who are hungry shoppers (Nisbett & Kanouse, 1969). This difference occurs because dieters find the signal that they are hungry to be reinforcing and suggestive that they are firmly on track to meeting their weight loss goal via limiting caloric intake, whereas the same signal of hunger is not interpreted as goal-promoting among nondieters.

In the same domain of dieting and eating, research has manipulated monitoring and assessed

whether it improved self-control. Janet Polivy and her colleagues (1986) gave dieters and nondieters either a "preload" consisting of two thick milkshakes, which each participant had to consume, or no preload. Then in a second study conducted supposedly in conjunction with the marketing department, participants were allowed to eat as much candy as they wished. As one would expect, having drank two big milkshakes should leave people not wanting as much candy, and this pattern was true for the nondieters. Dieters, in an illustrative example of the "what the hell" effect, ate more candy if they had earlier had the milkshakes. Why? Polivy et al. claimed that dieters stopped checking their caloric intake after they perceived that their diet was "broken" and therefore overate. This claim was supported by the eating behavior among dieters in a condition in which their empty candy wrappers were placed in a conspicuous spot; being aware of how many candies had been eaten deterred a total loss of self-control among these dieters.

The effects of alcohol are similar to the "what the hell" dietary-disinhibition effect, insofar as alcohol results in a disinhibited state in which monitoring of one's behaviors and responses is reduced. Hull (1981) demonstrated that when people drink alcohol, they pay less attention to themselves. A lack of self-focus disables the ability to behave with respect internal standards (Duval & Wicklund, 1972) leads people under the influence of alcohol to overspend, make inappropriate comments, drink even more, and generally misbehave.

We cannot stress enough the importance of monitoring as a route to goal attainment. Although it may not be pleasant, monitoring is relatively easy and requires very little in the way of new behavioral patterns. Paying attention to one's flaws may not engender positive self-views in the short-run, but an improved self in the future is probably worth it.

Operations: Using Self-Regulatory Strength to Move Oneself to the Goal

Getting to the goal from one's current state requires a certain amount of motivational energy, which we call *self-regulatory strength*. According to a recent model, self-regulatory strength is governed by a supply of global, but finite, resources that enable people to perform operations needed to progress toward the goal. Work on this model, which is described in detail below, has been used to understand why people cannot put forth equal amounts of motivational effort at all times – because any act of self-control takes something away from the supply of resources needed to succeed at subsequent goal striving. This makes for a temporarily loss in self-control ability as a function of having attempted to achieve a previous goal. This concept has been useful in illuminating self-control failures from a situational perspective pertaining to the operate phase of the TOTE model. Because the model depicts the resources as being global, it is important to demonstrate that acts of self-control in different domains have similar effects on subsequent self-control strength. Initial, parameter testing experiments of the self-regulatory resource model showed, for instance, that engaging in thought suppression led to decreases in emotion control ability subsequently (Muraven et al., 1998).

Applications of the Self-Regulatory Strength Model

Overeating and overspending. Research has applied the self-regulatory resource model to eating and spending. This work suggests that especially for people who have a chronic goal regarding inhibition (of eating or of spending), depletion of self-regulatory resources leads to precisely the behaviors that were meant to be inhibited.

In one study on eating (Vohs & Heatherton, 2000), dieters and nondieters were brought into the laboratory and were asked to watch a film about sheep. While watching the boring film, there was a tray of delicious snack foods that was placed either next to the participant or across the room. This factor was combined with instructions that the food was either available or unavailable for snacking. Later, participants were given a 'tasting and rating' task of three flavors of ice cream. Very little ice

cream intake is required to perform the tasting and rating task, but we were interested in measuring amount of ice cream eaten. Given that nondieters are not regulating with respect to a food intake goal, it was not expected that their eating would vary as a function of food proximity or food availability, and this expectation was borne out in the data. Among dieters, however, it was expected and found that dieters who had been seated next to the scrumptious snacks and who were told they were free to eat the snacks ate more ice cream in the second task, suggesting that resisting the earlier temptations reduced their self-control strength.

Two additional studies ensured that a simple priming mechanism could not account for the results of the aforementioned study. In another experiment, dieters were seated next to or far away from tempting snack foods; then they were given a task to work on until they had "solved it or decided to quit." Unbeknownst to the participants, the task contained 12 of 16 items that were unsolvable, and therefore raw persistence was being measured, not performance. Dieters who had been seated near to the tray of snack foods persisted less, consistent with a reduction in self-regulatory resource explanation. A sad film about a young mother dying of cancer served as a manipulation of emotion regulation demands in another study; dieters were either asked to keep their facial expressions and their internal feelings neutral, whereas others were told to watch the movie "as if they were in their own home." The former group should have expended more regulatory strength in attempting to feel nothing during the highly emotional film, and the fact that they went on to eat significantly more than other dieters during a taste-and-rate ice cream task suggested that this is what occurred.

Four experiments on impulsive spending after a reduction in self-regulatory strength also demonstrated the deleterious effects of a lack of self-control (Vohs & Faber, in press). It was assumed that most people possess a goal not to spend money needlessly, so that at some level everyone attempts to control unintended spending. Using a variety of measures, it was predicted and found that self-control is needed to curb the urge to spend impulsively. In one study, participants were asked to

control their attention during a video task in which irrelevant words were flashed on the bottom of the video screen, whereas others who saw the same video were not asked to control their attention to the words. Subsequently, all participants saw a booklet of products and were asked to give the price at which they would be willing to pay for each of the items (hypothetically). Participants who had earlier regulated their attention said they would pay more money for the same items as compared to participants who did not control their attention. Two additional studies used a mock store to test for behavioral indices of impulsive spending. In these studies, participants in the self-regulatory depletion condition were asked either to read aloud a nonemotional text with exaggerated emotions or to suppress unwanted thoughts of a white bear. Non-depleted participants were asked to perform the same tasks, but in a more natural fashion (i.e., without additional instructions to read emotionally or to suppress specific thoughts). In both studies, participants whose regulatory strength had been taxed bought more items and spent more money than participants whose regulatory resources remained intact. Following the same logic as was used in the dieting studies, participants' dispositional tendencies to control their urges to spend were used as a moderating variable. In parallel to the dieting work, Vohs and Faber found that the buying behavior of participants who typically attempt to restrain their urges to spend impulsively showed a sharper increase in spending after depletion than did participants who normally had lesser urges to buy impulsively.

In sum, having to exert self-control was shown to increase rates of undesirable behaviors that are otherwise controlled. Dieters, who have a chronic goal to curb caloric intake, ate more ice cream after they had engaged in self-control in an earlier task. In a similar vein, spending in an unplanned, ad hoc buying situation represents a tempting situation for most people, given that they likely possess the goal of not overspending on unnecessary products. Nonetheless, if people are robbed of their self-regulatory resources, they spend more money than if they are in full command of these precious

resources. Chronic impulsive spenders show the effect even more, which follows from the notion that there are constantly restraining their urges to spend.

Effective Impression Management Requires Self-Regulatory Resources. Self-regulation most likely evolved within humans not to enable us to persist at unsolvable puzzles or inhibit the urge to eat the whole bag of potato chips, but rather to maximize survival and reproductive opportunities through social inclusion. Accordingly, it would be essential to have control over one's public image, as this is how people get to know whether someone would be a worthy member of their group. Self-presentation is the term for putting forth a specific social image, and it would appear to be strongly linked to self-control abilities. In a series of eight studies, Vohs, Baumeister, and Ciarocco (2005) found that reductions in self-regulatory resources led to impairments on self-presentation tasks, and that engaging in impression management resulted in reduced self-regulation ability.

In one experiment, Vohs et al. (2005) tested the idea that different presentation styles are most appropriate with different audiences, and that deviating from those typical interaction styles taxes self-regulatory resources because greater coordination of self-control is required. One typical style of self-presenting for different audiences is that interactions with a friend tend to call for a modest style of self-presenting, whereas interactions with a stranger allow for a more self-enhancing style (Tice et al., 1995). Accordingly, some participants were asked to engage in a style of self-presenting that was typical (modest with friends and enhancing with strangers), whereas others were asked to do the opposite. Hence, participants were interviewed by either a confederate or a friend and were asked to respond during the interview by thinking of themselves "at their best" or "not at their best." These instructions were aimed at manipulating enhancing or modest styles of self-presenting without asking participants to lie about themselves. Subsequently, participants completed a set of mathematical problems, and time spent persisting on the problems was the measure of self-control. As predicted, participants who were interviewed by a friend but whose instructions were to be self-enhancing as well

as participants who were interviewed by a stranger but who were asked to be modest were less persistent at the math problems. Their decreased persistence was taken as a sign that they were somewhat depleted in their self-regulatory resources due to their unusual social interaction styles.

Another experiment showed that the link between self-presentation and self-regulation is bidirectional, such that engaging in self-control can lead to inappropriate impression management behaviors. To this end, participants first performed the Stroop task under conditions either to read the ink color of a row of Xs or the ink color of color-name words. These participants were known to have one of three attachment styles – avoidant, anxious-ambivalent, or secure – and Vohs et al. hypothesized that the interaction patterns of these people would differ according to attachment style. Vohs et al surmised that people will attempt a moderate amount of self-disclosure, even if they would prefer to be more disclosing (as may be the case among anxious-ambivalent people) or less disclosing (as may be the case among avoidant people) but that their predispositions toward being over- or under-disclosing may emerge if they are robbed of their ability to engage in self-control. This pattern is what the researchers found. Under conditions in which people had full control of their responses, individuals (regardless of attachment style) said they preferred to disclose moderately intimate details about themselves. After participants had engaged in the color-naming version of the Stroop and were therefore depleted of their self-regulatory resources, the two insecurely attached groups reverted to the extremes of desiring highly intimate self-disclosures (among the anxious-ambivalent participants) or shallow, nonintimate self-disclosures (among the avoidants). Similar to the nondieters in the previous work, intimacy preferences of securely attached individuals did not change as a function of self-regulatory resource availability, because their preferred style of intimacy needs no regulating.

Hence, using the self-regulatory resource model, there is evidence that the two "master functions" of the self – self-regulation and impression management (Higgins, 1996) — are intimately intertwined. People's ability to get across a specific image of themselves to others requires that they

have ample self-regulation resources to coordinate their thoughts, emotions, urges, and behaviors. If people do not have enough self-regulatory resources, they fail to portray themselves in the most desirable light.

Making Choices Reduces Self-Regulatory Strength. In this next section, we connect the self and its regulatory resources to decision making. A recent model of human behavior (Strack & Deutsch, 2004) posits that when people make choices, they not only deliberate but they also connect the self to each decision that is made. This idea suggests that each choice thus involves not only activating one's preferences but also taking an additional step of associating the self with the choice. This additional step performed over and over again may well take something away from the self such that it leaves the self wilted and unable to exert self-control. We tested the relationship between decision making and self-control capacity in two ways: First, we showed that making choices depletes the self's resources and renders the person less agentic; second, we showed that engaging in self-control hinders intelligent, rational thought.

Six experiments manipulated the extent to which people engaged in active decision making and then measured self-regulation ability (Vohs et al., 2005). A seventh experiment went to a local shopping mall to test the connection between choice making and self-regulation in a naturalistic setting. One experiment typical of research asked participants in the choice condition to make a long series of binary choices between household products (e.g., lemon candle or a vanilla candle). Participants in the no-choice condition gave their opinions on eight print ads, a task that required thinking about one's preferences but not choosing. Later, all participants were asked to consume as many one ounce cups of a bad tasting (but good for one's health) drink as they could. As predicted, participants in the choice condition drank far less of the drink (M = approximately 2 oz) than those in the no-choice condition (M = approximately 6 oz.). In another experiment, participants made choices about the courses they would be taking in the remainder of their college careers or were asked to

review the course catalogue but were not asked to make choices. Self-control in this experiment was the amount of time participants spent practicing for an upcoming intelligence test – while in a room that contained not only the practice test but also games and magazines. Participants who had chosen the courses they would be taking at the university procrastinated more, as evidenced by recordings of how long they spent practicing for the test, as compared to their no-choice counterparts.

A naturalistic study tested the hypothesis that choice making depletes the self's resources by asking shoppers at an outdoor mall in Salt Lake City Utah to indicate how many choices they had made during their shopping trip and then asking them to perform a self-control task. Specifically, shoppers first completed a questionnaire that tapped extent of choice making during their shopping trip. Then participants were asked to complete multiple pages of addition problems. Length of time and number of problems attempted were taken as signs of self-control ability. As predicted, shoppers who reported making many length, deliberate choices were less able to force themselves tally up the digits in the mathematical problem set than were shoppers who had not made many choices. This effect remained even when controlling for important variables, such as age, gender, and time spent shopping.

This work suggests that there is a crucial link between the self's executive functioning and its ability to regulate and control its responses. After people have made decision after decision after decision, they are temporarily less able to perform tasks that require controlled responses. With a world of ever-increasing choices (Starbucks coffee company brags that it presents customers with 19,000 options in each store), it is perhaps no surprise that people are less-than-optimal self-regulators.

Rational Thought and High-Level Processing of Information. Information processing is of course a key element of human goal striving and achievement. The ability to pursue some lines of thought and discard others and to think through the implications of various ideas to arrive at reasoned decisions gives direction to human behavior that gut reactions or stimulus-response associations simply cannot provide. Indeed, the human capacity for logical reasoning and other complex thought is one

characteristic that sets us apart from other animals. The human self may manipulate conscious thought processes in an effort to pursue its ideals and goals. In this view, information processing is another domain in which the self exerts an active, controlling influence. Several recent lines of research have examined this type of cognitive self-control. The first deals with the self-control involved in problem solving and other complex cognitive operations, and the others deal with the self-control of particular kinds of thoughts, such as prejudicial and stereotypical ones.

If high-level cognitive operations rely on self-regulation, then activities that deplete self-regulatory resources should undermine high-level cognitive performance. To test this idea, we had participants take tests of logical reasoning and reading comprehension after engaging (or not) in effortful self-control (Schmeichel, Vohs, & Baumeister, 2003). Our reasoning was that effortful self-control depletes a limited internal resource or strength, and in this depleted state, the self-control required to think logically is impaired. In one study, participants began by watching a videotape of a woman being interviewed. Half of the participants were asked simply to watch the tape. The other half of participants was given the same instructions plus an additional instruction to focus their attention only on the woman in the scene and to ignore everything else on the screen. Thus, half the participants were instructed to control their attention by focusing on only a small portion of the TV screen, whereas the others were free to attend to any and all elements of the screen. Shortly after watching the videotaped interview, all participants spent 10 minutes attempting to solve a set of logical reasoning problems taken from the Graduate Record Exam (GRE). In line with the depletion hypothesis, participants who attempted to solve the logic problems after carefully controlling their attention scored worse than participants who watched the same videotape without careful attention control. Further, the depleted participants attempted fewer problems in the allotted time than the non-depleted participants. These patterns indicated a substantial decrement in cognitive functioning after engaging in self-control: Both working speed and response accuracy were reduced by a prior, unrelated act of attention control.

In a second study, we examined whether only highly complex and advanced forms of thought are impaired after depleting self-regulation or whether simpler cognitive processes are also affected. Half of the participants were asked to engage in effortful self-control and half were not, and then all participants took a pair of cognitive tests. More specifically, all participants watched an emotional film clip that depicted scenes of environmental degradation and animal suffering. Some participants were instructed simply to watch the clip and react in whatever way was normal and natural for them. Other participants were instructed to suppress the outward expression of emotion as they watched the clip. In this way, we varied the amount of self-control that was required while participants viewed the emotional film clip, prior to the cognitive tests. After the clip, participants performed a test of cognitive estimation and a test of general knowledge. The difference between the two tests was meant to mirror the distinction between fluid intelligence and crystallized intelligence. That is, the cognitive estimation test required participants to extrapolate from known information to make estimates about unknown quantities. Even if participants did not know the precise answers to the questions on this test (e.g., How many seeds are there in a watermelon? How far can a horse carry a cart in 1 hour?), they could reason their way to an approximate answer. The general knowledge test presented a different type of cognitive challenge. Here, participants had to answer multiple-choice questions, and generally the answers to the questions either were readily available in long-term (semantic) memory or they were not (e.g., Who wrote *Gone With the Wind*? Which city is nicknamed "The Windy City"?).

The results were telling. After engaging in effortful self-control, participants showed reduced performance on the cognitive estimation (fluid intelligence) test but performance on the knowledge test (crystallized intelligence) was unaffected. Thus, it appeared that fluid intelligence was undermined by prior self-control, whereas the ability to retrieve facts from long-term memory was not so affected. Moreover, the careful control of attention (Study 1) and the purposeful suppression of emotional expressions (Study 2) had similar derogatory effects on fluid intelligence. These patterns supported the

view that exercising self-control temporarily disrupts cognitive processing that requires some degree of active, executive intervention on the part of the self.

A third study provided additional support for the specificity of the depletion effect. As in the first study, some participants attempted to focus their attention on only a small portion of a TV screen whereas others were free to attend to whatever they wanted. All participants then performed two separate cognitive tests in counterbalanced order: One test required participants to encode nonsense syllables into short-term memory and then recall them moments later. The other test required participants to read and comprehend two passages of text in order to answer questions about them. The questions about the text passages required participants to make inferences about the authors' intentions in writing the passages instead of simply recalling specific information from the text. Thus, this study examined the effects of prior self-control on short-term memory and on complex reading comprehension. The results showed that only high-level reading comprehension was undermined by prior acts of self-control. Participants who carefully controlled their attention prior to the reading comprehension test scored significantly worse than participants who had not been required to control their attention. Further, all participants were perfectly able to encode into and recall information from short-term memory, regardless of whether they had just engaged in self-control or not.

Cognitive Responses Are Impaired by Emotional Exaggeration. Given that suppression is one of the most common forms of self-control, it is not surprising that the bulk of the research on self-control has been concerned with response suppression. However, according to the self-regulatory strength model, response exaggeration should also consume self-control resources and therefore undermine subsequent cognitive control. A recent study by Schmeichel, Demaree, Robinson, and Pu (in press) tested this hypothesis. They had participants attempt to exaggerate their emotional responses (or not) while watching an emotion-laden film clip. After the clip, all participants performed tests of cognitive fluency. One test, a verbal fluency test, allotted participants one minute to generate as many

words as they could that started with the letter "a". Consistent with the previous results, participants who exaggerated their responses scored worse (that is, they generated fewer words in the allotted time) than participants who watched the film clip without attempting to exaggerate their responses. These results support the view that various forms of self-control, including response suppression and response exaggeration, deplete the resources that underlie complex cognitive performance.

Self-Regulatory Resource Depletion Affects Working Memory. A new line of research considered the effects of self-control on information processing by examining working memory. Working memory is perhaps the single most influential construct in the psychology of cognitive control (for a recent overview, see Miyake & Shah, 1999). Working memory refers to the capacity to control attention (Engle, 2002), and individual differences in this capacity predict the ability to process multiple streams of information simultaneously. For example, individuals with high working memory capacity are better able to remember words from a list while also solving math problems than are individuals with low WM capacity. Moreover, high (compared to low) working memory capacity is associated with better performance on the Stroop task (Kane & Engel, 2003). Thus, low working memory capacity indicates an inability to control the contents of one's attention and consequently, one's conscious thoughts.

In a series of studies, Schmeichel (2005) found that disparate acts of self-control all had the effect of reducing working memory capacity. For example, individuals who suppressed emotional reactions while watching a disgusting film clip had lower subsequent working memory capacity than those who watched the same disgusting film clip without attempting to suppress reactions. And the act of focusing attention on only a portion of a television screen reduced later working memory capacity compared to focusing on any and all portions of the screen. Once again, exerting self-control impaired subsequent cognitive processing, consistent with the idea that self-control depletes a limited resource that is also required for the control of attention. Further, the effect of prior self-control was consistent

across multiple types of working memory tests, which suggests the particular content of the tests was not important. Indeed, it appeared that the control of attention rather than performance on specifically verbal or mathematical aspects of the tests was impaired by prior self-control.

Suppressing Stereotypes Reduces Self-Regulatory Resources. Another line of research took a different approach to the self-control of information processing by examining the control of specific kinds of thoughts, namely prejudicial or stereotypical thoughts. Prejudicial attitudes persist today despite increasingly strong social norms for tolerance and acceptance. More and more, stereotypes and prejudicial attitudes are viewed as inappropriate, and their expression is being met with strong social sanctions. Yet some people still endorse discriminatory or prejudicial attitudes. These people face a self-control dilemma: They hold discriminatory attitudes, but in many social situations they are forbidden from acting on them and therefore are best served by inhibiting their true beliefs.

The nature of this self-control dilemma is especially salient when people who harbor stereotypical attitudes interact with members of the stereotyped group. Recent work by Richeson and Trawalter (2005) examined some consequences of this dilemma. They had white participants report to the lab to take part in a brief interaction with another person (actually a confederate who was part of the research team). For some participants, the interaction partner was another white person. For others, the interaction partner was a black person. Richeson and Trawalter reasoned that, for the most racially-biased white participants, interacting with a black partner would present a self-control challenge. These participants would have to inhibit their racial biases in order to avoid giving the impression that they were indeed biased against blacks. For white participants who were less racially-biased, interacting with a black partner would require little or no self-control because nothing needed to be inhibited to avoid giving off a biased impression. And, of course, for participants interacting with a white partner no particular self-control or response inhibition was needed.

To test the self-regulatory consequences of intraracial and interracial interactions, the researchers had all the participants perform a common test of cognitive self-control – the Stroop task – after the interaction. The idea was that a reduction in self-control resources would undermine the ability to inhibit the natural word-reading response and thereby disrupt performance on the Stroop task. The results supported the view that interracial interactions, particularly for those who are racially biased, deplete self-control resources. Specifically, interacting with a black partner (versus interacting with a white partner) led to poorer performance on the Stroop task, but only among people who held racially-biased attitudes. Non-biased people performed equally well on the Stroop task whether they had just interacted with a black or a white partner.

Related research by Gordijn and colleagues (Gordijn, Hindriks, Koomen, Dijksterhuis, & van Knippenberg, 2003) revealed similar results. They found that suppressing the expression of stereotypical thoughts about skinheads reduced the ability subsequently to solve anagrams. Moreover, Gordijn and colleagues found that the derogatory aftereffects of stereotype suppression were most pronounced for individuals who had low internal motivation to suppress stereotypes. By contrast, people who were highly internally motivated to suppress stereotypes showed little or no aftereffects of suppression. Taken together, the results of these studies on stereotype suppression indicate that non-prejudiced individuals and individuals who are internally motivated to inhibit stereotypes show no ill effects of controlling stereotypical thoughts – presumably because this does not present a self-control challenge for these individuals as it does for prejudiced individuals and people with low internal motivation to suppress stereotypes.

Being a Target of Stereotyping Depletes the Self. More recent work has examined the consequences of being the target of stereotypes rather than controlling one's stereotypical thoughts about others. More precisely, Inzlicht, McKay, & Aronson (in press) tested the hypothesis that people who belong to stigmatized groups have to expend self-control resources to suppress awareness of their

stigmatized identity when in a situation that reminds them of it. In support of this hypothesis, Inzlicht et al. found that coping with stigma weakens the capacity for self-control subsequently. For example, they found that reminding black participants about a race-based stereotype about blacks reduced later performance on the Stroop task, even though the racial stereotype had little or no direct relationship to Stroop performance. Apparently, suppressing awareness of one's own stigmatized identity depletes self-control resources, which produces reduced self-control ability subsequently.

Summary. It is apparent that logical reasoning, cognitive estimation, the suppression of stereotypes, and the inhibition of one's stigmatized identity all rely on the ability to control attention. It is this very ability that is derailed by depleting acts of self-control. These patterns suggest that information processing is improved when the person is at his or her uppermost capacity of self-regulatory resources; else, effective processing may not occur. Moreover, ineffective processing occurs when people use stereotypes as heuristics or fail to exercise adequate control over attention.

Individual differences

Long has there been efforts aimed at measuring individual differences in self-control. In this next section we review two trait scales that have had varying histories in terms of their background, development, use, and predictive utility.

One scale comes from the field of criminology and specifically from the ideas of Gottfredson and Hirschi, who wrote a book describing criminality as a result of low self-control. Grasmick and his colleagues responded to the book by creating a scale to be used to predict potential criminals as a function of low self-control. The Low Self-Control Scale (Grasmick, Tittle, Bursik, & Arneklev, 1993) is widely used among criminologists to better understand the underlying causes of aggression, delinquency, and other crimes. The scale has good predictive abilities, and people who have scored low on the scale have been later been shown to have more criminal and problematic behavior. The

Low Self-Control Scale (24 items) list statements such as, "I will try to get things I want even when I know it's causing problems for other people." and "When things get complicated, I tend to quit or withdraw." Participants consider how well the statements describe "the type of person you are."

The scale that is increasingly being used in social psychology is the Self-Control Scale by Tangney, Boone, and Baumeister (2004). This scale taps different life domains of self-control and is aimed at predicting psychological and practical consequences of poor self-control. The scale has five subscales, which concern being disciplined, non-habit forming, and able to resist temptation. The subscales are called Self-Discipline, Deliberate/Nonimpulsive Action, Healthy Habits, Work Ethic, and Reliability.

The Self-Control Scale has 36 items, such as "I have a hard time breaking bad habits." "I am lazy." "I say inappropriate things." Respondents assign higher numbers to indicate their agreement with the idea that the statement "best represents what you believe to be true about yourself for each question." There is a shorter form that has only 10 items.

Higher scores on the Self-Control Scale are predictive of lower rates of social, personal, and performance problems. Students who scored high on this scale earned higher marks in college, were less depressed, were less prone to overeating or overdrinking, were less likely to have insecure attachments to others, experienced less negative emotionality, and had better interactions and relationships with friends and family than students with low scores.

In sum, there are two solid trait scales that appear to effectively predict different facets of self-control failure. If a researcher is looking to predict the more deviant sides of self-control failure, such as violence, weapons use, stealing, or other failures to follow rules, then perhaps the Grasmick et al scale would be most helpful. For other social psychological concerns, the Self-Control Scale by Tangney et al (2004) is recommended.

Conclusions and Future Directions

In their seminal book on self-regulation, Carver and Scheier (1981) described three fundamental ingredients of human self-regulation: standards or goals to be achieved, the monitoring of progress toward (or away from) those standards, and regulatory operations designed to reduce any discrepancy between one's current state and one's standards. In this chapter, we have described research conducted subsequent to the publication of that seminal book regarding how self-regulation may fail or succeed according to how well cooked (or how undercooked) these ingredients are. Because our own research on self-regulatory resources has dealt mainly with the self-regulatory operations – the behaviors that move individuals toward their standards – our review has focused on this ingredient in detail.

Simply put, self-regulatory operations are costly in the sense that they consume a limited resource. People cannot regulate their own actions indefinitely because the energy required for such regulation is finite. Occasionally people need to rest, relax, take a break from effortful action, and cede control of behavior to instinctive tendencies and external influences. The limited nature of self-regulatory resources has been shown to underlie a broad array of self-regulatory failures. Even when people have clear goals and are fully aware of the work they need to do to accomplish them, they still must expend energy to achieve them, and this energy is in limited supply.

The role of limited regulatory resources in the setting of standards and the monitoring of goal progress remains an open area of inquiry. We have suggested that regulatory resources are mainly at issue for self-regulatory operations, but it is plausible that depleted resources also influence goal-setting and monitoring. Perhaps people with depleted resources lower their standards or set less ambitious goals, or maybe they interpret even minor increments in progress as satisfactory. Or perhaps depleted resources are associated with a failure to monitor progress at all, which would surely contribute to self-regulatory failure.

Another pressing theoretical issue regards the role of nonconscious processes in conscious, effortful self-regulation. Clearly, conscious and nonconscious processes interact, such as when an

individual forms a conscious intention to perform a certain action and then performs it at an opportune time with little or no conscious awareness (Gollwitzer, 1999). Less clear, though, is whether seemingly intentional nonconscious processes consume or rely on regulatory resources. Is nonconscious goal pursuit affected by depleted regulatory resources? Is some nonconscious goal pursuit effortful, and therefore potentially depleting? Can depleted resources be overcome by the nonconscious activation and pursuit of self-regulatory goals? Answers to these questions promise important advances in understanding the whole of self-regulation – conscious and nonconscious alike.

In closing, we reiterate that the benefits of successful self-regulation are difficult to overstate. Thought control, overcoming impulses, impression management, smoking, drinking, overspending, overeating, and countless other phenomena are central to the topic of self-regulation. The pressing need to understand these phenomena and the factors that influence them only highlights the need for additional research on why people struggle to reach their goals.

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