

Self-Regulation of Health Behavior: Social Psychological Approaches to Goal Setting and Goal Striving

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Objective: The goal of this article is to review and highlight the relevance of social psychological research on self-regulation for health-related theory and practice. **Methods:** We first review research on goal setting, or determining which goals to pursue and the criteria to determine whether one has succeeded. We discuss when and why people adopt goals, what properties of goals increase the likelihood of their attainment, and why people abandon goals. We then review research on goal striving, which includes the planning and execution of actions that lead to goal attainment, and the processes that people use to shield their goals from being disrupted by other competing goals, temptations, or distractions. We describe four types of strategies that people use when pursuing goals. **Results:** We find that self-regulation entails the operation of a number of psychological mechanisms, and that there is no single solution that will help all people in all situations. We recommend a number of strategies that can help people to more effectively set and attain health-related goals. **Conclusions:** We conclude that enhancing health behavior requires a nuanced understanding and sensitivity to the varied, dynamic psychological processes involved in self-regulation, and that health is a prototypical and central domain in which to examine the relevance of these theoretical models for real behavior. We discuss the implications of this research for theory and practice in health-related domains.

Keywords: self-regulation, goal setting, goal striving, health behavior

Many of the most deadly and prevalent illnesses people face can be prevented or treated by making changes to individual's own behavior. It has been suggested that more than 50% of mortality from the leading causes of death could be reduced if people ate a healthy diet, maintained a reasonable weight, exercised regularly, and refrained from smoking cigarettes (Knoops et al., 2004; van Dam, Li, Spiegelman, Franco, & Hu, 2008). In addition, a host of other behaviors would help people achieve or maintain optimal health, including adhering to medications, attending regular health screenings, performing therapeutic exercises for chronic pain, con-

trolling one's hostility, and reducing stress through meditation or other means. Most of these behaviors need to be attended to and engaged in on an ongoing basis. In short, they require self-regulation. Physicians, family members, and even the media routinely exhort individuals to make these changes, and individuals themselves are often eager to do so. But as anyone who has ever tried to change even one of these behaviors knows, these prescriptions are easy to recommend and easy to accept but very difficult to achieve and maintain. The aim of this article is to review emerging theoretical perspectives and empirical findings to foster new opportunities to integrate theory and practice in health-related domains.

Advances in the social psychological study of self-regulation have helped improve our understanding of the factors that lead people to set and keep productive goals, as well as the factors that undermine people's efforts at achieving their goals. These social psychological theories differ from traditional health behavior models, such as the theory of planned behavior (Ajzen & Fishbein, 1980). Whereas the latter focus primarily on behavioral prediction, self-regulation models attempt to explicate the dynamic psychological mechanisms that lead to success and failure in behaving relative to some standard. Another important difference between traditional health and social psychological approaches to self-regulation is the emphasis on mental content versus process. For example, the common-sense model of self-regulation of health and illness (Leventhal, Weinman, Leventhal, & Phillips, 2008; Leventhal, Leventhal, & Breland, 2011) highlights the beliefs and

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We thank Bill Klein, Alex Rothman, and Linda Cameron for their guidance on this article, as well as the authors who participated in the informative webinars in preparation for this issue. We thank Denise de Ridder's lab group for their helpful comments and Toni Gabrielli for her work on the references. We also thank Mita and Harish Sujana for their hospitality in New Orleans. We cannot imagine a more perfect place to think about self-regulation for 72 hours. Preparation of this article was supported in part by National Institutes of Health grant HL88887 to Traci Mann, as well as travel funding from the NCI. The three authors made equal contributions, and the order of authorship is arbitrary.

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expectations that people have about behavior change and suggests that self-regulatory breakdowns occur when beliefs and expectations are poorly calibrated and inappropriate to the tasks at hand. Social psychological models of self-regulation, in contrast, tend to assume that people generally have sufficient and appropriate knowledge to execute the task, and focus instead on the mechanisms by which that knowledge is transformed into behavior change, as well as on why individuals who know exactly what they must do to achieve optimal health still do not do so. We hope to highlight the relevance of these process-oriented self-regulation models not only to health promotion and prevention behaviors but also broadly to other health concerns, such as pain management and adjustment to illness. We acknowledge, of course, that in particular settings, powerful external factors, such as limited financial resources, may constrain an individual's ability to engage in self-regulatory behavior.

Self-regulation theories are most relevant to the issue of health behavior change and maintenance with respect to health promotion and chronic illness management. When individuals are engaged in some behavior that impairs good health or illness management, they must decide to improve their current situation, determine the criteria with which to judge progress toward that end, and execute necessary and appropriate behaviors. These questions lay at the heart of social psychological models of self-regulation. The aim of this conceptual review is to provide evidence that these theories promote our understanding of who successfully engages in behaviors to protect and maintain their health, when they do so, and how they do so. Where appropriate, we also discuss the implications of studying health for the study of self-regulation.

What Is Self-Regulation?

Self-regulation is an umbrella term used to describe the various processes by which people pursue and attain goals. These processes include both those that are initiated consciously and deliberately, as well as those that are more automatic and operate without conscious intent or monitoring. Self-regulation theorists agree upon the major distinction of self-regulation into two broad components that capture the numerous cognitive, emotional, and behavioral challenges that must be resolved in goal pursuit: goal setting and goal striving (e.g., Carver & Scheier, 1982; Mischel, Cantor, & Feldman, 1996). Goal setting involves determining which goals one wants to pursue and the criteria for judging success. Depending on the setting and the individual, goal setting may be a fairly effortless and quick process or one that involves extensive deliberation and resource use. Goal striving refers to planning and executing actions that promote goal attainment and shielding those goals from distraction or disruption. Supporting people's goal striving efforts are a myriad of conscious and unconscious mechanisms that promote goal success through prospection, automatization, reappraisal, and inhibition.

Although goal striving typically follows goal setting, there may be times when goal setting follows goal striving. For example, when people experience setbacks in the pursuit of their goals, they may be forced to reconsider whether the goals are worth pursuing or whether the criteria for determining goal success need to be revisited. Regardless of their temporal order, both goal setting and goal striving are necessary for successful self-regulation. The attainment of an unsatisfying or undesirable goal, for example, is

as poor an outcome as the failure to attain a highly desired goal. Successful self-regulation entails selecting desired goals with appropriate criteria for success (i.e., goal setting), and engaging in those strategies and behaviors necessary to procure that outcome (i.e., goal striving). We use this major distinction between processes of goal setting and goal striving as a framework to discuss findings on self-regulation in health behavior. Before doing so, a brief discussion of the goal concept is warranted.

What Is a Goal?

Goals are mental representations of desired outcomes to which people are committed (e.g., Fishbach & Ferguson, 2007; Fujita & MacGregor, 2011). People may value good health without actually adopting a health goal that guides their behavior. For example, they may agree that health is important without committing themselves to eating more vegetables and fruits or exercising regularly. Setting a goal creates a sense of urgency, motivating individuals to make an effort to reduce the discrepancy between the current state and a desired state (Carver & Scheier, 1982). Although people may desire or intend to attain some outcome, they are not committed to that as a goal until they are willing to invest affect, cognition, and behavior in attaining it. Whereas goal intentions specify a desired end state, goal commitment indicates how much that end state is desired and motivates action. Merely having an intention is thus insufficient to constitute a goal (Austin & Vancouver, 1996). People frequently express intentions to alter their behavior, but nevertheless soon find themselves violating those intentions. In a field study of individuals who were making new year's resolutions, for example, only about half of the participants kept their resolution (primarily for dieting or quitting smoking) for even a month (Norcross, Ratzin, & Payne, 1989). The result is a well-documented gap between intentions and behavior (Webb & Sheeran, 2006). A person who fails to act on an intention may feel disappointed, but a person who fails to act on a goal feels upset, ruminates, and engages in compensatory behavior (e.g., Fishbach & Ferguson, 2007; Förster, Liberman, & Friedman, 2007).

Although people may be able to report what their goals are, they may also pursue goals that they are not aware that they have (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). That people are pursuing goals is evident by the judgments and decisions that they make, the behaviors that they engage in, and their emotional, cognitive, and behavioral reactions to various outcomes. Thus, the ability to explicitly declare that one is pursuing a particular goal is not necessarily a gold standard for determining one's goal status. Nevertheless, most researchers continue to rely on self-report, asking participants to indicate to what extent they value and are pursuing a particular goal. Some looking for greater precision also assess participants' perceived commitment to future goal-directed behavior. Because people tend to be emotionally invested in their goals and respond to setbacks with compensatory behavior (e.g., Fishbach & Ferguson, 2007; Förster et al., 2007), items that assess people's emotional or behavioral reactions to goal failures may be particularly diagnostic.

Goal Setting

Self-regulation begins with the adoption of a goal, which can be as small as eating an apple a day or as large as pursuing a long and

healthy life. In this section we discuss three issues related to setting goals in general, and health goals in particular. First, we examine the reasons people adopt—or fail to adopt—health goals. Second, we explore goal characteristics and highlight the features of goals that are likely to be successfully attained. Third, we discuss the conditions that lead people to prematurely abandon their goals, as well as cases where goal abandonment is an adaptive choice.

Adopting Health Goals

Although most people want to be healthy, there are many reasons why they may not adopt health goals. If people are unaware of the health consequences of their behavior or do not feel vulnerable to those health consequences, they are unlikely to adopt a health goal (Becker, 1974; Weinstein, 1988). However, in the current context of increasing communication of health risks, it seems more likely that people will fail to adopt a health goal because they are overwhelmed or confused by a bombardment of often-conflicting health information. This may cause defensiveness and ultimately backfire, preventing people from adopting a new behavior (cf., Mischel et al., 1996). Laboratory research with healthy college students suggests, however, that this defensiveness about acknowledging the risks of one's own behaviors can be overcome with brief interventions that either enhance positive affect (Aspinwall & Brunhart, 1996), affirm people's sense of self-worth (Sherman, Nelson, & Steele, 2000), or affirm people's connection with and caring for others (Crocker, Niiya, & Mischkowski, 2008). Similar work with ill populations in field settings is necessary here.

A common viewpoint in psychology is that people are unlikely to engage in behaviors that they perceive as inconsistent with their self-image or identity (Fishbein, Triandis, Kanfer, Becker, Middlestadt, & Eichler, 2001), and this is true for the adoption of goals as well. This is also the case for people's social identity, or the part of their self-concept derived from membership in a particular group (Tajfel & Turner, 1979). Recent research on identity-based motivation among college students of various ethnic groups suggests that people who strongly identify with a social or ethnic minority group may regard health behavior as typical for the majority (Oyserman, Fryberg, & Yoder, 2007), and this may lead them to dis-identify with health goals and therefore not adopt them.

As has been demonstrated with adults attempting to start a regular exercise routine, health goals compete with goals in other important life domains for the scarce resources of time, energy, and money (Riediger & Freund, 2004), and people are unlikely to adopt a health goal if it would interfere with a goal that is more important to them. People with lower socioeconomic status may feel that they cannot afford investing in health goals when there are more immediate concerns to address (Ouwehand, De Ridder, & Bensing, 2009). Similarly, if exercising three times a week would prevent a person from spending sufficient time at work, for example, and if succeeding at one's career is a more highly valued goal, the exercise goal is unlikely to be adopted. Even goals that do not compete with each other for resources can be incompatible with each other (Riediger & Freund, 2004), such as the goal of restricting calories (declining a piece of cake that someone baked for you) and the goal of being polite (consuming the cake) (de Ridder & Kuijer, 2006).

On the other hand, people are more likely to adopt health goals if they are aligned with goals in other domains, and indeed, health goals are not necessarily adopted solely for health-related reasons. According to goal systems theory, it is particularly advantageous when goals are multifinal—when several ends can be achieved by the same means (Kruglanski et al., 2002), thereby maximizing goal attainment with the same amount of effort. Sexually active Dutch adolescents, for example, reported engaging in safe sex partly because of a goal to be healthy, but partly because of a goal to increase intimacy in their relationships (Gebhardt, Kuyper, & Greunsvan, 2003).

People may adopt goals because they have an intrinsic interest in changing their behavior or because they have an extrinsic interest in doing what (they believe) others expect of them (Koestner, Lekes, Powers, & Chicoine, 2002; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). A meta-analysis of laboratory research suggests that subsequent goal directed behavior is more likely to occur when people are intrinsically motivated to achieve that goal (Koestner et al., 2002). Outside of the lab, research with individuals at risk for coronary artery disease found that dietary changes were more likely to occur among those who were intrinsically, rather than extrinsically, motivated to change (Pelletier et al., 2004).

These findings can be explained with self-determination theory (Deci & Ryan, 1985), which proposes that autonomous motivation to change one's behavior is an important predictor of successful goal adoption and behavior change. Interventions based on this theory have been conducted to promote exercise adherence and smoking cessation by training health care providers to present information about these behaviors and to discuss the individual's values without recommending a goal, and then to support the individual in whatever goal they choose. Both interventions showed positive long-term behavioral effects (Silva et al., 2011; Williams et al., 2006).

Goal Characteristics

People may be genuinely concerned about their health and want to make a change, but then experience difficulties transforming that vague wish or desire into a binding health goal. Without the proper goal formulation, many good intentions are doomed to fail (Norcross et al., 1989). Research on spontaneous goal setting in patients with Parkinson's disease and chronic fatigue syndrome suggests that patients tend to address their immediate concerns (e.g., understanding physical symptoms) rather than long-term considerations (e.g., getting back to work) (de Ridder, Schreurs, & Bensing, 1998). In addition, newly diagnosed diabetes patients in a self-management intervention tended to formulate goals without taking into consideration the processes and strategies that were necessary to achieve them (Taylor, Pham, Rivkin, & Armor, 1998; Thoolen et al., 2009), which may lead to problems when they are confronted with unforeseen obstacles and setbacks during goal pursuit (de Ridder & Kuijer, 2006).

Social psychologists have studied several characteristics of goals, including the motivational orientation (approach vs. avoidance), the level of difficulty (easy vs. challenging), the type (performance vs. mastery goals), the level of specificity (concrete vs. abstract), and the proximity of the end state (near vs. distant). Variation on these dimensions influences the success of subse-

quent goal pursuit. For example, when people set proximal goals, they receive feedback on their progress sooner and are better able to adjust their strategies of goal striving (Locke & Latham, 1990). This work comes primarily from business settings, however, and does not usually include health-related goals. We discuss three goal dimensions that are particularly relevant for health goals: motivational orientation, goal difficulty, and goal type.

Approach vs. Avoidance Goals

Goals can be oriented not only toward securing desired outcomes (approach goals) but also to avoiding unwanted outcomes (avoidance goals; e.g., Carver & Scheier, 1982; Elliot & Sheldon, 1997). Because approach goals are geared toward reducing distance to some end-state, they have a definite criterion for success (i.e., reaching that end-state). Avoidance goals are associated with increasing distance from an undesired end-state, so their criterion for success is not as clear-cut (i.e., one can always get further from the undesired end-state). Perhaps because of these structural arrangements, avoidance goals involve less clearly defined strategies and are more likely to be associated with negative outcomes than approach goals—at least in the realm of academic achievement (Elliott & Sheldon, 1997). One exception to this pattern occurs with a type of avoidance goal that involves curing an unwanted outcome that is already occurring (e.g., “I want to get rid of my smoker’s cough”), rather than preventing an unwanted outcome that has not yet occurred (e.g., “I want to avoid getting lung cancer”). In one study, the more of the “cure” type of avoidance goals individuals in smoking cessation programs had, the more likely they were to quit smoking (Worth, Sullivan, Hertel, Rothman, & Jeffery, 2005).

Because approach goals tend to be more effective than typical avoidance goals, one intervention strategy may be to reformulate avoidance goals into approach goals (e.g., “avoid being sedentary” can be transformed into “take regular walks”). With certain goals, people may be able to specify a substitution goal (“eat fruits *instead of* an unhealthy snack”) or a different goal for which the avoidance goal is instrumental (“quitting smoking” is instrumental for “climbing the stairs without getting short of breath”). Another promising strategy for intervention is to induce approach goal orientations with mental simulation. In a community sample of sedentary individuals, those who were taught to use mental imagery of an exercise approach goal engaged in more physical activity than individuals using neutral imagery (Chan & Cameron, 2011).

Challenging vs. Easy Goals

A particularly important goal characteristic relates to the level of aspiration it specifies. By definition, a goal relates to a discrepancy between a current state and a desired state, which is thought to motivate efforts to decrease the discrepancy (Carver & Scheier, 1998). But how large a discrepancy can a person handle before the goal is deemed unattainable? Previous research in the organizational setting has emphasized that goals should not be overly ambitious, as exemplified in the SMART acronym, which calls for people to adopt behavior change goals that are Specific, Measurable, Attainable, Realistic, and Timely (Latham, 2003).

There is accumulating evidence, however, that a singular focus on the feasibility of goals does not necessarily promote goal

striving, and that unrealistic goals may actually inspire, rather than compromise, goal pursuit (Linde, Jeffery, Finch, Ng, & Rothman, 2004)—although the evidence is limited to goals relating to weight loss. In the case of desirable but less attainable goals, people may adjust their goal evaluations to reduce the discrepancy between desirability and feasibility. They may even do this by working to make the goal more attainable (e.g., by taking direct action to achieve the goal), rather than by deciding the goal is less desirable (de Ridder & Kuijer, 2006). Appreciating both the feasibility and desirability of goals may also help to increase self-efficacy and expectancies of positive outcomes, as shown in a survey of patients with diabetes, heart disease, and asthma (Kuijer & De Ridder, 2003).

Performance vs. Mastery Goals

Another relevant characteristic of goals is the extent to which they involve the achievement of a specific standard (“performance goals,” e.g., lose 25 pounds) or the development of a skill (“mastery goals,” e.g., learn to eat balanced meals; cf. Elliott & Dweck, 1988). Individuals attempting to achieve a performance goal are focused on *documenting* their ability, so short-term setbacks are seen as information that their ability is inadequate. Individuals pursuing a mastery goal, on the other hand, are focused on *improving* their ability to perform a certain skill, so short-term setbacks are considered information on how to best go about acquiring that skill (Elliott & Dweck, 1988). Outside the health domain, learning research with college students indicates that even if individuals fail at them, mastery goals promote self-efficacy and lead to more successful goal pursuit than performance goals (Bell & Kozlowski, 2002). This distinction has not often been applied to health goals, but by focusing the individual on gradually incorporating a new behavior, rather than an all-or-nothing attempt to achieve a particular outcome, reframing health goals into mastery goals may have considerable benefits.

Abandoning Goals

People frequently abandon their health goals at an early stage (e.g., giving up on new year’s resolutions; Norcross et al., 1989). Early goal abandonment may be attributable to problems originating with faulty goal setting, such as adopting goals for the wrong reasons, or attributable to conflict with other goals or immediate needs. Early abandonment may also result from a lack of adequate goal striving skills that are required for successful goal pursuit (as covered in the next section). In both cases, goal abandonment may be considered a failure of self-regulation because people give up on a goal prematurely.

When difficulties in goal pursuit are experienced, individuals are faced with the dilemma of either increasing their effort and staying committed to the goal or disengaging from the goal. Research tends to focus on ways to secure goal commitment when setbacks occur, but persistence is not always the most beneficial response. Although in many situations it can be adaptive to remain tenaciously committed to a goal, when a goal turns out to be impossible or nearly impossible to attain, continued effort may unnecessarily consume scarce personal resources, such as when people with chronic pain attempt to persist in all their previous activities (Schmitz, Saile, & Nilges, 1996). When health goals are

beyond personal control (e.g., the goal to obtain a “perfect” slim body), individuals need to weigh the benefits of spending scarce resources on persistent goal-directed effort against adjusting health goals toward more promising outcomes (Brownell, 1991).

How can people tell that the difficulties encountered during goal striving are normal setbacks or a clear signal that further pursuit is no longer fruitful? Self-regulation theories emphasize the role of affect in monitoring progress toward a goal. Positive affect suggests that one is doing better than expected and that other goals may be attended to, and negative affect suggests that progress is slower than expected (Carver & Scheier, 1998). Importantly, not all forms of negative affect have the same meaning. Frustration and anger are typically an indication that greater effort is required to sustain goal commitment and goal striving, whereas sadness and depression call for decreased priority of goal striving and, eventually, goal abandonment. This view on the central role of affect is in line with social psychological approaches that emphasize the informational properties of affect (Schwartz & Clore, 1996). Although this theoretical account of the role of affect in monitoring goal progress is thought provoking, empirical tests in the health domain are scarce.

Goal Striving

Whereas goal setting entails determining what goals to pursue and by what criteria people judge successful goal attainment, goal striving refers to the process of planning and performing those behaviors necessary to achieve those goals. Successful goal striving entails meeting two primary self-regulatory challenges. First, people must plan and execute those behaviors that directly promote goal attainment. To do so, people need to know *what* they can do to achieve their goals and *when* they can act to attain their goals. For any one goal, though, there is likely more than one way to achieve it and more than one opportunity to do so. Being aware of multiple means allows people to be more resilient to setbacks that they may encounter (Carver & Scheier, 1982; Kruglanski et al., 2002), and being able to identify opportunities where those behaviors would be maximally effective increases the likelihood of goal success.

Rarely, however, do people strive for a single goal. In daily life, people may be juggling competing goals from other domains, and each of these goals may be threatened by temptations, frustrations, or distractions. Therefore, people are typically faced with a second self-regulatory challenge: protecting valued goals from disruption. For example, a dieter who is making dinner for her children has to resist snacking on the tempting high calorie parts of the meal, attend to the distractions involved with preparing multiple foods, and simultaneously strive for the competing goals of keeping her children safe (by monitoring their proximity to the hot stove) and being a good role model for them (by suppressing the tendency to lose her temper when interrupted by a call from a telemarketer).

People address these self-regulatory challenges with multiple strategies, which we classify into four general categories. These strategies directly promote execution of goal-directed behavior, indirectly promote goal attainment by shielding goals from disruption, or both. Note that much of the goal striving self-regulation literature that we review below assumes that people have the requisite knowledge about what has to be accomplished and what might reasonably be expected as outcomes. Self-regulatory break-

downs can occur as a result of unrealistic or incorrect beliefs (Leventhal et al., 2008, 2011), but process-oriented models of self-regulation tend to assume some modest degree of appropriate knowledge and highlight instead those processes that promote or impair the utilization of knowledge for goal attainment.

Strategy 1: Prospecction and Planning

People have the remarkable ability to think prospectively about the future, anticipating goal-relevant events and mentally rehearsing goal-directed behaviors (Trope & Liberman, 2003). These mental simulations allow people to identify appropriate opportunities for goal-directed behavior and to practice the desired behavior mentally to “get it right” before having to actually perform it, which in turn promotes goal attainment. For example, students who were instructed to visualize studying for an exam studied more and outperformed students who were instructed to visualize getting a good grade (Pham & Taylor, 1999). Thus, imagining and mentally rehearsing goal-directed behavior appears to be an effective means to identify the what, when, and how of goal-directed behavior, although evidence with patient populations is scarce.

Prospecction can also be used to identify potential obstacles and challenges that people may face in implementing their goals. For example, people may be able to identify that fatigue at the end of a long day may tempt them to skip the gym, thus acting in a manner inconsistent with their exercise goals. When people can anticipate such events, they can plan and precommit to courses of action that counter the draw of such temptations. The fatigued exerciser might then arrange to work out at the beginning of the day. Individuals may also make small changes to their surroundings that lead them to regulate their behavior better without even noticing (Thaler & Sunstein, 2008), such as choosing to keep tempting foods at a distance (Maas, De Ridder, De Vet, & De Wit, in press) or avoiding a route to work that passes a bakery.

Other prospective strategies can be devised to alter the consequences of failing to achieve a goal, rather than by altering the likelihood of encountering temptation. In a series of laboratory studies, for example, undergraduates faced with the prospect of a painful medical test were willing to pay higher cancellation fees if they anticipated those painful procedures would tempt them to skip the test all together (Trope & Fishbach, 2000). Similarly, a smoker who buys only one pack of cigarettes at a time does not just limit the amount of cheating that is possible, but also makes each cigarette cost more, thereby imposing a financial punishment for failing at smoking cessation (Werthenbroch, 1988). In this case, then, their purchasing choice prospectively alters both the temptation and the consequence. Although these prospective strategies seem likely to be effective in health contexts, the efficacy and frequency of use of these strategies in patient populations is still an open research question.

Strategy 2: Automating Behavior

Goal striving would be easier to accomplish if people did not have to consciously attend to their environment for goal-relevant opportunities and consciously initiate and monitor goal-directed behavior. If these processes did not require conscious resources—if they were automatic—they would not be disrupted by distractions or cognitive burdens. Indeed, one

theme that has emerged from the study of self-regulation is the important role of automatic processes (see also Sheeran, Gollwitzer, & Bargh, this issue), and research has suggested that people are indeed capable of capitalizing on these processes to promote goal striving.

When people consistently engage in goal-directed behavior in a particular context, over time mere exposure to that context can promote goal striving behaviors (e.g., Bargh et al., 2001). Cued habits can similarly promote goal-directed behavior. Exercise, for example, is a habitual behavior that can promote health goals. When students transfer between schools, those whose new environment contains the same exercise cues as their old environment are more likely to sustain exercise habits than those whose new environment no longer presents the same cues (e.g., Wood, Tam, & Witt, 2005). This automatic cueing of behavior reduces the need to consciously identify a situation as goal-relevant and puts less strain on consciously remembering what one was supposed to do in this particular context. Instead, the context cues the behavior directly, promoting more efficient and effective goal-directed behavior.

People can also develop automatic processes that protect their goals from disruption. Dieters who are immediately reminded of their weight-loss goals when presented with chocolate cake, for example, are more successful in resisting its allure than dieters who are not similarly reminded (Kroese, Evers, & De Ridder, 2009). Laboratory research suggests that over time, successful dieters may automate these processes, such that temptation-related thoughts automatically cue diet-related thoughts, whereas diet-related thoughts render it more difficult to think of temptation-related thoughts (Fishbach, Friedman, & Kruglanski, 2003). Similarly, whereas food temptations normally provoke positive hedonic thoughts among dieters (e.g., Papies, Stroebe, & Aarts, 2007), successful dieters develop automatic negative responses (e.g., Fishbach & Shah, 2006). Thus, people can automate effective mechanisms with which to counter temptation, although this technique has yet to be tested in a field setting or with a patient population.

Certain associations, however, do not require consistent pairing of a cue with a behavior over time but can be formed simply by repeating the association several times in one's head. These associations, called implementation intentions (Gollwitzer, 1999), are "if-then" behavioral plans that specify a behavior to be performed in a particular context, or in response to a particular thought (e.g., "if I think about chocolate cake, then I will eat an apple instead"; Adriaanse, De Ridder, & De Wit, 2009). When that context or thought is encountered, it automatically cues the behavior, even when cognitive load prevents conscious attention to environmental stimuli. Students trying to reduce junk food intake who were taught to create implementation intentions (e.g., like the one above) ate less of that food over the next week than did students who were not asked to form implementation intentions (Adriaanse et al., 2009).

Implementation intentions have been shown to be effective in promoting diverse health behaviors, including eating a low-fat diet, limiting binge drinking, completing cancer screenings, and increasing exercise (for a meta-analysis across many behavioral domains, see Gollwitzer & Sheeran, 2006), although very few of those findings come from patient populations. It should also be noted that implementation intentions to *not* engage in a behavior

(e.g., "If I think about the tempting chocolate, I will not eat it") have not been found to be effective (Adriaanse, Van Oosten, De Ridder, De Wit, & Evers, 2011). Specifying what "not" to do appears to backfire by making the temptation behavior salient, thereby making it more desirable and more difficult to control.

Strategy 3: Construal

The way people think about and understand goal-directed behavior can change dramatically over time (e.g., Trope & Liberman, 2003). For example, when thinking about the distant future, exercise may conjure thoughts about weight-loss, looking better, and making a change for the better. When the future becomes the present and one is debating whether to go to the gym after a long day at work, exercise instead conjures thoughts about the inconvenience of changing clothes, how tired one feels, and all of the other things one might do as an alternative. This change in how people understand events over time is referred to as a change in *construal*, and these shifting construals appear to explain why people find health-directed behaviors so positive and desirable in the distant future, yet so negative and undesirable once the future becomes now.

Research suggests that changing people's construal of immediate health behaviors to be more consistent with their distanced, abstract construals promotes goal-directed behavior, at least in single sessions within a laboratory study (e.g., Fujita, 2008; Metcalfe & Mischel, 1999; Mischel, Shoda, & Rodriguez, 1989). For example, children who are promised two marshmallows if they can wait 15 minutes without eating a single, immediately available marshmallow are better able to delay gratification when instructed to think of the marshmallows in an abstract (e.g., "they look like clouds") rather than emotion-laden manner (e.g., "they look yummy;" Mischel et al., 1989).

Construals of immediate behavior also tend to emphasize the concrete, unique features of events, whereas those of distant behavior tend to emphasize more abstract, goal-relevant features (e.g., Fujita, 2008; Trope & Liberman, 2003). Metaphorically, concrete construals allow one to see a single tree in great detail at the expense of seeing the proverbial forest beyond. Thus, the concrete construal that "THIS cake looks good" may blind one from the more general understanding that "eating cake contributes to weight gain." Research indicates that adopting more abstract rather than concrete construals promotes preferences for apples over candy bars among populations concerned about their weight (Fujita & Han, 2009). This change in one's preferences as a function of construal, moreover, appears to not require conscious effort. Simply adopting a more distanced perspective appears to make one think of immediate behaviors in a new light, helping people to relate the present to one's long term future goals (e.g., Fujita, 2008). Whether this strategy can be taken advantage of to promote long-term behavior change remains to be explored.

In general, strategies such as precommitment and prospective planning capitalize on the distanced, abstract construals people adopt when considering future rather than immediate goal-directed behavior. By structuring and organizing one's environment and behavior to be consistent with one's goals when one is able to "see the forest beyond the trees," people are better able to protect themselves from a shift in construal as the future becomes the present (Fujita, 2008). However, even in the absence of such

prospective planning, people can still reconstrue immediate goal behaviors in a manner more conducive to goal striving success. Doing so, however, may require taking a step back to adopt a more distanced perspective on present events, something that some people may not always do consistently and spontaneously.

Strategy 4: Effortful Inhibition

One of the most studied goal striving strategies from a psychological perspective is effortful inhibition. This strategy primarily serves to protect one's goals from distraction and disruption by other concerns, rather than to directly enhance one's attainment of goals. Effortful inhibition is the process by which people attempt to fight off or suppress thoughts, feelings, and behaviors that are contrary to their goals through conscious monitoring and effort. For example, as one tires while exercising, one might consciously will oneself to not think about the aches and pains that fill the mind. Similarly, dieters might consciously fight impulses to indulge in their favorite foods when those foods are made available to them. Although confronting and resisting temptation by one's conscious will sounds like—and is often considered—the prototypical self-regulation task, this strategy may be limited in its effectiveness. As noted earlier, one's conscious resources are finite. Any burdens on the capacity and motivation to engage in effortful inhibition can detract from its effectiveness. Thus, although effortful inhibition can be used to promote goal attainment, research suggests that it is a strategy that is vulnerable to fail in a systematic manner.

Inhibition requires cognitive capacity and resources. Much of the work on effortful inhibition in self-regulation is inspired by dual-process and dual-systems theories (e.g., Strack & Deutsch, 2004). According to these models, temptations are governed by impulsive or reflexive processes that operate quickly and automatically, without requiring conscious effort. The act of inhibiting temptation, however, is governed by separate controlled or reflective processes that operate slowly and deliberately, and which require sufficient cognitive or attentional resources. The primary tenet of these models is that whether one is successful in countering tempting impulses depends on one's capacity and ability to fight those impulses through conscious effort. When cognitive abilities and resources are scarce or burdened, behavior is primarily influenced by impulsive processes, as those processes can operate outside of conscious awareness. Efforts to shield one's goals from disruptions are likely to fail when individuals have diminished cognitive resources.

Both dispositional and situational factors can limit cognitive capacity and resources and thus impair inhibition of temptations through conscious effort. Impairments in working memory and executive functioning have been systematically linked to poor self-regulatory outcomes. Decrements in working memory capacity predict overeating (e.g., Hofmann, Gschwendner, Friese, Weirs, & Schmitt, 2008) and problematic drinking behavior (e.g., Whitney, Hinson, & Jameson, 2006). Similarly, burdening people's conscious resources by imposing cognitive load can also impede goal-directed behavior. Research suggests, for example, that when people are asked to divide their attention among multiple tasks at the same time, they are more likely to overeat (Ward & Mann, 2000) and to choose to eat foods such as cake rather than fruit salad (Shiv & Fedorikhin, 1999). Transient states that are

thought to disrupt executive functioning, such as alcohol intoxication (Steele & Josephs, 1990) or fatigue (Harrison & Horne, 1998), have also been shown to prevent individuals from expending cognitive resources on long-term goals. Even aging, which leads to deficits in executive functioning, appears to promote particular unchecked social behaviors that come about when individuals cannot suppress impulsive thoughts or words (von Hippel, 2007).

When cognitive resources are scarce, efforts to inhibit some thought or behavior have even been shown to backfire. For example, when people attempt to consciously restrict a particular thought, they may ironically render it more likely that they will think it (e.g., Wegner, 2009). Even when people eventually get their unwanted thoughts under control, these same thoughts can return and influence behavior when one redirects conscious attention to other matters (e.g., Macrae, Bodenhausen, Milne, & Jetten, 1994). This rebound of previously suppressed thoughts can negatively impact health behavior. Smokers who were instructed to not think about smoking, for example, smoked more over a 3-week period than those who were simply asked to monitor their nicotine intake (Erskine, Georgiou, & Kvavilashvili, 2010). Similarly, dieters who suppressed rather than freely expressed their food-related thoughts ironically ate more chocolate in an ostensible taste test (Erskine, 2008). Thus, effortful inhibition—particularly when cognitive resources are scarce—may make goal failure more, rather than less, likely (Wegner, 2009).

Inhibition requires motivational resources. Beyond cognitive resources, research on ego depletion suggests that effortfully inhibiting goal-undermining impulses both requires and depletes a motivational resource (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Once depleted, subsequent efforts to resist temptation—especially in unrelated domains—are less successful. This phenomenon has been documented in a large body of research, much of which has been conducted on college students using the same laboratory paradigm: participants are asked to do a task that requires them to effortfully resist something tempting (e.g., resist eating fresh-baked cookies) versus a task that does not require them to resist temptation (e.g., eating the cookies). Then all participants are asked to do an unrelated inhibition task. Across nearly one hundred studies involving a variety of tasks (e.g., resisting food; inhibiting the expression of emotions or aggression; and persisting at difficult or unsolvable puzzles), engaging in an initial act of effortful impulse resistance led to worse performance on a subsequent act of effortful impulse resistance (Hagger et al., 2010).

Researchers have discovered a number of situational factors that appear to prevent this depletion effect in laboratory settings. These factors include enhancing motivation by offering cash incentives (Muraven & Slessareva, 2003), inducing positive mood with humor (Tice, Baumeister, Shmueli, & Muraven, 2007), reducing fatigue with rest (Tyler & Burns, 2008), challenging participants' expectancy that they cannot perform two exertion tasks in a row (Martijn, Tenbult, Merckelbach, Dreezens, & De Vries, 2002), forming implementation intentions (Webb & Sheeran, 2003), reducing participants' belief that willpower is limited (Job, Dweck, & Walton, 2010), reminding individuals of their core values (Schmeichel & Vohs, 2009), and even providing them with glucose (Gailliot et al., 2007).

Certain individual difference factors may influence resource depletion, and one with particular relevance to health is chronic

pain. Recent research with fibromyalgia patients suggests that people in chronic pain may constantly be in a state of resource depletion (Solberg Nes, Carlson, Crofford, de Leeuw, & Segerstrom, 2010). Pain patients in the study had deficits on temptation-resisting tasks that were similar to deficits shown by pain-free patients who had first been depleted. Pain patients may therefore be especially vulnerable to temptation and may need extra attention and help in shielding their focal goals from disruptions.

Interventions based on this research literature are rare. There is some evidence that giving individuals practice or training in resisting temptation in one daily life domain (e.g., managing money) helps them succeed at shielding other goals (e.g., dieting) from disruption as well (Hui et al., 2009). It is unclear, however, when daily acts of resisting temptation count as training (which should lead to improved self-control), and when those acts count as initial depleting tasks (which should lead to worse self-control). This lack of clarity contributes to the difficulty in applying these concepts to long-term goal striving, in which many acts of resisting temptation occur—and may influence each other—over the course of a day.

Discussion and Future Directions

The explication of dynamic psychological mechanisms that underlie self-regulation may allow health researchers to better understand when, why, and for whom successful health behavior change is most likely. The examination of health behavior, in turn, has much to contribute to theories of self-regulation, as health is a prototypical and central domain in which to examine the relevance of these theoretical models for real behavior. We highlight some of the enduring questions and future directions that are suggested by the integration of these two research domains.

It is clear from the present review that there is no single solution that will help all people to set and attain health-related goals. Self-regulation of health behavior instead entails the operation of a number of psychological mechanisms. People not only need to commit to health goals, but must also properly specify and frame these goals. They need to plan and execute goal-directed behaviors in appropriate contexts, and they must be vigilant for temptations, distractions, and disruptions to health goals. Any one of these processes can go awry and lead to detrimental outcomes. Importantly, successful self-regulation does not solely rely on willpower but rather on careful selection of strategies that promote goal setting and goal striving. Indeed, a saying that is common among the Dutch is “If you are not strong, you must be smart.”

This is not to say, however, that self-regulation research does not lead to clear recommendations. To promote health behavior, people ideally should commit to health goals that are consistent with other personal goals, and they should give careful consideration to the desirability and feasibility of these goals. Ideally, these goals will be mastery goals, have an approach orientation, and be intrinsically motivated. Once committed to a health goal, people need to think about how to implement these goals in the near and distant future. Attention should be paid to identifying goal-relevant opportunities and planning appropriate goal-directed behavior that capitalizes on these opportunities. Individuals should also think about obstacles, distractions, and temptations that may undermine goal-directed behavior and take prospective action to prevent their interference. Whenever possible, people should work to develop

habits and other automatic responses that link goal-relevant thoughts, feelings, and behavior to particular contexts. Learning to distance one’s self from the immediate present through reconstrual may also help keep one’s attention on the “big picture” and promote goal attainment. When all else fails, people may consciously and deliberately redirect attention and behavior away from tempting alternatives and back to those behaviors necessary for health goal attainment.

Although the multitude of necessary processes for successful self-regulation may appear overwhelming, there may be a silver lining: a deficiency in one area may be addressed by strengths in another. For example, if people fail to formulate attainable goals, they may focus on desirable outcomes for inspiration and engagement. Similarly, although each of the goal striving strategies has strengths and weaknesses and a reliance on any single strategy may render one vulnerable to failure, when used in combination with each other, the strategies may be more likely to be effective. For example, if prospective strategies are used effectively, goal-undermining temptations will not be encountered. If such strategies fail and temptations are encountered, automatic processes, reconstrual, and effortful inhibition may serve as “backup” strategies. Research addressing the interaction of all of these processes within the self-regulatory system is lacking and in need of greater attention.

More also needs to be done to understand the where and when of self-regulation, and health may be an ideal domain in which to study these questions. Very little is known about the temporal and situational conditions that help people to set health goals and strive for them. For example, there is a tendency to encourage people to adopt health goals when they are not experiencing a noticeable threat to their health, whereas they may be more willing to consider health goals when they have been confronted with potential health problems. In addition, more research is needed on the individual characteristics that help or hinder people’s self-regulation. For example, individual differences in the ability to effortfully inhibit impulses have been studied by psychologists as far back as William James (James, 1890) and have been found to predict important outcomes related to self-regulation (Mischel et al., 1989). Very little is known, however, about the situational and dispositional factors that lead people to successfully engage the other goal-striving strategies. In addition to exploring differences in impulse inhibition ability, the strength of people’s impulses to engage in goal-undermining temptation may represent another important area for future research. For example, whether a result of genetics or learning history, some individuals may experience stronger impulses to smoke, which may make it more difficult for them to regulate smoking behavior (e.g., Sayette & Hufford, 1997). Enhancing goal-directed behavior, including goals and behavior relevant to health, requires a full exploration of these questions.

Although people’s behavior is often influenced by their relationships, the self-regulatory strategies delineated here have not been looked at in the context of personal relationships. Social psychologists are only beginning to explore the effects of relationships on self-regulatory outcomes, particularly those related to health, and some of their findings so far have been counterintuitive. In particular, recent studies have found that having a partner support one’s efforts at attaining a diet goal (Kappes & Shrout, 2011) or simply thinking about how one’s partner has been helpful

(Fitzsimons & Finkel, 2011) can undermine successful diet goal pursuit. It will be interesting to further explore the processes through which these effects occur, and to what extent they may explain real-world dieting failures.

Finally, before taking advantage of these strategies to create interventions to help people regulate their health behaviors, a number of translational issues must be addressed, both at the conceptual and empirical levels. At the conceptual level, more needs to be done to integrate dynamic process models of self-regulation into the predictive models with which most health researchers are familiar. One model that does so is temporal self-regulation theory (Hall & Fong, 2007), which integrates insights from the theory of planned behavior (Ajzen & Fishbein, 1980) with some of the goal striving processes that we have described above. This work is an important step in incorporating more dynamic process accounts of health behavior into what are traditionally more static, descriptive models. Further work is still necessary, however, to incorporate more fully the contributions from both research domains.

Empirically, it is still necessary to assess whether the self-regulation strategies reviewed earlier are effective outside the lab, as people go about their daily life. The ability to achieve one's goals is frequently constrained by external or situational factors, such as limited time, money, or access to other necessary resources—constraints that do not tend to apply to laboratory settings. There are also times, however, when small changes to the environment or situation may lead to positive changes in individual's behavior that would not be evident in a lab. These “nudges” have been demonstrated with health behaviors (Thaler & Sunstein, 2008), but more work can be done linking this approach more specifically to self-regulation processes.

Although there is much research on goal setting, we still know very little about when and why people are truly motivated to adopt health goals. In spite of research emphasizing the importance of personal goals, health interventions typically try to persuade people to adopt health goals that are important from a medical-professional—rather than a personal—point of view. Lab findings on goal setting could be used to develop strategies that support the formulation of personal goals in the health domain. In addition, even when goal striving strategies that have proven effective for the duration of a lab experiment work outside the lab, little is known about whether their effectiveness fades over time or whether they become more effective with practice and repetition. More work needs to be performed to understand whether these strategies can effectively promote goal attainment in the “messiness” of the real world and specifically in the domain of health.

The goal of this article was to review and highlight the relevance of self-regulation research for health-related theory and practice. By outlining how people set goals and then implement them successfully, we hope to encourage those in health-related fields to consider and incorporate insights from self-regulation research into their own theoretical models and clinical practice. We also look forward to insights that the application of these ideas to health-related domains may have for generating new ideas to further the research performed in more traditional social psychological settings.

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Received June 2, 2011

Revision received November 15, 2011

Accepted January 6, 2012 ■

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