The Power of Planning: Effective Self-Regulation of Goal Striving

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The Power of Planning

Research on the psychology of goals suggests that successful goal pursuit implies solving two subsequent tasks: goal setting and goal striving (Gollwitzer & Moskowitz, 1996), Oettingen & Gollwitzer, 2001). This distinction between goal setting and goal striving was originally emphasized by Kurt Lewin (1926; Lewin et al., 1944). To successfully solve the first task of goal setting, the following issues are to be tackled: First, people need to set goals framed in a way that maximizes goal attainment. Framing one's goals in terms of promoting positive outcomes versus preventing negative outcomes (promotion versus prevention goals, Higgins, 1997) helps goal attainment, as does acquiring competence versus demonstrating the possession of competence (learning versus performance goals, Dweck, 1999), and anticipating internal versus external rewards (intrinsic versus extrinsic goals, Ryan & Deci, 2000). That is, promotion, learning and intrinsic goals are commonly attained more successfully than prevention, performance, and extrinsic goals. The precision with which the desired future outcome is spelled out also seems to matter. For example, goals with a proximal versus a distal time frame (Bandura & Schunk, 1981) are more likely to be achieved, and goals with specific rather than I-will-do-my-best standards lead to better performances (Locke & Latham, 1990).

Second, it is also useful to set goals to which one can strongly commit, as such goals (intentions) have a better chance of being attained (Ajzen, 1991; meta-analysis by Webb & Sheeran, 2006). Strong goal commitments are based on the belief that a given goal is both highly desirable and feasible (Ajzen, 1991; Atkinson, 1957; Bandura, 1997; Gollwitzer, 1990; Klinger, 1975; Locke & Latham, 1990). Desirability comprises the summarized beliefs about the pleasantness of expected short-term and long-term

consequences of goal attainment (Heckhausen, 1977). Feasibility is defined as expectations that future events and actions will occur (Gollwitzer, 1990). Prominent examples include expectations of whether one can execute a behavior necessary for realizing a specific outcome (i.e., self-efficacy expectations; Bandura, 1977, 1997; Maddux, 1999), expectations that a behavior will lead to a specified outcome (i.e., outcome expectations; Bandura, 1977; instrumentality beliefs; Vroom, 1964), and judgments about the general likelihood of a certain outcome (i.e., general expectations; Oettingen & Mayer, 2002).

It is important to recognize, however, that perceiving a very desirable goal as highly feasible does not necessarily make for strong goal commitments. Recent research suggests that the way people think about a desired future outcome affects whether high feasibility is indeed translated into strong goal commitments facilitating subsequent goal striving and goal attainment. The model of fantasy realization (Oettingen, 2000; Oettingen, Pak, & Schnetter, 2001) proposes that mentally contrasting a desired future with the reality that impedes its realization will create expectancy-dependent goal commitments. Specifically, in *mental contrasting*, people imagine the attainment of a desired future (e.g., becoming a physician; giving a good talk) and then reflect on aspects of the present reality that stand in the way of attaining the desired future (e.g., the GRE exam yet to be taken; evaluation anxiety). As a consequence, expectations of attaining the desired future become activated and determine the person's commitment and subsequent striving to attain the wanted future. When perceived chances of success (expectations of success) are high, people will actively commit to and then strive towards reaching the desired future; when expectations of success are low, people will refrain from doing so.

In other words, mental contrasting makes a person sensitive to the question of which goals are reachable, and it gets people to go for reachable goals and keep clear of unreachable ones. This ultimately should protect a person's resources (time, energy, and money) as people will not show any engagement in the face of unreachable goals, but engage without restraint in the face of reachable goals.

It thus appears that mental contrasting is a very useful self-regulation strategy for goal setting. But what qualifies as a good self-regulation strategy for goal striving (or goal implementation). As highlighted by Kurt Lewin goal attainment is not yet secured solely by forming strong commitments to strongly desirable and feasible goals and framing these goals in an appropriate manner. There is always the second issue of implementing a chosen goal, and one wonders what people can do to enhance their chances of being successful at this second phase of goal pursuit. A promising answer seems to be the following (Gollwitzer, 1993, 1999): People need to prepare themselves so that their chances of overcoming the major difficulties of goal implementation are kept high. But what are these difficulties or problems? There are at least four problems that stand out. These problems include getting started with goal pursuit, staying on track, calling a halt, and not overextending oneself. For all of these problems, the self-regulation strategy of forming if-then plans (i.e., implementation intentions) has turned out to be beneficial.

Implementation Intentions: Planning out Goal Striving in Advance

To form an implementation intention (Gollwitzer, 1993, 1999), one needs to identify a future goal-relevant situational cue (i.e., the *if-component*) and a related planned response to that cue (i.e., the *then-component*). Whereas a goal intention

specifies the desired event in the form of "I intend to perform Behavior X/to reach Outcome X" (e.g., to exercise regularly/ to get an A in Introductory Psychology), an implementation intention specifies both an anticipated goal-relevant situation and a proper goal-directed response. Thus, an implementation intention that serves the goal intention to "get an A in the social psychology class" would follow the form "**If** Situation Y arises (e.g., when my roommates will be asking me to go out tonight), **then** I will perform Behavior Z (e.g., will say that I will be joining them next week when my exam is over)."

There is added benefit of an implementation intention: a meta-analysis by Gollwitzer and Sheeran (2006) involving over 8,000 participants in 94 independent studies reported an effect size of $d = .65$. This medium-to-large effect size (Cohen, 1992) represents the additional facilitation of goal achievement by implementation intentions compared to goal intentions alone. As goal intentions by themselves already have a facilitating effect on behavior enactment (Webb & Sheeran, 2006), the size of this effect is remarkable.

How Do Implementation Intention Effects Come About?

The mental links created by implementation intentions facilitate goal attainment on the basis of psychological processes that relate to both the anticipated situation (the if-part of the plan) and the intended behavior (the then-part of the plan). Because forming an implementation intention implies the selection of a critical future situation, the mental representation of this situation becomes highly activated, and hence more accessible (Gollwitzer, 1999). This heightened accessibility of the if-part of the plan was observed in several studies (e.g., Aarts, Dijksterhuis, & Midden, 1999; Parks-Stamm, Gollwitzer,

& Oettingen, 2007; Webb & Sheeran, in press, 2007) and means that people are in a good position to identify and take notice of the critical situation when they subsequently encounter it (e.g., Webb & Sheeran, 2004). For instance, participants who formed implementation intentions to collect a coupon were faster to recognize words related to the location of the coupon (e.g., corridor, red door) compared to participants who only formed the goal intention to collect the coupon; and implementation intention participants also were more likely to collect the coupon subsequently.

Studies also indicate that implementation intentions forge a strong association between the specified opportunity and the specified response (Webb & Sheeran, in press, 2007). The upshot of these strong links is that the initiation of the goal-directed response specified in the if-then plan becomes automated, that is, exhibits features of automaticity including immediacy, efficiency, and redundancy of conscious intent. The idea is that people do not have to deliberate anymore about when and how they should act when they have formed an implementation intention—unlike people who have formed mere goal intentions. Evidence that if-then planners act quickly (Gollwitzer & Brandstätter, 1997, Experiment 3), deal effectively with cognitive demands (Brandstätter, Lengfelder, & Gollwitzer, 2001), and do not need to consciously intend to act at the critical moment (Sheeran, Webb, & Gollwitzer, 2005, Study 2) is consistent with this idea.

These component processes of implementation intentions (enhanced cue accessibility, automatization of responding) mean that if-then planning enables people to see and seize good opportunities to move towards their goals. Fashioning an if-then plan *strategically automates* goal striving (Gollwitzer & Schaal, 1998) because people delegate control of goal-directed behaviors to pre-selected situational cues with the

explicit purpose of reaching their goals, that is, automatic action initiation originates in a conscious act of will (if-then planning).

Implementation Intentions and Overcoming Problems of Goal Striving

Given these special features of action control by implementation intentions, one wonders whether people benefit from forming implementation intentions when they are confronted with the four central problems of goal implementation named above.

Getting started. Numerous studies suggest that problems of *getting started* on one's goals can be solved effectively by forming implementation intentions. For instance, Gollwitzer and Brandstätter (1997, Study 2) analyzed a goal intention (i.e., writing a report about how the participants spent Christmas Eve) that had to be performed at a time (i.e., during the subsequent two Christmas holidays) where people are commonly busy with other things. Still, research participants who had furnished their goal intention with an implementation intention that specified when, where, and how one wanted to get started on this project were about three times as likely to actually write the report than mere goal intention participants. Similarly, Oettingen, Hönig, and Gollwitzer (2000, Study 3) observed that implementation intentions helped people to act on their task goals (i.e., taking a concentration test) on time (e.g., at 10 a.m. in the morning of every Wednesday over the next four weeks).

Other studies have examined the ability of implementation intentions to foster goal striving that is unpleasant to perform. For instance, the goal to perform regular breast examinations (Orbell, Hodgkins, & Sheeran, 1997) or cervical cancer screenings (Sheeran & Orbell, 2000), resume functional activity after joint replacement surgery (Orbell & Sheeran, 2000), eat a low-fat diet (Armitage, 2004), recycle (Holland, Aarts, &

Langendam, 2006), and engage in physical exercise (Milne, Orbell, & Sheeran, 2002), were all more readily acted upon when people had furnished these goals with implementation intentions. Moreover, implementation intentions were found to help attainment of goal intentions where it is easy to forget to act (e.g., regular intake of vitamin pills, Sheeran & Orbell, 1999; the signing of work sheets with the elderly; Chasteen, Park, & Schwarz, 2001).

Staying on track. Many goals cannot be accomplished by simple discrete one-shot actions but require that people keep striving for the goal over an extended period of time. Such staying on track may get very difficult when certain internal (e.g., being anxious, tired, overburdened) or external stimuli (e.g., temptations, distractions) are not conducive to goal realization but instead generate interferences that could potentially derail the ongoing goal pursuit. Implementation intentions can facilitate the shielding of such goal pursuits from the negative influences of interferences from outside the person by suppressing these negative influences (Gollwitzer & Schaal, 1998). For instance, if a person wants to avoid being unfriendly to a friend who is known to make outrageous requests, she can protect herself from showing the unwanted unfriendly response by forming suppression-oriented implementation intentions. Such suppression-oriented implementation intentions may take various forms: “And if my friend approaches me with an outrageous request, then I will not respond in an unfriendly manner!” or “…, then I will respond in a friendly manner!” or “…, then I’ll ignore it!”

But suppression-oriented implementation intentions can also be used to shield ongoing goal pursuits from disruptive inner states. Achtziger, Gollwitzer, and Sheeran (in press, Study 1) report a field experiment concerned with dieting (Study 1) in which goal

shielding was supported by suppression implementation intentions geared at controlling potentially interfering inner states (i.e., cravings for junk food). An alternative way of using implementation intentions to protect ongoing goal striving from getting derailed by adverse inner states (e.g., inappropriate moods, ego-depletion, irritation) is forming implementation intentions geared at stabilizing the ongoing goal pursuit at hand (Bayer & Gollwitzer, 2007a). Using again the example of a person who is approached by her friend with an outrageous request, let's assume that this person is also tired or irritated and thus particularly likely to respond in an unfriendly manner. If this person has stipulated in advance in an implementation intention what she will converse about with her friend, the critical interaction may simply run off as planned, and being tired or irritated should fail to affect the person's relating to her friend.

Calling a halt. The self-regulatory problem of calling a halt to a faulty goal pursuit can also be ameliorated by forming implementation intentions. People often fail to readily disengage from chosen means and goals that turn out to be faulty because of a strong self-justification motive (Brockner, 1992). Such escalation phenomena (also referred to as "throwing good money after bad") can be controlled effectively, however, by the use of implementation intentions that specify exactly when and how to consider a switch to a different means or a different goal. For instance, Henderson, Gollwitzer, and Oettingen (2007) asked participants who had chosen a certain strategy for a given task goal to either form an implementation intention that specified a complex reflection response ("If I receive disappointing feedback, then I'll think about how things have been going with my strategy!") or a more simple action response ("If I receive disappointing feedback, then I'll switch my strategy!"), or merely set the goal to always use the best

strategy available. Henderson et al. observed that action implementation intentions facilitated disengagement as a response to experienced failure no matter whether there were signs that things were picking up or that they would continue to stay bleak. Reflection implementation intention participants, on the other hand, integrated information about recent improvement in forming their disengagement decision (i.e., they were less willing to disengage when things were picking up). This study shows that implementation intentions can be used to curb the escalation of behavioral commitment commonly observed when people experience failure with a chosen strategy of goal striving. Using reflection implementation intentions (as compared to action implementation intentions) even allows for flexible disengagement in the sense that recent turns to the better are respected in one's decision to switch (or not) to a different goal striving strategy.

Not overextending oneself. The assumption that implementation intentions subject behavior to the direct control of situational cues (Gollwitzer, 1993) implies that the self is not implicated when behavior is controlled via implementation intentions. As a consequence, the self should not become depleted (Muraven & Baumeister, 2000) when task performance is regulated by implementation intentions, and thus for individuals using implementation intentions, not over-extendin*g* themselves should become easier. Indeed, using different ego-depletion paradigms, research participants who had used implementation intentions to self-regulate in a first task do not show reduced self-regulatory capacity in a subsequent task. Whether the initial self-regulation task was controlling emotions while watching a humorous movie (Gollwitzer & Bayer, 2000), or performing a Stroop task (Webb & Sheeran, 2003, Study 1), implementation intentions

successfully preserved self-regulatory resources as demonstrated by greater persistence on subsequent difficult tasks (i.e., solving difficult anagrams).

When the Going Gets Tough: Implementation Intention Effects in the Face of Hardships

In the rest of the chapter we will explore whether implementation intention unveil their beneficial effects even under conditions where goal striving becomes tough. This question and the respective line of research have been stimulated by Aristotle's concept of *akrasia* (lack of will power). We felt that any self-regulation strategy of goal striving that psychology claims to contribute to people's self-control has to proof itself under conditions where people commonly fail to demonstrate willpower. Such conditions are manifold and thus we concentrated on the following four:

(a) situations in which a person's knowledge and skills constrain performance such as taking academic tests,

(b) situations in which an opponent's behavior limits of one's performance such as sports competitions or negotiation settings,

(c) situations in which the wanted behavioral (e.g., no littering), emotional (e.g., no fear), or cognitive (e.g., no stereotyping) response runs into conflict with habits favoring an antagonistic response, and

(d) situations in which individual who are known to have problems with action control, such as children with ADHD, have to tackles the typical problems burdening goal striving (e.g., shielding ongoing goal striving form distractions).

Academic Test Performance

Performance on academic tests (math tests, general intelligence tests) is by definition determined primarily by a person's knowledge, analytic capability, and cognitive skills. To increase test scores by willpower, a person thus may want to focus on motivational issues such as staying concentrated on the various test items throughout the test or by reducing worry cognitions (did I find the right answer on the last item) and self-doubts (do I have the skills to find the right solution for the present item).

Taking a math test. Bayer and Gollwitzer (2007b, Study 1) asked female high school students to complete a math test (composed by high school math teachers) under two different instructions. Half of the participants were asked to form the mere achievement goal intention: "I will correctly solve as many tasks as possible!" The other half of the participants had to furnish this goal intention with the following self-efficacy strengthening implementation intention "And if I start a new task, then I will tell myself: I can solve this task!" We observed that participants in the implementation intention group showed a better performance in the math test (in terms of number of tasks solved correctly) than participants in the mere goal intention condition, indicating that self-efficacy strengthening implementation intentions facilitate successful goal pursuit in a challenging achievement situation.

Implementation intentions are usually constructed by specifying a situational cue in the if-part and linking it to goal-directed cognitive or behavioral responses in the then-part. In the present study, a critical situational cue (i.e., starting a new test item) in the if-part was linked to a motivational response (i.e., a private self-efficacy strengthening statement) in the then-part. Interestingly, this pre-programmed, inner self-motivating speech sufficed to produce better test performance. This suggests that implementation

intentions can be used to ameliorate also motivational problems of goal implementation (such as self-doubts in the face of challenging test items) and thus increase a person's willpower (i.e., the potential to exert self-control).

The present manipulation to increase willpower was particularly parsimonious, as we only had participants asked to form a plan in respect to when they will have to execute an inner self-efficacy strengthening statement. Still, these findings leave open a pressing question: Does this inner speech need to take the format of an implementation intention? Maybe it suffices that participants simply form an additional goal intention geared towards holding up self-efficacy, such as "And I will tell myself: I can solve these problems!" To explore this possibility, Bayer and Gollwitzer (2007) conducted a follow-up study that included a further control condition (i.e., a self-efficacy strengthening goal intention condition).

Taking an intelligence test. Bayer and Gollwitzer (2007b, Study 2) asked college students to perform the Raven's Advanced Progressive Matrices intelligence test. They found that students who had been asked to form a self-efficacy enhancing implementation intention showed higher test performance than participants with a mere goal intention to perform well. This replication of the implementation intention effect observed with high school students working on a math test is particularly noteworthy as the well established Raven's Advanced Progressive Matrices intelligence test (Raven, 2000) was used. The tasks on the test get increasingly harder requiring greater cognitive capacity to encode, analyze, and solve them correctly; the test is considered to allow for reliable assessments of a person's analytical reasoning capabilities.

In this study, it was also examined whether adding a self-efficacy strengthening goal intention ("And I will tell myself: I can do these problems!") to the achievement goal intention ("I will correctly solve as many tasks as possible!") improves participants' test performance. As it turned out, test performance improved only when participants were instructed to form additional self-efficacy strengthening implementation intentions. This finding is important for several reasons. First, many of the field and laboratory studies investigating the benefits of implementation intentions (e.g., on health behaviors, job safety, environment protection; see meta-analysis by Gollwitzer & Sheeran, 2006) do not use an additional condition that spells out the then-part of the implementation intention in terms of a further goal intention (for an exception see Oettingen, Hönig, & Gollwitzer, 2001). Therefore, in these studies the benefits of implementation intentions as compared to mere goal intentions could potentially be based on having access to additional information on how to act. With the present study, we can rule out this alternative account as suggesting the use of the strategy of strengthening one's self-efficacy in terms of a mere goal did not lead to higher test scores. Only when this strategy was suggested to participants in the format of an if-then plan, positive effects on test performance emerged.

Finally, the observed differences between self-efficacy strengthening implementation intentions and self-efficacy strengthening goal intentions further support the assumption (Gollwitzer, 1999) that implementation intentions – by specifying situational cues – recruit different action control processes than goal intentions. Whereas the latter instigate effortful, conscious processes, the former trigger automatic processes. Assuming that performing the Raven test is quite demanding and thus burdens cognitive

capacities, it is not surprising that only self-efficacy strengthening implementation managed to be effective.

Considering both of the Bayer and Gollwitzer (2007) studies in tandem, forming implementation intentions that specify a motivational response in the then-part (i.e., strengthening self-efficacy) suggest themselves as a powerful volitional (i.e., willpower enhancing) tool for achieving high performance on academic tests.

Dealing with Opponents

Often our performances are restrained by others who are competing with us for positive outcomes. Typical examples are sports competitions where athletes try to triumph over their opponents or negotiations in which a common good has to be shared between two opposing parties. In such situations exerting willpower means to protect one's goal striving from unwanted influences of the competitive situation. In the following, we report two studies showing that implementation intentions can be used to bolster such willpower.

Winning tennis competitions. Studies on sports competitions discovered that negative inner states (e.g., performance anxiety, Williams et al., 2002; Covassin & Pero, 2004; anger, Collins, 1991; Wughalter & Gondola, 1991; feelings of stress, Hanegby & Tenenbaum, 2001) hamper the quality of athletic performance. This is particularly true for sports that involve a direct competition with an opponent as it is the case with tennis. Accordingly, Achtziger, Gollwitzer, and Sheeran (in press) wondered whether specifying these negative inner states as critical cues in the if-component of implementation intentions and a goal-shielding response in the then-component, supports staying on track under such adverse inner states. The specified goal-shielding responses were taken from

research that analyzed strategies of improving one's performance during a tennis match (e.g., ignoring the noise made by the audience, focusing one's attention on the ball, engaging in relaxation behavior; see Ryska, 1998; Anshel & Anderson, 2002; Mamassis & Dogamis, 2004).

Achtziger et al. manipulated participants' goal intention to perform well in a tennis match rather than simply measuring it. Accordingly, we had a no-goal control condition and a mere goal intention condition in which tennis players (taken from German tennis leagues) were assigned the following goal the day before a critical match: "I will play each ball with utmost concentration and effort in order to win the match!" In the implementation intention condition, participants were also assigned this goal, and in addition, were asked to form four if-then plans that specified internal states in the if-components (e.g., performance anxiety, physiological arousal) and staying-on-track responses in the then-components (e.g., ignoring the adverse inner state). It was observed that self- and other-ratings (trainers and teammates) of physical fitness and performance were higher for implementation intention participants as compared to both goal intention and no-goal (control) participants.

This field experiment is one of the few implementation intention studies (e.g., Murgraff et al., 1996) in which participants could choose their implementation intentions in an individualized manner and make use of more than just one implementation intention. Participants selected the four, most personally relevant, negative inner states as if-components of their implementation intentions and the four goal-directed responses that they assessed as being suited best for shielding their goal striving. These findings speak to the idea that implementation intention inductions can easily be tailored to one's

particular self-regulatory problems at hand (Gollwitzer & Sheeran, 2006). To facilitate goal striving and increase rates of goal attainment in competitive situations, people apparently can also form multiple if-then plans, geared at alleviating the particular inner states they find most detrimental to their performance, and using the responses they perceive as most effective in shielding their goal.

Moreover, in the present study the goal-directed responses specified in the then-component of the implementation intentions studied were coping responses linked to various handicaps and weaknesses originating inside the person and not to challenges arising from outside the person. One therefore may wonder whether if-then plans that link coping responses to disruptive external events will also be effective in shielding an ongoing goal pursuit. Research by Gollwitzer and Schaal (1998) on resistance to temptations provides an affirmative answer to this question, given that certain coping responses are specified in the then-component (e.g., ignore responses). Participants who had to perform arithmetic problems for a period of 15 min were more successful in doing so despite the presentation of various interspersed attractive video clips, when participants had formed implementation intentions that specified “attractive video clips” in the if-component and an “ignore” response in the then-component.

Reflecting on the pros and cons of forming implementation intentions that link a coping response to negative external events versus detrimental inner states, the following should be kept in mind: specifying inner states has the advantage that these detrimental states could function as a summary label for all of those negative external events that might compromise goal striving – even those one is not aware of or may fail to anticipate. Accordingly, whenever a person is not in a good position to know about and anticipate

critical events, specifying detrimental inner states seems to be the safer strategy to shield one's goal striving. For instance, patients with panic attacks are usually not aware of which kinds of external events trigger the attack and whether these events are to be expected in a forthcoming external context (e.g., Hinton, Nathan, & Bird, 2002). For these patients it would make sense to specify inner states (i.e., upcoming anxiety) as if-components in order to control their negative emotions.

Prevailing in loss framed negotiations. Negotiations particularly lend themselves well to investigate the power of implementation intentions: Negotiations are cognitively very demanding tasks in which a large amount of information has to be processed on-line and the course of events is hard to predict as one is not performing a task alone but conjointly with an opponent. Thus, negotiations can be understood as the prototype of a complex situation in which the pursuit of desired goals can easily become derailed. Therefore, analyzing whether the beneficial effects of implementation intentions found in previous research also hold true in negotiations is of great interest to assess whether needed willpower accrues from forming if-then planning.

In their negotiation research, Trötschel and Gollwitzer (2007) explored whether the self-regulation strategy of forming implementation intentions allows negotiators to arrive at high performance levels in finding agreements even if they have to operate under the adverse conditions of a loss frame (i.e., the negotiation outcomes are loss framed and thus a resistance to concession making is induced; e.g., Bottom & Studt, 1993; Olekalns, 1997). In one of their experiments, pairs of negotiators were assigned the role of representatives of two neighboring countries (i.e., the blue and the orange nations) and asked to negotiate the distribution of a disputed island (i.e., its regions, villages, and towns). One group of pairs of negotiators was asked to form mere prosocial goals ("I

want to cooperate with my counterpart!"), and a second group to furnish such goals with respective implementation intentions ("And if I receive a proposal on how to share the island, then I will make a cooperative counterproposal!"). Both groups were then subjected to a frame manipulation, whereby both members of the pair received a loss-frame manipulation (i.e., each region's value was expressed in points that are lost when the region is given away). In addition, two control conditions were established: A first control condition contained pairs of negotiators who were not assigned prosocial goals and asked to negotiate under a loss frame; the second control condition also consisted of pairs of negotiators who were not assigned prosocial goals, but these pairs of negotiators were asked to negotiate under a gain frame (i.e., each region's value was expressed in points thare are won when the region is kept). These two control conditions were used to establish the negative influence of loss vs. gain frames on joint profits. In addition, the loss-frame control condition served as a comparison group for the two critical experimental groups (i.e., the prosocial goal group and the prosocial goal plus implementation intention group).

When looking at the agreements achieved (i.e., level of joint outcomes), it was observed that pairs of loss-frame negotiators with a prosocial goal intention managed to reduce the resistance to concession making arising from the loss-frame negotiation context thus fin, but that only negotiators who furnished their prosocial goal intentions with respective implementation intentions were successful in completely abolishing the negative impact of the loss-frame negotiation context (i.e., showed a negotiation performance that is not different from that of gain-frame negotiators). In addition, action control via implementation intentions was found to be very efficient. Implementation intentions abolished the negative effects of loss framing by leaving the negotiators' cognitive capacity in tact; negotiators who had formed implementation intentions were

more likely to use the cognitively demanding integrative negotiation strategy of logrolling (i.e., making greater concessions on low rather than high priority issues).

In a follow-up experiment, the effects of prosocial goals and respective implementation intentions on the course of the negotiation was analyzed. The analyses on the course of the negotiation indicate indicated that loss-frame pairs of negotiators who had furnished their prosocial goals with corresponding implementation intentions revealed a steeper progress in finding agreements than loss-frame pairs of negotiators without prosocial if-then plans; actually, at the end of the negotiation they achieved negotiation agreements that were comparable to those of gain-frame pairs of negotiators. Furthermore, implementation intentions were again strongly associated with using the integrative negotiation strategy of logrolling. Apparently, having one's negotiation behavior controlled by implementation intentions saved cognitive resources that could be used to successfully discover integrative solutions.

Overcoming Habitual Responses

The self-regulation of one's goal striving becomes difficult when habitual responses conflict with the initiating and executing the needed goal-directed responses instrumental to goal attainment. In such cases, having willpower means to assert one's will of attaining the chosen goal against one's "bad" habits. Accordingly, we wondered whether the self-regulation strategy of forming if-then plans can help people to let their goals win out over their habits.

Behavioral responses. By assuming that action control by implementation intentions is immediate and efficient, and adopting a simple race horse model of action control, people can be expected to be in a position to break habitualized responses by forming implementation intentions (i.e., if-then plans that spell out a response that is

contrary to the habitualized response to the critical situation). Such studies have been conducted successfully in the field (Holland, Aarts, and Langendam, 2006), but also in the laboratory (Cohen, Bayer, Jaudas, & Gollwitzer, in press).

Holland, Aarts, and Langendam (2006) addressed whether implementation intentions could help break unwanted habits (and replace them with new wanted behaviors) in a field experiment in an institution. The goal of the researchers was to increase the use of recycling bins for plastic cups and paper, and reduce the bad habit of throwing out these recyclable items in personal wastebaskets. Participants were randomly assigned to one of six conditions: a no treatment control condition, a control condition with a behavior report questionnaire, a facility condition where each participant received her own recycle bin, a combined facility and questionnaire condition, and two implementation intention conditions: one with a personal facility, and one without. Recycling behavior was substantially improved in the facility as well as in the implementation intentions conditions in week 1 and week 2, and still two months after the manipulation. In addition, the correlation between past and future behavior was strong in the control conditions, whereas these correlations were nonsignificant and close to zero in the implementation intention conditions. Apparently, implementation intentions effectively broke old habits by facilitating new recycling behavior. This shows that even strongly habitualized behaviors can be replaced by new planned goal-directed behaviors via implementation intentions.

Cohen, Bayer, Jaudas, and Gollwitzer (in press, Study 2) explored the suppression of habitual responses in a more controlled laboratory experiment using the Simon task. In this paradigm, participants are asked to respond to a non-spatial aspect of a stimulus (e.g.,

whether a tone is high or low) by pressing a left or right key, and to ignore the location of the stimulus (e.g., if it is presented on the left or on the right side). The difficulty of this task is in ignoring the spatial location (left or right) of the tone in one's response (Simon, 1990). The cost in reaction time is seen when the location of the tone (e.g., right) and required key press (e.g., left) are incongruent, as people habitually respond to stimuli presented at the right or left side with the corresponding hand. Cohen et al. (2007) found that implementation intentions eliminated the Simon effect for the stimulus that was specified in the implementation intention. Reaction times for the critical (planned) stimulus did not differ between the congruent and incongruent trials.

Emotional responses. Recent research has also explored whether adding implementation intentions to emotion-regulation goals would make these goals more effective (Schweiger Gallo, Keil, Mc Culloch, Rockstrok, & Gollwitzer, in press). In one study, participants were exposed to a series of pictures used to elicit disgust. When participants formed a response-focused implementation intention ("if I see disgusting scenes, then I'll stay calm and relaxed), they exhibited a reduction in arousal compared to a control group. As anticipated, participants who operated on mere goals to not get disgusted could not willfully reduce their arousal to the disgusting pictures. A second study analyzed the control of spider fear in spider phobics. Both participants with response-focused implementation intentions ("if a see a spider, then I will stay calm and relaxed") and antecedent-focused implementation intentions ("if I see a spider, then I'll ignore it") experienced less negative affect in the face of spider pictures than a no self-regulation control group; again, mere goal intentions to not get frightened failed to achieve this effect. Moreover, spider phobics using implementation intentions even

managed to control their fear to the low level observed with a sample of participants who were pre-selected on the basis of having no fear of spiders at all. In a final study using dense-array electroencephalography, the effectiveness of ignore-implementation intentions for the control of spider fear in spider phobics was replicated, and the obtained electrocortical correlates revealed that those participants who furnished their goal intention with an ignore-implementation intention showed a significantly reduced early visual activity in response to spider slides, as reflected in a smaller P1. The ignore-implementation intention seemed to function in the first 120ms after the spider picturess were presented. As conscious efforts to inhibit the activation of the mental representation of a presented stimulus are commonly assumed to show their effects no earlier than 300ms after stimulus presentation (overview by Bargh & Chartrand, 2000), the smaller P1 produced by ignore-implementation intentions also supports the hypothesis that implementation intentions lead to strategic automation of the goal-directed responses spelled out in their then-part.

Cognitive responses. Automatic biases and stereotyping represent another habitualized pattern of thought and behavior that can be in opposition to one's goals. Although one may have the goal to be egalitarian, automatic stereotyping happens quickly and unintentionally; some attempts to control automatic stereotyping has even resulted in backfire effects (e.g., Payne, Lambert, & Jacoby, 2002). Extending earlier work by Gollwitzer and Schaal (1997), Stewart and Payne (2007) examined whether implementation intentions designed to counter automatic stereotypes (e.g., "when I see a black face, I will then think 'safe'") could reduce stereotyping towards a category of individuals (versus a single exemplar). They used the Process Dissociation Procedure

(PDP; Jacoby, 1991) to estimate whether the reduction in automatic stereotyping came about by reducing automatic stereotyping, increasing control, or a combination of these two processes. It was found that implementation intentions reduced stereotyping in a weapon identification task (Studies 1 and 2) and an IAT task (Study 3) by reducing automatic effects of the stereotype (without increasing conscious control). This reduction in automatic race bias held for even new members of the category (Study 2). These studies suggest that implementation intentions are an efficient way to overcome automatic stereotyping.

Implications: Implementation intentions in the brain. The reported research findings on the control of habitual responses by implementation intentions implies that action control by if-then plans turns top-down control by goals into bottom-up control by the situational cues specified in the if-component of an implementation intention. This implication was recently tested in an fMRI study by Gilbert, Gollwitzer, Cohen, Oettingen, and Burgess (2007). The study draws on the gateway hypothesis of rostral prefrontal cortex (area 10) function by Burgess, Simons, Dumontheil, and Gilbert (in press; see also Burgess, Dumontheil, Gilbert, Okuda, Schölvinck, & Simons, in press) suggesting a distinction between action control that is primarily triggered by low level stimulus input, and action control that is primarily guided by higher-level goal representations. Looking at the results of a host of studies using different kinds of executive function tasks, Burgess et al. observed in a meta-analysis that stimulus-driven, bottom-up action control is associated with medial area 10 activity, whereas goal-driven, top-down action control is associated with lateral area 10 activity. Accordingly, Gilbert, Cohen, Gollwitzer, Oettingen, and Burgess (2007) postulated that action control by

implementation intentions should by characterized by medial area 10 activity, whereas action control by mere goals should be associated with lateral area 10 activity.

To test this hypothesis, a prospective memory (PM) paradigm was used. PM tasks require participants to perform an ongoing task (e.g., a lexical decision task, a classification task), but remember to also perform an additional response (i.e., the PM response, e.g., pressing the space bar) whenever a particular stimulus is presented within the ongoing task (e.g., a particular word, a particular constellation of the stimuli to be classified). In the Gilbert et al. study, each participant had to perform two different prospective memory tasks, one with a goal intention to perform the PM responses and the other with an implementation intention to perform these responses. As it turned out, implementation intentions facilitated the performance of PM responses as compared to mere goal intentions, and this gain in performance did not lead to any additional costs in performing the ongoing task. Even more importantly, PM performance based on a goal intention were accompanied by greater lateral area 10 activity, whereas PM performances based on implementation intentions were associated with greater activity in the medial area 10. Moreover, the difference in brain activity associated with correctly responding to PM targets under goal vs. implementation intentions correlated strongly and significantly with the behavioral difference as a consequence of acting on the basis of goal versus implementation intentions. The fact that acting on implementation intentions is associated with medial area 10 activity, whereas acting on goal intentions is associated with lateral area 10 activity, adds further support to our theory that by forming implementation intentions people can switch from goal striving that is guided by conscious top-down control to direct, stimulus-triggered goal striving.

Critical Samples: Children with Attention-Deficit/Hyperactivity-Disorder (ADHD)

In the past, implementation intention research with clinical samples has been conducted to test process hypotheses on how implementation intentions achieve their effects. For instance, the hypothesis that implementation intentions lead to efficient action control (i.e., action control by implementation intentions does not suffer from cognitive load) was tested by assessing whether heroine addicts during withdrawal and patients suffering from schizophrenia (Brandstätter, Lengfelder, & Gollwitzer, 2001, Studies 1 and 2), and patients with a frontal lobe damage (Lengfelder & Gollwitzer, 2001) also benefit from forming implementation intentions. The present line of research on children with ADHD instead serves the purpose of testing the power of implementations in terms of improving goal striving even under adverse conditions. Children with ADHD are known to be inattentive, hyperactive, and particularly impulsive (APA, 1994). They show impairments in focusing, sustaining, and switching attention, as well as inappropriate motor activity, and limited inhibitory control of responses (e.g., Barkley, 1997; Nigg, 2001; Smith & Taylor, 2006). ADHD emerges in the preschool years and affects 3 to 5% of school-aged children (e.g., Barkley, 1997).

Approximately two-thirds (50 to 70%) of individuals diagnosed with ADHD exhibit comorbid clinical problems related to learning ability, social adjustment and functioning, and/or emotional well-being. ADHD-related symptoms, as well as comorbid symptoms, lead to several difficulties in everyday life. Children with ADHD show moderate to large deficits in academic achievement (Frazier, Youngstrom, Glutting, & Watkins, 2007) and experience interpersonal problems (Hoza, et al., 2005). Consequently, in comparison to children without ADHD, children with ADHD tend to

receive poorer grades in school, more frequently need to repeat a school year, often require tutoring or placement in special classes, and show reading disabilities. Furthermore, in comparison to children without ADHD, children with ADHD are less popular with their peers, more frequently experience rejection, and are less likely to have dyadic friendships.

ADHD not only leads to difficulties in everyday life, but also to impaired performance on different neuropsychological tasks measuring inhibitory control (Frazier, Demaree, & Youngstrom, 2004; Halperin & Schulz, 2006), such as the Go/NoGo task (Rubia et al., 2001), the Continuous Performance Test (CPT; Rosvold, Mirsky, Sarason, Bransome, & Beck, 1956), the Stop Signal Test (SST; Logan & Cowan, 1984), and the Stroop Test (Stroop, 1935). For example, in a Go/NoGo task, a response must be either executed or inhibited in response to the presentation of a Go or a NoGo signal, respectively. In most studies using the Go/NoGo paradigm, the inhibitory effect is enhanced with a predominant Go response due to frequent Go trials and infrequent NoGo trials. Generally, children with ADHD have longer response times to Go stimuli (i.e., targets) and make more errors when presented with NoGo stimuli (i.e., non-targets).The basic paradigm in a CPT is typically a Go/NoGo task in which the participant responds to the presentation of a target and withholds the response to the presentation of a non-target. Importantly, CPT derived measures predict the presence of most ADHD symptoms (Epstein, Erkanli, & Conners, 2003; Nichols & Waschbusch, 2004): Children with ADHD miss more targets and show more false alarms to non-targets than children without ADHD. Unlike the Go/NoGo task and the CPT, the SST requires children to inhibit a motor response while the action is being executed. Furthermore, research

illustrates that children with ADHD have slower stop signal reaction times and significantly slower reaction times in Go trials than comparison children without ADHD on the SST (e.g., Booth et al., 2005, Oosterlaan, Logan, & Sergeant, 1998, Oosterlaan & Sergeant, 1996; Pliszka, Borcherding, Sprattey, Leon, & Irick, 1997). Finally, in a Stroop Interference Test (Stroop, 1935) participants have to name the color (e.g., green) of a non-congruent color word (e.g., red). Participants must inhibit the automatic response (i.e., reading) in favor of the non-automatic response (i.e., naming the color). In a meta-analysis, Homack and Riccio (2004) showed that children with ADHD consistently exhibit poorer performance on Stroop Tasks when compared to children without ADHD (Sergeant, Geurts, & Oosterlaan, 2002). In sum, these findings support the idea that behavioral inhibition is a core deficit in children with ADHD (Barkley, 1997; Tannock, 1998).

Children with ADHD also have difficulties on tasks requiring cognitive flexibility (i.e., shifting a cognitive set). For instance, on the Wisconsin Card Sorting Test (WCST; Berg, 1948), children with ADHD tend to preserve instead of responding flexibly (i.e., they stick to unsuccessful hypotheses instead of adapting their strategy). Accordingly, this tendency appears to be another characteristic feature of ADHD, explaining these children's poorer performances on various dependent variables measured with the WCST (Romine, Lee, Wolfe, Homack, George, & Riccio, 2004). Moreover, children with ADHD also have difficulties in multitasking. The Six Elements Test, for example, which measures complex planning behavior in the sense of multitasking situations, requires the simultaneous execution of six different tasks (SET; Burgess, 2000). Teenagers with ADHD show significantly worse results on a SET than children without ADHD (Clarke,

Prior, & Kinsella, 2000). In sum, these findings seem to suggest that children with ADHD have difficulties developing strategies and monitoring their own behavior.

Implementation intentions facilitate response inhibition in children with ADHD. Initial research investigated whether implementation intentions can support children with ADHD on a Go/NoGo task. The task required children to both classify randomized stimuli presented on a computer screen, as well as inhibit classification in response to a NoGo signal (Gawrilow & Gollwitzer, in press). Specifically, children had to respond as quickly as possible to pictures of vehicles or animals by pressing a respective vehicle or animal key (i.e., Go trial). On one third of the trials, however, an audible NoGo signal presented before the stimulus announced to the children that they should inhibit their response on that trial (i.e., NoGo trial). In two experiments, children with ADHD were assigned to either a goal intention group (‘‘I will not press a key for pictures that have a sound!’’) or an implementation intention group (‘‘And if I hear a tone, then I will not press any key!’’). Both the response times for the Go trials and the number of successful stops on the NoGo trials were measured.

In the first study, the performances of children with and without ADHD were compared. Children with ADHD who furnished a suppression goal with implementation intentions improved inhibition of an unwanted response on a Go/NoGo task to the same level observed in children without ADHD. The second study compared the performances of children with ADHD with and without psychostimulant medication. In this study, a combination of implementation intentions and psychostimulant medication resulted in the highest level of suppression performance in children with ADHD (Gawrilow & Gollwitzer, in press).

In a recent follow-up study, Gawrilow, Oettingen, and Gollwitzer (2007, Study 1) asked children with and without ADHD to complete a Number-Stroop task. All children saw rows of single-digit numbers containing numbers from 1 to 9 on a computer screen. The amount of numbers on each trial was varied from two to seven. The task required children to either name the number in a naming task (e.g., press key "one" to a row of four ones) or count the amount of numbers in a counting task (e.g., press key "four" to a row of four ones). All children began with the (easier) naming task, followed by the (more difficult) counting task. Error rates and response times were measured as dependent variables.

To establish the three experimental conditions, prior to the counting task one third of the children received only a goal intention ("I will count the numbers"), while the remaining children additionally received one of two different implementation intentions: a task-facilitating implementation intention (e.g., "as soon as a new row of numbers is presented, I will concentrate on the amount of numbers") or a distraction-inhibiting implementation intention (e.g., "as soon as a new row of numbers is presented, I will ignore the type of the numbers").

While children with and without ADHD both profited from if-then plans, children with and without ADHD had an increase in errors on the counting task. This occurred despite having the explicit goal to count the numbers. Only when given an additional implementation intention did they manage to nearly remain at the same error level in the counting task as in the naming task. In line with research by Mischel and colleagues (e.g., Patterson & Mischel, 1976) both children with and without ADHD profited more from distraction-inhibiting than from task-facilitating plans. Only in the distraction-inhibiting

implementation intention condition were the errors made during the naming task comparable to the amount of errors children made during the counting task. Thus, ignoring the distraction (i.e., type of numbers) is a more effective strategy than concentrating on the main task (i.e., counting the numbers).

Implementation intentions facilitate delay of gratification performance in children with ADHD. Go/NoGo and delay of gratification paradigms have one fundamental characteristic in common: In both tasks, performance requires controlling a prepotent response, whether it is producing a behavioral response in the Go/NoGo task (i.e., pressing the key although the NoGo signal indicates that the response has to be inhibited) or attending to the immediate reward in the delay of gratification task (i.e., grabbing the immediate reward although the delayed reward is more valuable). Not surprisingly then, performance on both tasks have been linked to activity in similar areas in the prefrontal cortex (Eigsti et al. 2006; Mischel & Ayduk, 2002). In the same vein, stop and delay of gratification paradigms have both been used to measure impulsivity, even though these two types of tasks may be suited particularly well for assessing one rather than the other aspect of impulsivity as described in the literature. These aspects include (a) the ability to collect and evaluate information before reaching decisions, (b) the ability to choose larger delayed rewards over small immediate rewards, and (c) the ability to suppress motor responses that have been rendered prepotent (Chamberlain & Sahakian, 2007). In sum, Go/NoGo task and delay of gratification paradigms seem to measure aspects of cognitive functioning that pertain to impulsivity.

The aim of the following two studies was to explore whether if-then plans help children with ADHD in a delay of gratification paradigm (Gawrilow, Gollwitzer, &

Oettingen, 2007). Specifically, children with and without ADHD were confronted with a self-developed computerized delay of gratification game, modeled after paradigms used in experiments by Mischel and colleagues (Mischel, Shoda, & Rodriguez, 1989) and by Sonuga-Barke and colleagues (Sonuga-Barke, Taylor, Sembi, & Smith, 1992). For this task, children had to decide between an immediate and less valuable (red pictures showing vehicles or animals with a value of one point) or a delayed and more valuable gratification (blue pictures showing vehicles or animals with a value of three points) presented on a computer screen. As an incentive, children could exchange their points for money at the end of the experiment.

Participants in the first study were children with ADHD in a German medical center specializing in the treatment of children with ADHD. Children were randomly assigned to three conditions: One third of the children received a neutral sentence ("Red pictures are one point, blue pictures are three points") and one third received a sentence with a goal intention ("I will earn as many points as possible"). The remaining children received the goal intention and additionally an implementation intention ("if a red picture appears, then I will wait for the blue one"). As compared to the neutral sentence (control) group, the children benefited from the implementation intention but not from the mere goal intention.

In a second study we invited not only children with ADHD, but we compared children with ADHD to children without any known psychological disturbances. Again, children were randomly assigned to the same three conditions (neutral vs. goal intention instruction vs. goal intention plus implementation intention instruction) as in the previous study. Both children with and without ADHD benefited from forming implementation

intentions. Specifically, children who formed an if-then plan, in contrast to those with a neutral statement or mere goal intention, could delay gratifications better during the game and therefore had earned more money at the end of the game. Consistent with the previous study, goal intentions were not superior to neutral instructions in children with ADHD and formulating the goal to obtain more points and therefore a bigger reward was not helpful for delaying gratifications in children with ADHD. Furthermore, implementation intentions enabled children with ADHD to wait significantly more often in the second half compared to the first half of the game. Thus, children with ADHD can use strategies to sustain their waiting behavior for delayed rewards over a longer period of time although impulsivity is one of the main symptoms of ADHD.

Implementation intentions facilitate set-shifting and multitasking in children with ADHD. Children with ADHD not only show deficits in inhibitory control as measured by Go/NoGo and delay of gratification paradigms, but also struggle on other neuropsychological tasks (Halperin & Schulz, 2006). We therefore investigated the effect of implementation intentions on executive functioning in two more studies: in tasks assessing set-shifting and multitasking.

In the *set-shifting* study, we presented children with ADHD with a slightly modified version of a WCST (Gawrilow, Oettingen, & Gollwitzer, 2007, Study 2). At the outset, the children received several stimulus cards and a stack of additional cards. The children were then asked to match each of the additional cards to one of the stimulus cards, but received no instruction (i.e., rule) on how to match the cards; they did however receive immediate feedback from the experimenter about the correctness of their choice. Following a child's 10th correct match, the experimenter changed the rule. Prior to the

task, one third of the children were randomly assigned to a neutral instruction condition ("the additional cards need to be matched to the cards on the table"), one third to a goal intention condition ("I will match as many cards as possible with the correct rule"), and the remaining children to an implementation intention condition ("and if my rule is wrong, then I will try another rule immediately"). The implementation intention group ended up with a significantly lower level of preservation errors in relation to the percentage of total errors than both the goal intention and control instruction group. This significant main effect implies that children with ADHD can benefit from implementation intentions in shifting cognitive sets as measured with a modified WCST.

In the ***multitasking*** study (Gawrilow, Oettingen, & Gollwitzer, 2007, Study 3), we used a multitasking paradigm modeled after the SET subtest (from the BADS-C; Emslie, Wilson, Burden, Nimmo-Smith, & Wilson, 2003). Children received three different tasks that were associated with different colors (i.e., green, blue, & red) and every task consisted of two parts. Children were instructed to work on two green tasks (consisting of counting and calculating items), on two blue tasks (consisting of naming items), and two red tasks (consisting of sorting items). In our modified version, children worked on each of the six tasks at least twice over a period of 10 minutes without working on a task with the same color consecutively. Children with and without ADHD were randomly assigned to a neutral instruction ("There are a lot of tasks and it is not allowed to work on two tasks with the same color consecutively"), goal intention instruction ("I will try to solve at least 10 items of every color alternating"), or an additional implementation intention ("and as soon as I have solved 10 items of a color, then I will switch to another color"). Children with ADHD achieved achieved a higher score as compared to the control group

only with implementation intentions; for children without ADHD this was true already with goal intentions.

Conclusion and Outlook

We have argued that making if-then plans is an effective self-regulation strategy when it comes to tackling the major problems of goal striving: getting started, staying on track, calling a halt, and not overextending oneself. We have then reported evidence that if-then plannning holds up its promise even when goal striving is challenged by the lack of relevant skills, competitive opponents, habitual antagonistic responses, and a psychological disorder handicapping action control in general (i.e., ADHD). Given this track record, if-then planning qualifies as an effective self-regulation strategy to be taught to people in interventions to facilitate their everyday goal striving.

Preparatory research for developing such interventions has to explore (a) conditions when people are particularly inclined to make if-then plans (e.g., after mental contrasting the future outcomes one wants to obtain with obstacles of present reality; Oettingen et al., 2001, Study 3), and (b) the moderators of the effects of if-then plans (e.g., strength of commitment of the superordinate goal; Sheeran, Webb, & Gollwitzer, 2005, Study 2). An ideal intervention would then teach self-regulation strategies that create favorable conditions for the formation and effectiveness of if-then plans with the specifics of the self-regulation strategy of forming such plans. This has recently been done in intervention studies that combined mental contrasting (MC) and implemementation intentions into one intervention (MCII-intervention) to affect exercising in middle-aged women (Stadler, Oettingen, & Gollwitzer, 2007) and coping

with the stressors of everyday life in college students (Oettingen, Barry, Guttenberg, & Gollwitzer, 2007).

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