IMPLEMENTATION INTENTIONS AND GOAL ACHIEVEMENT: A META-ANALYSIS OF EFFECTS AND PROCESSES

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Holding a strong goal intention ("I intend to reach Z!") does not guarantee goal achievement, because people may fail to deal effectively with self-regulatory problems during goal striving. This review analyzes whether -realization of goal intentions is facilitated by forming an implementation intention that spells out the when, where, and how of goal striving in advance ("If situation Y is encountered, then I will initiate goal-directed behavior X!"). Findings from 94 independent tests showed that implementation intentions had a positive effect of medium-to-large magnitude ($d = .65$) on goal attainment. Implementation intentions were effective in promoting the initiation of goal striving, the shielding of ongoing goal pursuit from unwanted influences, disengagement from failing courses of action, and conservation of capability for future goal striving. There was also strong support for postulated component processes: Implementation intention formation both enhanced the accessibility of specified opportunities and automated respective goal-directed responses. Several directions for future research are outlined.

I. Introduction

Understanding what factors determine whether people succeed or fail in achieving desired outcomes is a fundamental concern in both basic and applied psychology. Most theories of motivation and self-regulation converge on the idea that setting a behavioral or outcome goal is the key act of willing that promotes goal attainment (e.g., Ajzen, 1991; Atkinson, 1957;

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Bandura, 1991; Carver & Scheier, 1998; Gollwitzer, 1990; Locke & Latham, 1990). The basic assumption is that the strength of a person's intention determines respective accomplishments (Austin & Vancouver, 1996; Gollwitzer & Moskowitz, 1996; Oettingen & Gollwitzer, 2001; Sheeran, 2002). Although accumulated research supports this idea (e.g., Armitage & Conner, 2001; Sheeran, 2002; Sutton, 1998), there is also contrary evidence that gives credence to the proverb that "the road to hell is paved with good intentions" (Orbell & Sheeran, 1998; Sheeran, 2002). To address this issue, Gollwitzer (1993, 1996, 1999) proposed that successful goal achievement is facilitated by a second act of willing that furnishes the goal intention with an if–then plan specifying when, where, and how the person will instigate responses that promote goal realization. These plans are termed *implementation intentions*.

Implementation intentions appear to be effective at enhancing the likelihood of goal achievement. However, the effectiveness of if–then planning has been reviewed only in narrative (e.g., Gollwitzer, 1999; Gollwitzer, Bayer, & McCulloch, 2005) and small-scale quantitative (e.g., Koestner, Lekes, Powers, & Chicoine, 2002b; Sheeran, 2002) reports to date, and a comprehensive evaluation of implementation intention effects and processes is overdue. The aim of this review is to quantify the overall impact of implementation intention formation on goal achievement using meta-analytic techniques. In addition, this chapter tests the effectiveness of implementation intentions in relation to different self-regulatory problems and goal domains and assesses potential moderators of implementation intention effects. Finally, the impact of implementation intentions on theoretically specified component processes is examined to understand why implementation intentions may help people obtain outcomes that they desire.

II. Goal Intention Strength and Goal Achievement

Goal intentions are self-instructions to attain certain outcomes or perform particular behaviors and typically take the format of "I intend to reach Z!" They are derived from beliefs about the feasibility and desirability of actions and end states (e.g., Ajzen, 1991; Atkinson, 1957; Bandura, 1991, 1997; Brehm & Self, 1989; Carver & Scheier, 1998; Heckhausen, 1991; Locke & Latham, 1990; Vroom, 1964) and represent the culmination of the decision making process (Gollwitzer, 1990). Goal intentions signal the end of deliberation about what actions to perform or outcomes to reach; they imply a commitment to act that may vary in strength (Ajzen, 1991; Gollwitzer, 1990; Sheeran, 2002; Webb & Sheeran, 2005a).

In traditional theories of goal pursuit, goal intentions are construed as the most immediate and important predictor of attainment. For instance, preeminent accounts of goal-directed behavior, such as control theory (Carver & Scheier, 1982, 1998), social cognitive theory (Bandura, 1991, 1997), and goal setting theory (Locke & Latham, 1990), models of attitude–behavior relations, such as the theories of reasoned action (Fishbein, 1980; Fishbein & Ajzen, 1975) and planned behavior (Ajzen, 1991), and the model of interpersonal behavior (Triandis, 1980), as well as theories of health-related behavior, such as protection motivation theory (Rogers, 1983) and the prototype/willingness model (Gibbons, Gerrard, Blanton, & Russell, 1998), each accord goal intentions a central role in their theorizing about action. Accordingly, research has been concerned for several decades with the factors that determine strong intentions—the assumption being that intention strength is a good predictor of intention realization.

This assumption seems to be supported by meta-analyses of correlational studies in which participants' goal intentions (e.g., "I intend to perform behavior W!" or "I intend to achieve outcome Z!") are measured at one time-point and behavior is measured at a later time-point. For example, reviews of the theory of reasoned action (Kim & Hunter, 1993; Sheppard, Hardwick, & Warshaw, 1988; van den Putte, 1993), the theory of planned behavior (Armitage & Conner, 2001; Godin & Kok, 1996; Hausenblas, Carron, & Mack, 1997), and protection motivation theory (Floyd, Prentice-Dunn, & Rogers, 2000; Milne, Sheeran, & Orbell, 2000), as well as meta-analyses of particular behaviors (e.g., condom use, Sheeran & Orbell, 1998; physical activity, Hagger, Chatzisarantis, & Biddle, 2002), indicate that strength of intention typically explains 20–35% of the variance in goal achievement. To gain insight into the overall strength of intention–behavior consistency in this type of research, Sheeran (2002) conducted a meta-analysis of 10 meta-analyses of the intention–behavior relation. Findings showed that intentions accounted for 28% of the variance in behavior, on average, across 422 studies involving 82,107 participants. According to Cohen's (1992) power primer, $R^2 = .28$, constitutes a "large" effect size, which suggests that intentions are "good" predictors of behavior—as traditional theories of goal pursuit have supposed.

However, bivariate correlations between goal intentions and future behavior may overestimate the strength of intention–behavior relations because it is possible that future behavior and goal intentions are both determined by self-perceptions of past behavior (Bem, 1972). The implication is that analyses should control for previous performance in order to determine to what extent goal intentions are associated with behavior *change*. Sutton and Sheeran (2003) conducted a meta-analysis along these lines. Sampled-weighted average correlations between past behavior, goal

intentions, and future behavior were computed from 51 studies involving 8166 participants and then used as inputs for a hierarchical regression analysis. Findings indicated that, not surprisingly, past behavior was a good predictor of future behavior on the first step of the equation and accounted for 26% of the variance. Entering goal intentions on the second step was associated with a significant increment in the variance explained in future behavior ($R^2_{change} = .07$). These findings suggest that goal intentions have significant associations with future behavior even when previous performance is taken into account. However, the effect size for goal intentions is small-to-medium rather than large.

Even correlational analyses that statistically control for past behavior in estimating the goal intention–goal achievement relation are problematic, however, because it is always possible that a third variable is responsible for the observed associations. To eliminate this alternative explanation of intention–behavior consistency, it is necessary to experimentally manipulate goal intentions and then determine whether this manipulation produces a significant difference in subsequent goal attainment. Webb and Sheeran (in press a) tested this idea in a recent meta-analysis. They identified 47 studies ($N = 8802$) that (1) were successful at inducing statistically significant differences in goal intentions between experimental versus control participants and (2) followed up participants in order to measure differences in subsequent goal attainment. Findings showed that the mean difference in goal intention strength produced by the experimental manipulations had an effect size of medium-to-large magnitude ($d = .66$). Findings also indicated that manipulating goal intention strength engendered a significant difference in goal achievement. However, the effect size was small-to-medium only; d was .36 that equates to $R^2 = .03$. Thus, producing significant changes in goal intention strength only generates a modest change in goal achievement. This finding indicates that there is a substantial "gap" between people's goal intentions and their subsequent attainment.

A converging line of research has decomposed the intention–behavior relation in terms of a 2 (goal intention: to act vs. not to act) $\times$ 2 (goal achievement: acted vs. did not act) matrix (McBroom & Reid, 1992; Orbell & Sheeran, 1998; Sheeran, 2002). This decomposition provides insight into the sources of consistency and discrepancy between intentions and action. Consistency is attributable to participants who intend to act and subsequently act (termed "inclined actors") and to participants who do not intend to act and do not act ("disinclined abstainers"). Discrepancies between intentions and action, on the other hand, can be attributed to participants who intend to act but do not act ("inclined abstainers") and to participants who do not intend to act but end up acting ("disinclined actors"). A review by Sheeran (2002) found that inclined abstainers, rather than disinclined actors, were

principally responsible for the intention–behavior "gap." The median proportion of participants who intended to but did not act was 47%, whereas the median proportion of participants who did not intend to act but subsequently acted was only 7%. These findings would seem to confirm that the proverbial road to hell is paved with good intentions—barely more than one-half of people who intended to act were successful at translating those intentions into action.

In sum, it appears that the single act of willing involved in forming a goal intention is not sufficient to ensure goal achievement. The implicit assumption in traditional models of goal pursuit—that goal intentions fashioned from appropriate evaluation of feasibility and desirability considerations satisfactorily account for the intensity of goal striving—is not strongly supported by the evidence. Clearly, some additional psychological concepts are needed (1) to understand why people often become inclined abstainers rather than inclined actors and (2) to develop self-regulatory strategies to help people "bridge" the gap between their intentions and their behavior.

III. Self-Regulation of Goal Striving

Recent research on goals has demonstrated that variables other than strength of goal intention affect the intensity of goal striving and rate of goal attainment (Gollwitzer & Moskowitz, 1996; Oettingen & Gollwitzer, 2001). Some goal theories focus on the implications of particular goal contents and structural features. For instance, people who set themselves learning goals rather than performance goals are better at dealing with failure experiences and, consequently, show more persistent and successful goal pursuit (Dweck, 2000). Higgins (2000) demonstrates that people who pursue their goals using means that have a natural fit to the content of the goal have a better chance of goal attainment. For example, people with promotion goals (that focus on gain and achievement) are more likely to realize those goals using eagerness means whereas prevention goals (that focus on safety and security) are more likely to be realized by vigilance means. Other important distinctions between types of goals have been drawn by Locke and Latham (1990) (e.g., specific vs. "do your best" goals), Bandura (1991) (e.g., proximal vs. distal goals), and Deci and Ryan (1991) (e.g., goals based on needs for autonomy, competence, and social integration vs. goals based on other needs). All of these theories construe features related to the content and structure of set goals as critical in determining the likelihood of goal achievement.

Other goal theories assume that setting a goal (of whatever kind) is only a first step *en route* to goal realization. A key impetus for self-regulation

research on goals is the model of action phases (Gollwitzer, 1990; Heckhausen, 1991; Heckhausen & Gollwitzer, 1987) that construes goal attainment in terms of solving a number of consecutive tasks. Goal setting is viewed as merely the first of these tasks—with planning how to achieve the goal, getting started, and successfully completing goal striving as equally important subsequent tasks.

The model of action phases seeks to provide a comprehensive temporal account of goal pursuit. Four different consecutive action phases are postulated by the model. The first, *predecisional*, phase starts from the assumption that people have many more wishes and desires than they can possibly realize. Here people's task is to deliberate about the desirability and feasibility of their various wishes in order to choose which ones will be turned into binding goals. The model agrees with classic motivational notions (e.g., Atkinson, 1957; Fishbein & Ajzen, 1975; Lewin, 1926) that people commit to those goals in which attainment is perceived as both highly desirable and feasible. However, the model of action phases also states that goal attainment is not yet secured by the act of goal setting (i.e., by having formed strong goal intentions). Rather, goal accomplishment requires in addition that the individual effectively regulates the actual striving for the goal (i.e., engages in effective goal implementation).

Once a person has committed to a goal, she makes the transition to the second action phase, *preactional*. Here the goal-relevant task is to initiate goal-directed behaviors successfully. This may be straightforward when the respective actions have become routinized through frequent and consistent performance in stable situational contexts. However, matters are likely to be more complex when people are unfamiliar with, or imprecise about, the respective goal-directed actions and contexts of performance. In these circumstances, people are likely to benefit from fashioning plans that spell out when, where, and how to implement goal-directed behaviors.

The initiation of actual performance of the respective goal-directed behaviors marks the transition to the third, *actional*, phase. The task to be accomplished during this phase pertains to responding flexibly and adaptively to contextual threats to goal progress so that goal striving is not derailed prematurely. In other words, the key actional task is to bring the respective goal-directed activity to a successful conclusion by shielding it from distractions and temptations that could potentially disrupt goal striving.

In the final action phase, *postactional*, the task is to evaluate goal achievement both in terms of degree of attainment ("Did I do as well as I had hoped?") and quality of attainment outcomes ("Was it worth doing?"). This process involves comparing what has been achieved with one's original wishes and desires, and it may at times imply effortful disengagement from the goal (if further striving is inappropriate). Thus, goal completion is likely

to provide valuable information that can feed back into evaluations of the feasibility and desirability of future courses of action; people return to the position of deliberating about their various wishes and desires from which they started.

A. PROBLEMS *EN ROUTE* TO GOAL COMPLETION

The foregoing discussion suggests that merely forming a goal intention does not guarantee goal achievement as people often face problems en route to goal completion. So what are these challenges, and how can people tackle them successfully by using self-regulatory strategies? We propose that the following four problems may prevent people from reaching their goals.

1. Failing to Get Started

The first problem that can undermine goal attainment is failing to get started with goal striving. A number of factors militate against getting started on one's goals. The first has to do with remembering to act. When a behavior is not part of one's routine, or when one has to postpone acting until a suitable opportunity presents itself, one can easily forget to perform the intended behavior. This is because situational demands on attention and memorial resources may serve to reduce the activation level of a focal goal intention compared to other intentions (Einstein & McDaniel, 1996). Dealing with many things at once or becoming preoccupied by a particular task can make it difficult to remember to act on one's goals, especially when the intended behavior is new or unfamiliar. Empirical support for this explanation of intention–behavior discrepancies comes from retrospective reports by inclined abstainers. For example, 70% of participants who had intended to perform a breast self-examination but failed to do so, offered "forgetting" as their reason for nonperformance (Milne, Orbell, & Sheeran, 2002; Orbell, Hodgkins, & Sheeran, 1997). Similarly, meta-analysis has shown that the longer the time interval between measures of goal intentions and goal achievement, the less likely it is that intentions are realized (Sheeran & Orbell, 1998). These findings speak to the idea that remembering to act can be a vital but difficult task.

Even if one remembers what one intends to achieve, there is a second problem that may need to be resolved, namely, seizing the opportunity to act. This problem is especially acute when there is a deadline for performing the behavior or when the opportunity to act is presented only briefly. In these circumstances, people may fail to initiate goal-directed responses either because they fail to notice that a good time to get started has arrived or they

are unsure how they should act when the moment presents itself. For instance, Oettingen, Hönig, and Gollwitzer (2000, Study 3) showed that considerable slippage can occur even when people have formed strong goal intentions to perform a certain behavior at a particular time. In one of their experimental conditions, participants were provided with diskettes containing four arithmetic tasks and formed goal intentions to perform these tasks on their computers at a particular time each Wednesday morning for the next 4 weeks. The program on the diskette recorded the time that participants started to work on the task from the clock on participants' computers. Findings indicated that the mean deviation from the intended start time was 8 hours, that is, a discrepancy of 2 hours on average for each specified opportunity. Similar findings were obtained by Dholakia and Bagozzi (2003, Study 2) using a "short fuse behavior" paradigm in which participants' task was to evaluate a website that could be accessed only during a short time window. Here, only 37% of participants who formed goal intentions were successful at accomplishing the task (see also Gollwitzer & Brandstätter, 1997). In sum, people may not get started with goal striving because they fail to seize suitable opportunities to act.

Third, there are also many instances in which people remember their "good" intention (e.g., to order a low fat meal) and recognize that an opportune moment is upon them (e.g., it is lunchtime at one's usual restaurant) but, nonetheless, they fail to initiate action (e.g., because "I just didn't fancy the low fat meal!"). This problem has to do with overcoming an initial reluctance to act. Initial reluctance is likely to arise when people have decided to initiate a behavior that involves a trade-off between attractive long-term consequences versus less attractive short-term consequences. For example, a strong goal intention to order the low fat meal might have been formed on the basis of longer-term cognitive considerations (e.g., the low fat meal is perceived as "healthy" or "beneficial"); however, one might not have anticipated how the short-term affective considerations would occupy attention at the moment of action (e.g., the low fat meal is perceived as "unsatisfying" or "tasteless" at the critical juncture). Such dilemmas between the head and the heart are commonplace (e.g., Loewenstein, Weber, Hsee, & Welch, 2001; Metcalfe & Mischel, 1999; Trafimow & Sheeran, 2004). Evidence for this explanation of intention–behavior discrepancies comes, for instance, from the field of sexual health in which findings show that young people may, in "the heat of the moment" of a sexual encounter, have problems overcoming reluctance to practice safer sex (e.g., Abraham et al., 1999; Sheeran, White, & Phillips, 1991; Wight, 1992). Overcoming initial reluctance is also a significant problem in several other domains (e.g., environmental, consumer, and academic goals).

2. Getting Derailed

The goals of interest to social and health psychologists are not usually discrete one-shot actions but sequences of action that require continuous striving and repeated behavioral performance to be accomplished. The problem with such striving is that many situational contexts or self-states are not conducive to intention realization but instead hold the potential to derail an ongoing goal pursuit. Thus, the person's self-regulatory task is to shield goal striving from unwanted influences.

Shielding one's goal striving is necessary under the following circumstances. First, shielding is called for when conflicting attention and behavioral responses could make people stray off course. For example, despite making good initial progress with one's goal intention to finish a report, one may find one's attention wandering and feel compelled to join colleagues whom one hears gathering around the water cooler. In these instances, spontaneous attention to distracting stimuli may have to be suppressed in order to complete the goal. Such suppression may not be easy when the distractions are vivid, arousing, or highly valenced because, as the literature on cravings has shown (Kavanagh, May, & Andrade, 2005), people are liable to elaborate desirable stimuli through mental imagery. However, failing to control the attention paid to enticing stimuli (opportunities related to competing goal pursuits) can greatly undermine achievement of the focal (task) goal—as was demonstrated by Mischel and Patterson's (1978; Patterson & Mischel, 1976) classic studies on resistance to temptation (see also Gollwitzer & Schaal, 1998).

Of course, it may not be enough to suppress unwanted attention responses to appealing distractions in order to reach one's goal. Often, it will be necessary to suppress behavioral responses. For example, the person who succeeded in enacting her goal intention to order the low fat meal at lunchtime still has to forego the chocolate dessert after dinner if the superordinate goal intention is to lose weight. If an unwanted behavior possesses features of automaticity, it should be especially difficult to control (Aarts & Dijskterhuis, 2000a,b; Sheeran et al., 2005a; Verplanken & Aarts, 1999; Wood, Quinn, & Kashy, 2002). Keeping such behavioral responses in check merely by forming the respective goal intention may not be sufficient, as research on weight loss and smoking cessation has shown (e.g., COMMIT Research Group, 1995; Garner & Wooley, 1991). Findings from a recent meta-analysis (Ouellette & Wood, 1998) are also consistent with this idea. Goal intentions emerged as much poorer predictors of future action when antagonistic behaviors had been performed frequently and consistently in relevant contexts (see also Verplanken, Aarts, van Knippenberg, & Moonen, 1998). In sum, controlling interfering unwanted attention and behavioral responses makes an important

difference to whether one's goal-directed efforts warrant the designation "inclined actor" versus "inclined abstainer."

There is a second circumstance in which shielding an ongoing goal pursuit becomes crucial (Gollwitzer et al., 2005). So far, our discussion of controlling unwanted attention and behavioral responses has assumed that people have some knowledge and awareness of what sorts of obstacles (distractions, temptations, barriers) the environmental context is likely to present, when those obstacles are likely to arise, and what kind of unwanted responses those obstacles typically generate. Knowing what might happen, when it might happen, and how it might affect us thus appears to be a prerequisite for the successful use of any strategy of suppression. However, there is a route to effectively shielding an ongoing goal pursuit that does not require the anticipation of a situational threat or its impact on goal striving. The existence of such an alternative strategy is crucial as, more often than not, we are not in a position to consciously anticipate the occurrence of obstacles and the working of habits, or in what form and intensity these will threaten ongoing goal pursuits. The following three social psychological phenomena exemplify what we have in mind when we speak of obstacles to an ongoing goal pursuit that are not anticipated by the individual: deindividuation effects on social loafing, the impact of loss frames on negotiation outcomes, and nonconscious priming of antagonistic goals.

Social loafing effects occur when people are asked to work in groups in which performance outcomes cannot be checked at an individual level (Karau & Williams, 1993; Latané, Williams, & Harkin, 1979). Under these circumstances, people show reduced effort and performance compared to situations in which individual outcomes can be identified. The problem is that people are unlikely to have insight into the negative impact of the group setting and task instructions on their performance. Not surprisingly, therefore, having the goal intention to perform well is not sufficient to overcome social loafing (Gollwitzer & Bayer, 2000).

A similar issue arises in relation to the impact of loss versus gain frames on negotiation outcomes (De Dreu, Carnevale, Emans, & van de Vliert, 1995; Neale & Bazerman, 1985). In a typical experiment, pairs of participants are asked to negotiate the distribution of some finite resource (e.g., land on an island). The framing of the negotiation is manipulated by either providing participants with information about how many points they lose by giving up elements of the resource (loss frame) or by telling participants how many points they gain by receiving these elements (gain frame). Findings indicate that cognitive loss frames lead to comparatively unfair agreements about resources and also hinder integrative solutions. Participants are not aware of the negative impact of loss frames on their negotiation behavior.

Again, merely forming a goal intention to engage in fair and cooperative negotiation with one's partner fails to be sufficient to overcome the negative impact of loss framing (Trötschel & Gollwitzer, 2004).

Finally, people are unaware of the fact that their behavior is often guided by goals that have become activated directly by the situational context at hand. Auto-motive theory (Bargh, 1990; Bargh & Gollwitzer, 1994) proposes that goals that have a history of being acted upon in a particular situation have the potential to become directly activated by this critical situation without the need for conscious intent. Studies have used priming techniques to show that activated chronic goals have predictable effects on the intensity of goal striving. For example, participants who completed scrambled sentences designed to prime achievement goals performed better on a word puzzle task as compared to controls (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). Moreover, extensive debriefing indicated that participants had no awareness of either the activation of the goal or its impact on respective performance. Direct goal activation has serious implications for realizing one's goal intentions when the situational context activates a goal that is antagonistic to the focal goal. Consistent with this idea, Gollwitzer, Sheeran, Trötschel, and Webb (2004d) found that participants who had formed a goal intention to drive carefully in a driving simulator exhibited greater speed and more errors when they had been primed with the auto-motive of "moving fast" compared to when the primed auto-motive was to "move slow." Clearly, therefore, blocking the adverse contextual threat posed by situationally activated antagonistic goals constitutes an important challenge in shielding an ongoing goal pursuit.

The discussion so far only refers to derailments of goal striving by unanticipated unwanted influences that originate in the environment. But such unanticipated unwanted influences can also originate within the person (Gollwitzer et al., 2005). This is the third circumstance in which the shielding of an ongoing goal pursuit is needed—when detrimental self-states threaten goal attainment. The negative consequences of the following three self-states on goal striving may serve as examples: the effects of mood on stereotyping, the influence of self-definitional incompleteness on social sensitivity, and the impact of ego-depletion on subsequent task performance.

Being in a good mood signals to the self that one's current situation is unproblematic, and thus information processing is less elaborate or systematic as compared to being in a bad mood (Schwarz, 1990; Schwarz, Bless, & Bohner, 1991). Consequently, people are more liable to stereotyping when they are in a good mood than when they are in a bad mood (Bless, 1997; Bless & Fiedler, 1995). The impact of positive mood on stereotyping target persons is difficult to anticipate by the layperson and, thus,

should be difficult to control. Indeed, Gollwitzer and Bayer (2000) found that merely having the goal intention to form nonstereotypical impressions did not attenuate the good-mood-effect on increased stereotyping.

Symbolic self-completion theory (Wicklund & Gollwitzer, 1982) proposes that when people who are highly committed to an identity goal (e.g., becoming a lawyer) obtain negative feedback about their accomplishments in the respective domain, they experience a sense of self-definitional incompleteness. This is a highly aversive self-evaluative state that is associated with compensatory efforts to show off alternative symbols or indicators of the aspired to identity in front of other people (e.g., by wanting to talk about one's achievements). Consequently, incomplete individuals tend to become absorbed in self-symbolizing activities and thus neglect the thoughts and feelings of an audience; their interactions with others exhibit social insensitivity (Gollwitzer & Wicklund, 1985). Gollwitzer and Bayer (2000) observed that this effect cannot be ameliorated by explicitly assigning participants the goal of taking the perspective of their interaction partners.

Finally, ego-depletion refers to the phenomenon that exerting self-control on an initial task produces a temporary reduction in people's capacity for self-control that is reflected in poor performance on a subsequent task (Baumeister, Bratlavsky, & Muraven, 1998; Muraven & Baumeister, 2000). For example, Baumeister et al. (1998, Experiment 1) showed that participants who had to eat radishes instead of tempting chocolate during an initial task, persisted for less time on a subsequent unsolvable puzzles task than did participants who were allowed to eat the chocolate during the initial task (these participants did not have to exert self-control). Apparently, ego-depletion can undermine task performance even when people have strong goal intentions to perform well. Consistent with this idea, Webb and Sheeran (2003) found that ego-depleted participants and nondepleted controls exhibited substantive differences in puzzle task performance. However, both groups reported devoting equivalent effort to the puzzle task and had equivalent desire to quit. Thus, ego-depletion would seem to be an important factor in reducing the intensity of goal striving and one in which appropriate goal intentions are not necessarily an effective defense.

3. Not Calling a Halt

Initiating and shielding goal striving from unwanted influences are crucial for successfully reaching goal completion. However, there is a third problem that needs to be resolved, namely, disengaging from goal striving that has become unproductive (Wrosch, Scheier, Carver, & Schulz, 2003). Disengagement may be straightforward when goal monitoring indicates satisfactory progress, or attainment of desired outcomes. However, a good deal

of research indicates that it is very difficult to disengage from an ongoing goal pursuit when self-defensive concerns are activated. Researchers have studied such failure to disengage under varying labels, such as sunk costs (e.g., Arkes & Blumer, 1985), entrapment (e.g., Brockner, Rubin, & Lang, 1981), and escalation of commitment (e.g., Tan & Yates, 2002). However, the basic conceptualization of the phenomenon is similar (Bragger, Hantula, Bragger, Kirnan, & Kutcher, 2003). Again, mere goal intentions to halt a failing course of action are often insufficient as has been shown by work using standard escalation paradigms (Henderson, Gollwitzer, & Oettingen, 2004).

4. Overextending Oneself

There is a fourth problem in goal striving that has to do with the fact that people have to pursue multiple goals (e.g., Austin & Vancouver, 1996; Carver & Scheier, 1998; Gollwitzer & Moskowitz, 1996). Thus, overextending oneself in an ongoing goal pursuit is likely to jeopardize the achievement of subsequent important goals. Accordingly, effective self-regulation of goal striving needs to conserve the person's capability to successfully engage in subsequent goal pursuit once striving for the initial goal has ended. However, action control by goal intentions makes people vulnerable to overextension.

A good example is the phenomenon of ego-depletion in which assigning participants goal intentions to perform well on an initial task that requires self-control is associated with reduced self-regulatory capability (and diminished performance) on a subsequent task (Baumeister et al., 1998). The well-known ironic effects of mental control (Wegner, 1994) constitute another instance in which goal intentions can produce overextension on an initial task and thereby diminish future capability. For example, Macrae, Bodenhausen, Milne, and Jetten (1994) assigned participants the goal intention of forming a nonstereotypical impression of a homeless person (or not) and asked them to provide a written statement of their impression. After a 5-minute filler task, participants were asked to evaluate homeless people in general on semantic differential scales that included five stereotypical adjective pairs (e.g., drunk–sober, busy–lazy). Findings indicated that goal intentions were successful in producing less stereotypical impressions of the person on the initial task compared to controls. However, on the subsequent rating task, goal intention participants gave *more* stereotypical evaluations of homeless people in general. That is, goal intentions to suppress stereotypes produced a rebound effect. In sum, achieving desired outcomes on the basis of mere goal intentions has costs in terms of undermining the success of subsequent goal pursuits.

B. FORMING IMPLEMENTATION INTENTIONS: A STRATEGY FOR EFFECTIVE SELF-REGULATION OF GOAL STRIVING

The idea tested in the present meta-analysis is that implementation intentions (i.e., if–then plans) facilitate effective self-regulation of goal striving. Implementation intentions should enhance people's ability to initiate, maintain, disengage from, and undertake further goal striving and thereby increase the likelihood that strong goal intentions are realized successfully. In other words, this form of planning is expected to bridge the intention–behavior gap.

Implementation intentions are if–then plans that connect good opportunities to act with cognitive or behavioral responses that are effective in accomplishing one's goals. Whereas goal intentions specify what one wants to achieve (i.e., "I intend to reach Z!"), implementation intentions specify both the behavior that one will perform in the service of goal achievement and the situational context in which one will enact it (i.e., "If situation Y occurs, then I will initiate goal-directed behavior X!"). Thus, goal intentions and implementation intentions can easily be distinguished on the basis of their content and structure; a goal intention refers to *what* one intends to achieve, whereas an implementation intention specifies *when*, *where*, and *how* one intends to achieve it.

To form an implementation intention, the person must (1) identify a response that will promote goal attainment and (2) anticipate a suitable occasion to initiate that response. For instance, a possible implementation intention in the service of the goal intention to do more exercise would link an appropriate behavior (e.g., take the stairway instead of the elevator) to a suitable situational context (e.g., standing in front of the entrance to the elevator at work). As a consequence, a strong mental link is created between the critical situation of waiting for the elevator and the goal-directed response of walking upstairs.

Selecting suitable opportunities to enact goal-directed responses entails that people anticipate situations in which it would be fitting to execute goal-directed responses. The critical situation specified in one's plan can involve an internal cue (e.g., a strong feeling) or an external cue (e.g., a particular place, object, person, or point in time). The cues can either be related to good opportunities to act (i.e., it is easy to perform actions that are instrumental for reaching the goal) or to anticipated obstacles to goal striving. Thus, cue selection can focus on initiating and stabilizing the goal striving at hand or on shielding it from particular anticipated obstacles.

Forming an implementation intention also involves the selection of an effective goal-directed behavior. In line with the theory of goal systems (Kruglanksi et al., 2002; Shah, Kruglanksi, & Friedman, 2003), it is assumed

that for any given goal, various routes to goal attainment are available. Accordingly, the specification of the then-component of an implementation intention can take many different forms. For instance, not only can an implementation intention specify one of the many behaviors that lead to goal attainment, it can also specify the suppression of one of the many responses that prevent goal attainment. In addition, the specification of the goal-directed responses can either focus on the initiation or the maintenance of goal striving. Finally, the then-component of an implementation intention may specify ignoring those stimuli that have the potential to instigate unwanted attention or behavior responses that could derail an ongoing goal pursuit (see Appendix 1 for sample implementation intentions).

C. COMPONENT PROCESSES OF IMPLEMENTATION INTENTIONS

The mental links created by implementation intentions are expected to facilitate goal attainment on the basis of psychological processes that relate both to the anticipated situation (specified in the if-component of the plan) and the specified response (the plan's then-component). As forming implementation intentions implies the selection of a critical future situation, it is assumed that the mental representation of this situation becomes highly activated (Gollwitzer, 1999). The person who forms an implementation intention selects a situation that is ripe for action to achieve the goal; the person is therefore perceptually ready to encounter this critical situation. This idea implies that processing information about the critical situation is highly proficient (Gollwitzer, 1993; Gollwitzer, Bayer, Steller, & Bargh, 2004a; Webb & Sheeran, 2004). That is, compared to those who merely form a respective goal intention, people who form implementation intentions should exhibit increased accessibility of the critical cue, and thus should be better able to detect the cue and discriminate the cue from other similar stimuli. For instance, Webb and Sheeran (2004) used a classic illusion paradigm from the psychology of language to investigate cue detection by goal intentions as compared to implementation intentions. Participants were asked to form the goal intention to count the instances of the letter f in the following piece of text: "Finished files are the/result of years of scientific/ study combined with the/experience of years." (Line breaks are marked by back slashes.) The illusion resides in the fact that most people count only three fs because they miss the f in the three instances of the word "of." However, when participants furnished the goal intention with a respective implementation intention (i.e., "And as soon as I see the letter f, then I'll add one more to my count!") their detection of the difficult-to-identity fs

improved. Additional experiments showed that this improved detection of critical cues did not have costs in terms of false alarms or reduced performance on identifying noncritical stimuli, even when these stimuli were quite similar to the critical cue (i.e., ambiguous cues).

Increased accessibility of the specified situation should also facilitate spontaneous attention to the cue and engender better recall of the cue (Gollwitzer et al., 2004a). Spontaneous attention was demonstrated in a dichotic listening experiment. When the critical cues specified in implementation intentions were presented in the nonattended channel, participants' shadowing performance (i.e., repeating the words presented in the attended channel) declined. Gollwitzer et al. (2004a) also showed in a cued recall experiment that the situations specified in if–then plans are better remembered compared to alternative good opportunities to act. In sum, forming an implementation intention should induce heightened sensitivity to the critical situation at each stage of information processing such that people are better able to detect, attend to, and remember specified cues when these cues are encountered later.

Specifying that one will perform a particular goal-directed response in the then-component of a plan, at the critical moment stipulated in the if-component of the plan, involves a strategic abdication of effortful action control. This is because forming an implementation intention delegates control of behavior from the self to specified situational cues that directly elicit action (i.e., implementation intentions create "instant habits") (Gollwitzer, 1999). Forming an if–then plan means that the person commits herself in advance to acting as soon as certain contextual constraints are satisfied. Once that situation is encountered, action initiation should proceed swiftly and effortlessly and without requiring the person's conscious intent. Accordingly, the execution of a behavior specified in an implementation intention should exhibit features of automaticity as identified by Bargh (1992, 1994).

Automaticity commonly characterizes highly overlearned activities (e.g., driving a car, typing) including the operation of habits (Aarts & Dijksterhuis, 2000a,b; Sheeran et al., 2005a; Wood et al., 2002). Action control by implementation intentions seems to exhibit three features of automatic processes: immediacy, efficiency, and lack of conscious intent. Immediacy has been tested by means of response latencies (e.g., Webb & Sheeran, 2004) and the temporal proximity of actual performance to the time of performance specified in the implementation intention (e.g., Gollwitzer & Brandstätter, 1997; Oettingen et al., 2000, Experiment 3). For instance, Gollwitzer and Brandstätter had research participants watch a video presentation of a presumed Nazi who expressed racial slurs and mark good opportunities to speak up. Participants all formed the goal intention to counterargue at opportune moments when watching the video

a second time. A subset of participants also formed implementation intentions by mentally linking these critical situations with respective counterarguments. Only having marked critical opportunities (mere goal intention condition) was less effective in promoting the immediate initiation of counterarguments compared to having also formed implementation intentions (i.e., if–then plan participants were much faster in using the marked opportunities).

The efficiency of implementation intention effects is supported by studies that varied cognitive load either through selection of the sample (e.g., schizophrenic patients, heroin addicts under withdrawal) or by experimental manipulations using dual task paradigms (e.g., Brandstätter, Lengfelder, & Gollwitzer, 2001; Lengfelder & Gollwitzer, 2000). For instance, Brandstätter et al. (2001) assigned heroin addiction patients the task of writing a curriculum vitae within a set time period. Forming implementation intentions that specified exactly when and where to get started with this task helped not only control participants (i.e., heroin users who were no longer experiencing withdrawal symptoms) to meet this task but also those participants who still showed withdrawal symptoms. Apparently, the effect of implementation intentions on task achievement did not interact with the cognitive load (drug urge) experienced by the participants. Evidence for efficiency of action control by implementation intentions was also observed in experiments in which participants had to perform two tasks at the same time. The secondary task in these studies was always a Go/No Go task, whereas the primary task was either a memorization task or a tracking task (Brandstätter et al., 2001, Studies 3 and 4; Lengfelder & Gollwitzer, 2001, Study 2). The implementation intention was linked to performing the Go/No Go task and the difficulty of the primary task was varied (easy vs. difficult). The beneficial effects of implementation intentions on performance in the secondary task were not qualified by an interaction with the primary task indicating that the operation of implementation intentions is efficient (i.e., independent of cognitive load). Moreover, better performance was observed in the primary task during those phases of the secondary task that were guided by implementation intentions (i.e., a transfer of freed resources).

Finally, there is evidence that the effective operation of implementation intentions does not require that people be consciously aware of either the anticipated critical situation or the respective goal intention (e.g., Bayer, Moskowitz, & Gollwitzer, 2004; Sheeran, Webb, & Gollwitzer, 2005c). Bayer et al. (2004) demonstrated that conscious awareness of the specified situation was redundant in two experiments that used subliminal priming of respective cues. In one study, participants were asked to classify a series of geometric figures (e.g., circles, ellipses, squares) as rounded or angular objects by left- or right-button–press responses. All participants formed the goal intention to classify the objects as fast and accurately as possible.

Implementation intention participants were in addition asked to make the following plan: "And if I see a triangle, then I will press the respective button immediately!" This implementation intention led to faster classification responses for triangles. Importantly, classification performance on all angular figures was facilitated when these figures were preceded by a subliminal triangle prime compared to a control prime (the percentage symbol, %). No such effects were observed for goal intention participants.

Moreover, Sheeran et al. (2005c) showed that people need not be consciously aware of the underlying goal intention for implementation intention effects to occur. All participants formed the conscious goal intention to solve puzzles from the Wechsler Adult Intelligence Scale (WAIS III) as accurately as possible. Half of the participants also formed an implementation intention in relation to another dimension of performance, namely, to solve the puzzles as quickly as possible. This implementation intention manipulation was then crossed with a priming procedure that activated the goal of responding quickly outside of awareness. Speed and accuracy of responses to the puzzles was then measured. Even though participants reported no awareness of the primed goal during debriefing, findings indicated that responses were fastest when participants were primed to respond quickly and had formed respective implementation intentions. This study shows that conscious intent is not required to observe implementation intention effects on performance.

In sum, the evidence on component processes suggests that people can enhance rates of goal completion obtained by conscious and effortful guidance of behavior (action control by goal intentions) by strategically switching to automated self-regulation of goal striving (action control by implementation intentions).

IV. Present Review

Accumulated research indicates that there is a substantial gap between people's goal intentions and their goal achievement. This is because forming a goal intention does not prepare people sufficiently for dealing with self-regulatory problems in initiating, maintaining, disengaging from, or over-extending oneself in goal striving. Forming an implementation intention, on the other hand, spells out the when, where, and how of goal striving in advance. If–then plans are therefore thought to enhance the accessibility of the specified critical situation and induce automatic execution of the specified response. The consequence is that people should remember to act, seize good opportunities, overcome initial reluctance, suppress unwanted

responses, block detrimental self-states and adverse contextual influences, and successfully disengage from goals without costs to self-regulatory capability. Goal striving should be regulated effectively, and goal achievement should thereby be facilitated.

The present review tests these ideas using meta-analysis. First, we assess the overall impact of implementation intention formation on goal achievement. We evaluate potential moderators of implementation intention effects and test whether implementation intentions are effective in promoting performance in different domains of attainment. Second, we test the effectiveness of implementation intentions in overcoming self-regulatory problems that have to do with initiating goal striving, shielding goals from unwanted influences, disengaging from failing goals, and conserving self-regulatory capability. Finally, we calibrate the effect sizes for the component (if–then) processes of implementation intentions.

A. METHOD

1. Sample of Studies

Several methods were used to generate the sample of studies: (1) computerized searches were conducted on social scientific and medical databases (PsychINFO, Social Science Citation Index and Conference Papers Index [Web of Knowledge], Medline, Index Medicus, and Dissertation Abstracts International Online) from January 1990 to December 2003 using the keywords *implementation intention(s)* and *plan(s)*, (2) references in each article identified above were evaluated for inclusion, and (3) authors were contacted and requests were made for unpublished studies and studies in press.

Studies were included in the review if (a) the implementation intention formed by participants specified the performance of a goal-directed response upon encountering an internal or external critical cue and (b) a statistical association between the formation of an implementation intention and an outcome variable could be retrieved (or obtained). Using these criteria, 94 tests of the relationship between implementation intentions and goal achievement could be included in the meta-analysis. The focal goal and effect size for each test are presented in Table I. The 94 independent tests come from 63 reports (these reports are preceded by an asterisk in the reference list).

2. Meta-Analytic Strategy

The effect size estimate used here was d, which is the difference between the means for two groups divided by a pooled standard deviation and corrected for small sample bias (Hedges & Olkin, 1985). We subtracted the control

TABLE I

STUDIES OF THE IMPACT OF IMPLEMENTATION INTENTION FORMATION ON
GOAL ACHIEVEMENT

Author(s)	Goal	N	d
Aarts, Dijksterhuis, and Midden (1999)	Collect a coupon/latencies to cues	40	.80
Ajzen, Czasch, and Flood (2002)	Rate TV newscasts	102	.47
Armitage (2004)	Eat a low-fat diet	126	.30
Bagozzi, Dholakia, and Basuroy (2003)	Personal goals	153	.68
Bamberg (2000)	Public transport use	90	.45
Bamberg (2002)	Organic food purchase	160	.32
Bayer, Jaudas, and Gollwitzer (2002)	Task switch	40	.85
Bayer, Moskowitz, and Gollwitzer (2004) Study 1	Retaliation behavior	61	.98
Bayer et al. (2004) Study 2	Classification of geometric shapes	61	.49
Brandstätter et al. (2003)	Initiation of vocational retraining	126	.72
Brandstätter, Lengfelder, and Gollwitzer (2001) Study 1	Write a curriculum vitae	41	1.32
Brandstätter et al. (2001) Study 2	Go/No Go task	61	.93
Brandstätter et al. (2001) Study 3	Go/No Go task	68	.63
Brandstätter et al. (2001) Study 4	Go/No Go task	33	1.10
Brüwer, Bayer, and Gollwitzer (2002)	Simon effect task	34	2.20
Bulgarella, Oettingen, and Gollwitzer (2003)	Numerical judgment dilemma	34	.80
Chasteen, Park, and Schwarz (2001) Study 1	Prospective memory task	68	.82
Dewitte, Verguts, and Lens (2003) Study 1	Ten personal goals	15	.10
Dewitte et al. (2003) Study 2	Ten personal goals	14	.10
Dewitte et al. (2003) Study 3	Ten personal goals	16	.18
Dholakia and Bagozzi (2003) Study 1	Reading assignment	102	.56
Dholakia and Bagozzi (2003) Study 2	Visit website	138	.43
Dholakia and Bagozzi (2003) Study 3	Visit website	179	.82
Dholakia and Bagozzi (2002) Study 1	Product/service purchase	131	.49
Dholakia and Bagozzi (2002) Study 2	Personal goals	169	.41
Dieffendorf and Lord (2003)	Human resource task	170	.41
Einstein, McDaniel, Williford, Pagan, and Dismukes (2003)	Prospective memory task	48	−.24
Gillholm, Ettema, Sellart, and Garling (2004a) Study 1	Mundane activities	28	1.01
Gillholm et al. (1999) Study 2	Mail response forms	48	.02
Gollwitzer and Bayer (2004a) Study 1	Degree of perspective taking	34	1.16
Gollwitzer and Bayer (2004a) Study 2	Social loafing task	42	.75
Gollwitzer and Bayer (2004a) Study 3	Mood-induced gender stereotyping	54	.80
Gollwitzer, Bayer, Steller, and Bargh (2002) Study 1	Cue detection	46	.82
Gollwitzer et al. (2002) Study 2	Dichotic listening task	55	.72
Gollwitzer et al. (2002) Study 3	Recall of specified cues	79	.87
Gollwitzer and Brandstätter (1997) Study 1	Personal goals	70	.43
Gollwitzer and Brandstätter (1997) Study 2	Complete a written report	36	.90
Gollwitzer and Brandstätter (1997) Study 3	Counter arguments to racist remarks	60	.52
Gollwitzer, Sheeran, and Seifert (2004c) Study 3	Solving law cases	55	1.10
Gollwitzer, Sheeran, Trötschel, and Webb (2004d) Study 1	Driving simulation dilemma	69	.98
Gollwitzer et al. (2004d) Study 2	Accessibility of drinking behavior	72	.49
Gollwitzer et al. (2004d) Study 3	Helping behavior dilemma	60	1.25
Gollwitzer et al. (2004d) Study 4	Cooperation in resource dilemma	60	.90
Gollwitzer, Trötschel, Bayer, and Sumner (2004e) Study 1	Stereotype rebound task	30	1.81
Gollwitzer et al. (2004e) Study 2	Anagram performance	31	1.12
Henderson, Gollwitzer, and Oettingen (2004) Study 1	Escalation of commitment task	87	.52
Henderson et al. (2004) Study 2	Escalation of commitment task	96	.54
Henderson et al. (2004) Study 3	Escalation of commitment task	187	.43
Holland, Aarts, and Langendam (in press)	Recycling behaviors	54	1.42
Koestner, Downie, Horberg, and Hata (2002a)	Personal goals	106	.39
Koestner, Lekes, Powers, and Chicoine (2002b) Study 1	Personal goals	106	.39
Koestner et al. (2002b) Study 2	New Year resolutions	38	−.32
Koole and Van't Spijjker (2000)	Write a report	80	.75
Lengfelder and Gollwitzer (2001) Study 2	Go/No Go task	67	.80
Lippke and Ziegelmann (2002)	Exercise	88	.18
Milne, Orbell, and Sheeran (2002)	Exercise	248	1.25
Milne and Sheeran (2002a)	Testicular self-examination	432	.43

TABLE I Continued

Author(s)	Goal	N	d
Milne and Sheeran (2002b)	Persistence with boring task	66	1.35
Milne and Sheeran (2002c)	Visit study skills website	183	.87
Murgraff, White, and Phillips (1996)	Binge drinking	102	.68
Oettingen, Hönig, and Gollwitzer (2000) Study 2	Compose a CV	20	1.25
Oettingen et al. (2000) Study 3	Complete a project	25	.80
Orbell, Hodgkins, and Sheeran (1997)	Breast self-examination	155	1.22
Orbell and Sheeran (1999) Study 3	Reduce snack food consumption	111	.61
Orbell and Sheeran (1999) Study 4	Reduce snack food consumption	93	.45
Orbell and Sheeran (2000)	Recovery of functional activities	64	.70
Prestwich, Lawton, and Conner (2003a)	Personal goals	79	.54
Prestwich, Lawton, and Conner (2003b)	Exercise	58	.68
Rise, Thompson, and Verplanken (2003)	Exercise and recycling	112	1.58
Schaal (1993)	Arithmetic task	40	.93
Sheeran and Milne (2003)	Reduce snack good consumption	129	.49
Sheeran and Orbell (1999) Study 1	Vitamin supplement use	78	.35
Sheeran and Orbell (1999) Study 2	Vitamin supplement use	37	.59
Sheeran and Orbell (2000)	Cervical cancer screening	104	.58
Sheeran and Silverman (2003)	Attendance at workplace safety training	271	.52
Sheeran and Webb (2003)	Stroop performance	48	1.62
Sheeran, Webb, and Gollwitzer (2005c) Study 1	Independent study	85	.35
Sheeran et al. (2005c) Study 2	Performance on puzzle task	40	.70
Sniehotta, Scholtz, and Schwarzer (2002a)	Cardiac rehabilitation exercise/training	74	.61
Sniehotta, Scholtz, and Schwarzer (2002b)	Physical activity	65	.70
Steadman and Quine (2000)	Vitamin supplement use	174	.32
Steadman and Quine (in press)	Testicular self-examination	75	.54
Stephens and Conner (1999)	Resist taking up smoking	124	.37
Trötschel and Gollwitzer (2004) Study 1	Framing effects in negotiation	43	.82
Trötschel and Gollwitzer (2004) Study 2	Framing effects in negotiation	57	.87
Verplanken and Faes (1999)	Healthy eating	102	.47
Webb and Sheeran (2003) Study 1	Persistence with unsolvable puzzles	32	.87
Webb and Sheeran (2003) Study 2	Stroop performance	57	.87
Webb and Sheeran (2004) Study 1	Letter identification	54	.63
Webb and Sheeran (2004) Study 2	Number identification	42	.75
Webb and Sheeran (2004) Study 3	Number identification	53	.82
Webb and Sheeran (in press, b) Study 1	Personal goals	646	.75
Webb and Sheeran (in press, b) Study 2	Academic performance	129	.56
Williams (2003)	Return postcard	60	.56

group mean from the mean for the implementation intention group so that a positive d value indicates the benefit in performance conferred by forming an implementation intention. The average effect size was computed by averaging the d values with each d weighted by the reciprocal of its variance. As a test of significance, 95% confidence intervals were computed around each mean. Where studies reported r, t, F, χ^2, or contingency tables, we transformed values into ds using the formulas supplied by Hedges and Olkin (1985) and Hunter (1990). Homogeneity of effect sizes was tested by means of the Q statistic that has an approximate chi-square distribution with k-1 degrees of freedom, k being the number of effect sizes. When Q is significant ($p < .05$), effect sizes are heterogeneous.

3. Multiple Measures and Multiple Tests

Several papers contained data from more than one sample or reported effect sizes for multiple measures of an independent variable or multiple measures of the dependent variable. We tried to take advantage of the richness of these data without violating the assumption of independence that underlies the validity of meta-analysis. Data from independent samples were, therefore, treated as separate units. In the case of multiple measures of independent or dependent variables, the average d within each study was the unit of analysis. Where studies contained multiple nonindependent samples, we used the conservative strategy of computing the weighted average effect size and using the smallest N in the analysis in order to determine the overall effect size for that study (Sheeran, Abraham, & Orbell, 1999). For example, Holland, Aarts, and Langendam (in press) examined the impact of forming implementation intentions on objective measures of recycling old paper ($N = 54$, $d = 1.32$) and recycling plastic cups ($N = 109$, $d = 1.50$). The effect size used to represent this study is the weighted average of the two effects ($d = 1.42$), and the sample size is 54.

B. RESULTS

1. Overall Effect Size

The overall impact of forming implementation intentions on goal achievement was $d = .65$ based on $k = 94$ tests that involved 8461 participants. This effect had a 95% confidence interval from .60 to .70. According to Cohen's (1992) power primer, $d = .20$ is a "small" effect, $d = .50$ is a "medium"-sized effect, whereas $d = .80$ is a "large" effect. Thus, the effect size that characterizes the impact of if–then planning on goal achievement is of medium-to-large magnitude.

a. Moderators of Implementation Intentions Effects. We examined methodological moderators of the relationship between implementation intentions and goal achievement in order to ensure that the effect sizes for if-then plans were not exaggerated by weaker methods (e.g., correlational rather than experimental designs). The homogeneity test encouraged a search for moderators as there was significant variability in the effect sizes obtained in individual studies, $Q(93) = 173.46$, $p < .001$. Moderator analyses were conducted for three methodological factors: type of sample, study design (correlational vs. experimental), and measurement of goal attainment (self-report vs. objective).

Table II shows that most tests of implementation intention effects were conducted among university students ($k = 79$) though eight tests sampled members of the public and there were two tests of children/young people. Four tests were conducted with physically ill people, and there were three tests among people with psychological problems (schizophrenic patients, frontal lobe patients, and heroin addicts). Findings showed that, excluding

TABLE II

IMPACT OF METHODOLOGICAL FACTORS ON EFFECT SIZES FOR IMPLEMENTATION INTENTIONS

Factor	N	k	d	95% CI	Q
Sample					
General public	1076	8	.58	[.45, .70]	14.09*
Children/young adults	144	2	.47	[.14, .85]	2.38
People with physical illness	291	4	.52	[.28, .77]	3.66
People with psychological problems					
Schizophrenic patients	20	1	1.01		
Brain-injured patients	34	1	.87		
Heroin addicts	41	1	1.32		
University students	6855	79	.65	[.61, .70]	147.93***
Design					
Correlational	1688	11	.70	[.61, .82]	20.23*
Experimental	6773	83	.65	[.61, .70]	151.59***
Measurement					
Self-report	4488	36	.63	[.58, .70]	80.96***
Objective	3973	58	.67	[.61, .74]	92.32**
Publication status					
Unpublished	3759	46	.67	[.61, .72]	75.13***
Published	4702	48	.65	[.59, 70]	98.23***

$*p < .05$, $**p < .01$, $***p < .001$.

Note: The sum of k equals 96 because data from two different samples were disaggregated in two studies (Lengfelder & Gollwitzer, 2001, Study 2; Brandstätter et al., 2001, Study 2).

N = sample size; k = number of independent effects; d = effect size; CI = confidence interval; Q = homogeneity statistic.

people with psychological problems, effect sizes were of medium size and equivalent magnitude across samples, $Q(3) = 4.01, p > .25$. Implementation intentions appeared to have stronger effects for people with psychological problems compared to the other groups; this difference proved significant when subgroup comparisons were conducted ($ds = 1.10$ and $.66$, respectively), $Q(1) = 4.54, p < .04$. This finding suggests that forming implementation intentions is especially beneficial to goal attainment among people who have difficulties with regulating their behavior.

Findings indicated that implementation intentions were similarly effective whether the study design was correlational or experimental ($ds = .70$ and $.65$, respectively), $Q(1) = 1.93, p > .16$. Moreover, the impact of implementation intentions on goal achievement was not exaggerated by overreliance on self-report measures of behavior. Implementation intentions had similar effects whether or not the outcome was measured objectively ($d = .67$) or by self-report ($d = .63$), $Q(1) = 2.18, p = .14$.

We also examined whether publication status was associated with the strength of observed implementation intention effects. Forty-nine percent of the effects that could be included in the review were unpublished ($k = 46$), and it is possible that unpublished tests may be of poorer methodological quality than are published tests (Rosenthal, 1984). This could mean that the overall estimate of effect size is inflated. However, there was no difference in effect sizes from published versus unpublished tests ($ds = .65$ and $.67$, respectively), $Q(1) = 1.53, p = .22$.

b. Effect Sizes for Different Goal Domains. To test the generality of implementation intention effects, values of d were computed for different goal domains. We drew on the classification of domains used in Kim and Hunter's (1993) comprehensive meta-analysis of the impact of topic on attitude–behavior relations in order to categorize the goals (Canary & Seibold, 1984). Effects were available for seven of the domains identified by Kim and Hunter (health, academic, consumer, environmental, prosocial, antiracist, and laboratory tasks). An eighth category was personal goals because several studies asked participants to nominate their own desired outcomes that were then furnished with implementation intentions (or not).

Findings indicated that implementation intentions had medium or large effects for all domains (Table III). The goals examined most frequently related to laboratory tasks ($k = 38$) and health ($k = 23$). There were large effects for antiracist, prosocial, and environmental behaviors ($ds = .87, 1.01$, and 1.12, respectively). There were medium-to-large effects for laboratory tasks and academic achievement ($ds = .70$ and $.72$, respectively) and medium-sized effects for consumer behaviors, health behaviors, and personal goals. Overall, Table III indicates that implementation intentions have reliable effects for a wide range of goal domains.

TABLE III

META-ANALYSIS OF IMPLEMENTATION INTENTION EFFECTS FOR DIFFERENT GOAL DOMAINS

Goal domain	N	k	d	95% CI	χ^2
Consumer	291	2	.41	[.16, .65]	0.50
Environmental	256	3	1.12	[.85, 1.42]	17.07***
Antiracist	144	3	.87	[.52, 1.25]	5.30
Prosocial	254	5	1.01	[.72, 1.28]	1.91
Academic	836	9	.72	[.56, .87]	7.42
Personal	1391	11	.58	[.47, .70]	14.11
Health	2861	23	.59	[.52, .67]	47.92***
Laboratory	2428	38	.70	[.61, .79]	59.90*

$*p < .05$, $**p < .01$, $***p < .001$.

Note: N = sample size; k = number of independent effects; d = effect size; CI = confidence interval; Q = homogeneity statistic.

2. Effect Sizes for Different Self-Regulatory Problems

Table IV presents the effect sizes for implementation intentions for self-regulatory problems associated with initiating goal striving, shielding goals from unwanted influences, disengaging from failing goals, and conserving self-regulatory capability. Three problems that militate against action initiation are remembering to act, seizing opportunities, and overcoming initial reluctance. There were $k = 11$, 20, and 21 tests of these problems, respectively. For all three problems, effect sizes for implementation intentions were of medium-to-large magnitude ($ds = .54$, .61, and .65, respectively). These findings indicate that implementation intentions help to ensure that people (1) do not forget to perform intended actions, (2) do not miss good opportunities to initiate action, and (3) do not fail to act because they are swayed by short-term considerations. The overall effect size was $d = .61$ indicating that implementation intention formation makes an important difference to whether or not people initiate goal striving successfully.

We identified three self-regulatory tasks in relation to shielding goals from unwanted influences, namely, suppressing unwanted responses, blocking detrimental self-states, and blocking adverse contextual influences. Implementation intentions proved beneficial for all three tasks. First, implementation intentions had a large effect on suppressing unwanted attention responses ($d = .90$) and had a medium effect on suppressing unwanted behavioral responses ($d = .54$). Second, implementation intentions had a large effect on goal achievement even when participants were in a detrimental self-state ($d = 1.10$). Implementation intentions promoted performance

TABLE IV

META-ANALYSIS OF IMPLEMENTATION INTENTION EFFECTS FOR DIFFERENT SELF-REGULATORY
TASKS IN GOAL STRIVING

Self-regulatory tasks	N	k	d	95% CI	Q
Initiating Goal Striving					
Remembering to act	983	11	.54	[.45, .72]	16.79
Seizing opportunities	2270	20	.61	[.52, .70]	23.75
Overcoming initial reluctance	2588	21	.65	[.56, .72]	72.82***
Overall	5841	52	.61	[.56, .67]	114.21***
Shielding Goal Striving from Unwanted Influences					
Suppressing unwanted responses					
Attention responses	184	3	.90	[.61, 1.25]	5.75
Behavioral responses	559	5	.54	[.35, .70]	1.59
Blocking detrimental self-states	248	5	1.10	[.80, 1.39]	4.40
Blocking adverse contextual influences	405	8	.93	[.70, 1.16]	2.22
Overall	1396	21	.77	[.67, .87]	27.60
Disengaging from Futile Goal Striving	370	3	.47	[.26, .70]	0.22
Conserving Self-Regulatory Capability	93	3	1.28	[.77, 1.76]	3.08

$*p < .05, **p < .01, ***p < .001.$

Note: N = sample size; k = number of independent effects; d = effect size; CI = confidence interval; Q = homogeneity statistic.

when participants had incomplete self-definitions ($d = 1.12$, $k = 2$), were ego-depleted ($d = 1.22$, $k = 2$), or were in a good mood and therefore liable to stereotyping ($d = .80$, $k = 1$). Third, a large effect was obtained for implementation intentions when goal achievement was blocked by adverse contextual influences ($d = .93$). Forming an implementation intention meant that participants were able to overcome the characteristic impacts of deindividuation on social loafing ($d = .80$, $k = 1$), loss frames on negotiation ($d = .85$, $k = 2$), and situational activation of goals that were antagonistic to the focal goal striving ($d = 0.98$, $k = 5$). In sum, implementation intentions are effective in blocking adverse contextual influences.

As well as initiating goal striving and shielding ongoing goal pursuits from unwanted influences, people must also disengage from goal striving when such striving is no longer productive. Three studies tested the efficacy of implementation intentions in helping people disengage from failing goals. Findings indicated that implementation intention effects were of approximately medium size ($d = .47$).

The final self-regulatory problem is whether implementation intention formation conserves people's capability for future goal striving. Findings showed that, even when the experimental settings involved two phases and the initial task was known to engender performance deficits on the subsequent task, implementation intentions still had a large effect on performance

(d = 1.28). Participants who formed implementation intentions to control initial performance did not exhibit ego-depletion or stereotype rebound. In both cases, effect sizes for implementation intentions were positive and large (ds = .87, and 1.81, respectively).

3. Component Processes of Implementation Intentions

Forming implementation intentions should activate the mental representation of the specified cues (if-component) and automate responding to these cues (as specified in the then-component). Table V shows that implementation intentions had large effects on the detection, discrimination, and accessibility of critical cues (ds = .72, .82, and .95, respectively) and on the attention paid to, and memory for, those cues (ds = .72 and .87, respectively). The overall effect size for processes related to the if-component of the plan was large (d = .80) indicating that implementation intentions are associated with highly proficient processing of critical cues.

There were 7, 7, and 3 tests, respectively, of the immediacy and efficiency of, and redundancy of conscious intent for action control by implementation intentions. Implementation intentions showed large effects for each of these three key features of automaticity. If–then plans produced more immediate responding (d = .77), were efficient with respect to cognitive resources (d = .85), and proceeded without the need for conscious intent (d = .72). These findings provide strong support for the postulated automaticity of action control induced by implementation intentions.

TABLE V
META-ANALYSIS OF COMPONENT PROCESSES OF IMPLEMENTATION INTENTIONS

Component process	N	k	d	95% CI	Q
If-component					
Cue detection	100	2	.72	[.30, 1.16]	0.23
Cue discrimination	53	1	.82		
Cue accessibility	40	1	.95		
Attention to cue	55	1	.72		
Memory for cue	79	1	.87		
Overall	327	6	.80	[.56, 1.04]	0.89
Then-component					
Immediacy	363	7	.77	[.49, .98]	2.09
Efficiency	278	7	.85	[.58, 1.12]	26.45
Lack of intent	122	3	.72	[.39, 1.07]	1.62

*p < .05, **p < .01, ***p < .001.

Note: N = sample size; k = number of independent effects; d = effect size; CI = confidence interval; Q = homogeneity statistic.

C. DISCUSSION

Findings from 94 studies involving more than 8000 participants indicated that the effect size associated with the impact of implementation intention formation on goal attainment is $d = .65$, an effect of medium-to-large magnitude (Cohen, 1992). This effect size is impressive because $d = .65$ represents the difference in goal achievement engendered by furnishing a goal intention with a respective implementation intention compared to the formation of a goal intention on its own. The implication is that if–then planning substantially increases the likelihood of attaining one's goals.

Several features of the meta-analysis serve to underline the effectiveness of implementation intentions in promoting goal achievement. First, it is unlikely that the review suffers from the "file drawer problem" (e.g., Rosenthal, 1984) as 49% of the included tests were unpublished. Moreover, publication status had no impact on the effect size obtained for implementation intentions. Second, 88% of tests involved experimental designs (i.e., random assignment of participants to implementation intention formation) that increase confidence in the findings. It was also the case that the effect sizes obtained for experimental versus correlational studies were equivalent (unlike meta-analyses of the impact of goal intentions on goal achievement in which experimental tests show much weaker effects compared to correlational tests; Webb & Sheeran, in press a). Third, the composition of the sample generally did not moderate implementation intention effects. If–then plans were similarly effective in promoting goal achievement among students, members of the general public, and people with physical illness. Fourth, when we used Kim and Hunter's (1993) system to classify domains of attainment, implementation intentions were shown to have medium or large effects for a wide variety of goals. Finally, the effectiveness of implementation intentions was not exaggerated by overreliance on self-report measures of behavior. The effect size for implementation intentions was of equivalent magnitude in studies in which objective measures of performance were used. In sum, implementation intentions seem to have benefited goal achievement no matter how one looks at the data.

1. Implementation Intentions and Self-Regulatory Tasks in Goal Striving

Whereas traditional theories of goal pursuit assumed that strong goal intentions are a sufficient determinant of goal achievement (e.g., Ajzen, 1991; Atkinson, 1957; Fishbein, 1980; Locke & Latham, 1990; Rogers, 1983), the present research started from the position that there is a substantial gap between intentions and action as there are numerous problems of goal striving that need to be solved even if people hold strong binding goals (Gollwitzer,

1990, 1993, 1996, 1999; Heckhausen & Gollwitzer, 1987; Gollwitzer et al., 2005; Orbell & Sheeran, 1998; Sheeran, 2002). We analyzed the intention–behavior gap in terms of four key self-regulatory tasks: initiating goal striving, shielding ongoing goal pursuit from unwanted influences, disengaging from unproductive goal striving, and conserving self-regulatory capability. Findings indicated that if–then planning facilitated initiation of goal striving no matter whether getting started was an issue of remembering to act, seizing good opportunities, or overcoming initial reluctance.

Although fewer studies were conducted on the issue of shielding goal striving, the beneficial effects of implementation intentions were also strong. Forming if–then plans helped with different problems of maintaining an ongoing wanted (focal) goal pursuit. The implementation intentions used were geared either at suppressing unwanted attention and behavioral responses, or toward spelling out the focal goal striving and thereby blocking detrimental self-states and adverse contextual influences. It is worth noting that various detrimental self-states and adverse contextual influences have been scrutinized and the awareness of their presence varied between studies, as did the awareness of their potential negative impact on the person's goal striving.

Three studies investigated disengagement from failing courses of action (Henderson et al., 2004) using standard escalation of commitment paradigms (i.e., escalation of commitment was induced by instigating the justification motive; e.g., Bobocel & Meyer, 1994). Even though it is well established that it is very difficult to overcome strong self-justification concerns and thus halt escalation of commitment, implementation intention formation was effective in doing so and produced an effect of approximately medium size. Thus, implementation intentions provide a useful means for successfully bringing futile goal striving to a close.

The final self-regulatory task in goal striving is conserving capability for pursuing subsequent goals once an initial goal has been completed. Whereas action control by goal intentions has been shown to generate ironic rebound and ego-depletion effects for subsequent task performance, action control by implementation intentions did not produce such costs. In other words, controlling goal striving with implementation intentions allows people to move on to subsequent goal striving without these self-regulatory handicaps; compared to self-regulation by goal intentions, self-regulation by implementation intentions conserves rather than diminishes capability for further goal striving.

2. Psychological Processes Underlying Implementation Intention Effects

Several studies explored the if- and then-component processes of implementation intentions. Findings strongly support the postulated mechanisms (Gollwitzer, 1999). Apparently, specifying a situational cue in the if-component

of an implementation intention creates a heightened activation of the respective mental representation of the situation. The implied ease of accessibility could be observed in respective lexical decision, perceptual detection, cue discrimination, and memory performances. Moreover, implementation intention participants attended to specified critical cues even when the cues were presented on the nonattended channel in a dichotic listening task. Although studies used different paradigms to assess heightened activation, the effect sizes obtained were uniformly large. These findings strongly suggest that having selected a situational cue for acting toward one's goal, it is hard for the person to overlook this opportunity. This contrasts with the predicament of the person who has only formed a goal intention and thus needs to actively search for and identify good opportunities to act (Sheeran, Milne, Webb, & Gollwitzer, 2005b).

At the same time, specifying an effective goal-directed response in the then-component of the plan endows the control of this response with features of automaticity. The three features of automaticity that have been analyzed in various different studies are immediacy, efficiency, and lack of awareness (i.e., conscious intent is not required). For all three features, effect sizes were large. Apparently, furnishing goal intentions with implementation intentions switches the mode of goal-directed behavior from hesitant to immediate, from effortful to efficient, and from a conscious intent to act to direct response elicitation by the situation. Whereas the person who has only formed a goal intention still has to deliberate *in situ* about what goal-directed response to undertake and/or energize the self to perform it, forming an implementation intention means deciding these issues in advance, thereby delegating the control of goal-directed behavior to specified situational cues. Once these cues are encountered, action initiation is triggered automatically.

One might wonder whether a change in motivational factors (strength of respective goal intentions and/or self-efficacy) due to if–then plan formation may explain implementation intention effects on goal attainment—in addition to, or even instead of, the postulated component processes. However, at least two lines of research contradict this idea. First, studies that measured strength of goal intentions (commitment) or self-efficacy both before and after respective implementation intention inductions found no evidence that if–then plan formation increased scores on these variables in either within-participants analyses (differences within the if–then plan group over time) or between-participants analyses (differences between the if–then plan and control group at either time-point) (e.g., Brandstätter et al., 2001, Study 1; Milne et al., 2002; Oettingen et al., 2000, Study 2; Orbell et al., 1997; Sheeran & Orbell, 1999; Sheeran et al., 2005c, Study 1). Second, implementation intention formation enhanced rates of goal attainment even when participants had extremely high scores on goal intention and self-efficacy prior to

plan formation. For instance, Sheeran and Orbell (2000) found that if–then planning increased attendance for cervical cancer screening even though the preintervention means for the if–then plan group were 4.60 and 4.63, respectively, on 1–5 scales. It is implausible to attribute the observed 33% improvement in attendance behavior among implementation intention participants to postmanipulation increases in goal intentions or self-efficacy (for equivalent findings see also Sheeran & Orbell, 1999; Verplanken & Faes, 1999). These results, together with findings showing that implementation intention effects do not exhibit the temporal decline of motivational interventions (e.g., Sheeran & Silverman, 2003; Sheeran et al., 2005b) and actually show stronger effects for difficult-to-implement as compared to easy-to-implement goals (e.g., Gollwitzer & Brandstätter, 1997, Study 1), all indicate that increases in goal intention strength and self-efficacy as a consequence of if–then plan formation cannot explain implementation intention effects on goal achievement.

3. Implementation Intentions in Everyday Life

Two findings help to clarify when implementation intention formation is likely to especially benefit goal attainment. First, if–then planning has a significantly larger effect size among people who are known to have problems with action control (e.g., frontal lobe patients, schizophrenics). Second, implementation intentions exhibit a noticeably large effect size in tasks that are known to overextend people's capability to regulate their behavior (i.e., in ego-depletion and ironic rebound paradigms; $d = 1.28$). These findings speak to the idea that the presence of problems in goal striving is an important determinant of the strength of implementation intention effects. If the set goal is extremely easy to initiate and pursue, then simply forming the respective goal intention could satisfactorily facilitate goal achievement; in such instances, it is possible that forming an implementation intention may confer little additional benefit. If, on the other hand, person characteristics or task features make it difficult to execute goal-directed behaviors, then it is especially advantageous to engage in if–then planning. That is, forming implementation intentions is most likely to benefit goal achievement when regulating the behavior is difficult or people have chronic difficulties in regulating their behavior.

In the light of this analysis, and the overall support obtained in this review for the beneficial impact of implementation intentions on goal achievement, can we conclude that if–then planning will facilitate such attainment under any circumstances? In other words, is forming implementation intentions a foolproof self-regulatory strategy of goal striving? In everyday life, people may fail to form effective implementation intentions due to unfortunate

specifications of opportunities and goal-directed responses. For instance, a person may identify an opportunity that hardly ever arises (e.g., when one rarely has the choice between walking vs. taking the elevator), or an opportunity in which it turns out to be impossible to act toward one's goal (e.g., one's boss insists that you ride the elevator together to discuss work). Similarly, a person may specify a behavior that has limited instrumentality with respect to reaching the goal (e.g., taking the stairs instead of the elevator is unlikely, on its own, to achieve the superordinate goal of reducing weight) or a behavior that, in reality, proves impossible for the person to perform (e.g., walk up 60 flights of stairs to one's office).

In addition, if–then plans may not be very effective because opportunities and responses are not specified precisely. For example, a plan that specifies "eat healthily" in the then-component and "tomorrow" in the if-component has hardly spelled out an unambiguous opportunity to act or a specific goal-directed response to initiate—the person still has to identify a particular behavior to perform in a particular situation to facilitate goal achievement (e.g., order a salad at lunch time tomorrow in my usual restaurant). Having to thus deliberate about when, where, and what to do *in situ* means that the person is unlikely to garner much benefit from the enhanced activation of critical cues or automation of responding conferred by forming precise if–then plans; the person seems no better off than having merely formed the goal intention to "eat healthily tomorrow." In sum, implementation intention formation should prove useful in promoting goal achievement provided components of the plan are precise (i.e., deliberation about appropriate opportunities and responses is not required *in situ*), viable (i.e., the specified situation will be encountered, the specified response can be performed), and instrumental (i.e., the specified situation permits action, and the specified response facilitates goal achievement). How often the if–then plans fashioned in people's everyday lives satisfy these conditions is an empirical issue.

Finally, it is important that people who specify obstacles in the if-component of their implementation intentions select those barriers and distractions that most hinder goal completion. In other words, it matters that people specify those obstacles that do indeed undermine goal striving. Research has demonstrated that the mental exercise of juxtaposing the desired future with the present negative reality (i.e., mental contrasting) is a particularly effective strategy for discovering powerful barriers and hindrances that stand in the way of realizing desired outcomes (Oettingen, 2000; Oettingen et al., 2001). Accordingly, inviting people to engage in mental constrasting prior to if–then planning should ensure that people gear their implementation intentions to precisely those obstacles that present the greatest obstruction to goal attainment.

4. Do Implementation Intentions Engender Rigid Goal Striving?

Assuming that implementation intentions create strong links between antici-
pated situations and goal-directed behaviors, does this mean that implemen-
tation intention formation undermines performance when flexible goal
striving is called for? The idea that implementation intentions could engen-
der costs in terms of rigidity has at least three aspects. First, action control
by implementation intentions could be rigid in the sense that goal striving no
longer takes into account the state (activation, strength) of participants' goal
intentions. Research does not support this concern, however. Several studies
have shown that goal intentions moderate the impact of implementation inten-
tions on goal attainment such that strong effects of if–then plans only emerge
when participants hold strong respective goal intentions (e.g., Koestner et al.,
2002b; Orbell et al., 1997; Sheeran et al., 2005c, Study 1). Similarly, studies that
either activated (Bayer et al., 2004; Sheeran et al., 2005c, Study 2) or deactivated
(Seehausen, Bayer, & Gollwitzer, 1994, cited in Gollwitzer, 1996) relevant goal
intentions indicate that implementation intentions only affected performance
when the respective goal intention was activated. For example, Sheeran et al.
(2005c) showed that an if–then plan to enhance speed of responding on a puzzle
task only affected response times when the goal intention to respond quickly
had been primed in the situation. Thus, action control by implementation
intentions does not involve a mechanistic elicitation of action in the presence
of environmental cues but rather respects the presence versus absence of
activated strong goal intentions. Apparently, the automaticity instigated by
if–then plans is goal-dependent (Bargh, 1992, 1994)—concerns that if–then
plans could engender rigid adherence to a course of action that does not serve
a person's goals seem unfounded.

The second aspect of rigidity concerns the possibility that implementation
intentions could facilitate one aspect of goal striving but do so at the expense
of other aspects of goal striving. That is, forming an if–then plan to promote
one dimension of performance could consume self-regulatory resources
and thereby engender inflexible performance on other dimensions; as a con-
sequence, overall goal attainment might be compromised. Again, evidence
seems to contradict this idea. For example, although Sheeran et al. (2005c)
found that implementation intentions enhanced response times on a puzzle
task, accuracy of responses was not compromised. Similarly, Gollwitzer ·
and Bayer (2000) showed that implementation intentions not only increased
the number of solutions generated in a creativity task but also enhanced
the conceptual variety of those solutions. These findings indicate that action
control by implementation intentions does not induce rigidity in terms of
inevitable trade-offs between dimensions of performance (speed vs. accuracy,
quantity vs. quality). Rather, the automation of one aspect of goal striving

seems to free up cognitive capacity such that other aspects of the focal striving are not compromised, and even can be enhanced (Brandstätter et al., 2001).

The third aspect of potential rigidity concerns whether implementation intention participants refrain from using alternative good opportunities to act toward the goal by insisting on acting only when the critical situation specified in the if-part of the implementation intention is encountered. Several features of if–then plans suggest that such rigid adherence to specified opportunities is unlikely. Because implementation intentions respect the activation and strength of participants' superordinate goal intentions, participants who have formed if–then plans should still be sensitive to the issue of identifying good opportunities to act. Moreover, because action control by implementation intentions is efficient and conserves self-regulatory capability, if–then planners should be in a good position to effectively process information about alternative opportunities, and to seize those opportunities judged suitable for execution of behavior. In sum, implementation intentions do not seem to engender rigid self-regulation in terms of mechanistic situational control, performance trade-offs, or neglecting suitable alternative opportunities to move toward the goal.

Finally, there may be a further fourth issue related to rigidity, this one having to do with how people deal with having acted on a faulty if–then plan. We do not know yet what happens when people recognize that they have formed an if–then plan that failed to lead to goal attainment (or even produced negative outcomes). Do people stubbornly adhere to the faulty if–then plan, or readily modify the if- and then-components of that plan, or do they even completely refrain from forming if–then plans? Also one wonders how the explicitness of the failure feedback and the strength of the respective goal intention affect whether people will adhere to or modify the plan, or stay away from planning altogether.

5. Future Research on If–Then Plans

Although 94 independent tests of implementation intention effects on goal achievement were examined in this chapter, further research is warranted to exploit the benefits of implementation intentions in facilitating goal attainment and to enhance understanding of this mode of action control. Findings from 52 and 21 studies, respectively, showed that implementation intentions facilitated initiation of goal striving and effectively shielded ongoing goal pursuits from unwanted influences. However, there were fewer studies that addressed self-regulatory problems in disengaging from futile goal striving and conserving capability for future goal striving. Even considering the 21 tests to do with the problem of getting derailed, additional studies

would help to corroborate the efficacy of if–then plans in dealing with the various aspects of the respective self-regulatory tasks (i.e., suppressing unwanted responses, blocking detrimental self-states, and blocking adverse contextual influences).

The same reasoning applies to research in different goal domains and using different samples. Most studies to date used laboratory tasks, and there have been relatively few applications to consumer, environmental, antiracist, and prosocial behaviors. Similarly, the 23 tests in relation to health goals predominantly concerned the initiation of health-protective behaviors (e.g., exercise, cancer screening). However, health-risk behaviors, such as smoking, excess alcohol consumption, and poor diet, are major contributors to mortality and morbidity in Western societies (Belloc, 1973; Breslow & Enstrom, 1980). How well implementation intentions can help people to assiduously avoid these actions constitutes an important avenue for future investigation. Previous studies also mainly used undergraduate samples, and although sample type did not generally moderate implementation intention effects, further tests among more representative groups would enhance the generality of the present analysis. The finding that people with chronic problems in action control (e.g., schizophrenics) were especially likely to benefit from implementation intention formation is encouraging and provides grounds for further rigorous tests of if–then planning interventions among other clinical samples (e.g., ADHD children, depressed individuals). More generally, although the present meta-analysis shows that implementation intentions are effective in enabling people to translate their "good" intentions into action, the review also reveals considerable scope for further tests in relation to long-standing self-regulatory problems (e.g., control of pain or stress), under-researched samples (e.g., people with physical illness), and new domains of application (e.g., educational, organizational, and clinical settings). In whatever context people's goal intentions are found to fall short of their goal achievement, applied psychologists might do well to consider deploying if–then plans to promote effective self-regulation of goal striving.

There is also room for further theoretical integration of the concept of implementation intentions with theories of motivation (e.g., Bandura, 1997) and willpower (e.g., Metcalfe & Mischel, 1999). For instance, with respect to motivation, future studies may want to explore whether implementation intentions can be used to elevate self-efficacy beliefs (e.g., "And if I run into problems with any of my homework, then I will tell myself 'I can do it!' "). With respect to willpower, implementation intentions can be used to turn off the hot system and activate the cool system when self-control is needed. For example, a person who wants to cope better with unpleasant social encounters could use implementation intentions to reduce feelings of frustration

and anger (e.g., "And if I run into an obnoxious person, then I will try to understand this person as if I was a therapist!"). What distinguishes this approach from past research on implementation intentions is the fact that the then-component of the if–then plan does not specify one particular goal-directed response, but rather focuses on changing motivation-relevant beliefs and/or self-regulatory systems that can ultimately facilitate the performance of multiple and various goal-directed responses.

The present review obtained strong support for the component processes postulated to underlie implementation intention effects. Implementation intentions showed large effects on processes to do with heightened activation of the critical situation (accessibility, detection, discrimination, attention, memory) and automation of the goal-directed response (immediacy, efficiency, redundancy of intent). However, it would be valuable to conduct mediation analyses to explore whether these processes are indeed responsible for the positive effects of implementation intention formation on rates of goal achievement. One study that conducted this type of analysis measured the accessibility of situational cues specified in participants' if–then plans in a lexical decision task and subsequently measured rates of goal attainment (Aarts et al., 1999). Findings indicated that cue accessibility mediated the impact of implementation intention formation on goal completion. Recently, Webb and Sheeran (2005c) extended this paradigm to investigate the mediational role of both cue accessibility and the strength of cue–response links forged by if–then planning. In one experiment, participants had the goal intention to collect a coupon from a specified location as part of a series of laboratory tasks. A subset of participants also formed an implementation intention that specified the location for collecting the coupon in the if-component and the action of coupon collection in the then-component. Subsequently, an ostensibly unrelated lexical decision task had to be performed that assessed the accessibility of the critical cues (location words) and the accessibility of the target behavior when subliminally primed by the critical cues (i.e., the word "collect" preceded by location words). Findings indicated that implementation intention formation increased the rate of coupon collection (goal achievement) as well as the accessibility of both location cues and location-primed target behavior (i.e., the strength of the link between the if- and then-components of the plan). Most important, implementation intention effects on goal attainment were mediated by cue accessibility as well as the strength of respective cue–response links. These findings are consistent with the postulated theoretical mechanisms. Further tests are needed to explore the mediational role of the other hypothesized processes (e.g., immediacy, efficiency, and redundancy of conscious intent), however.

Moderators of implementation intention effects also warrant investigation. There are two aspects to moderation here. First, individual differences could

either enhance or reduce the impact of implementation intentions on goal achievement. Individuals with personal attributes that make regulating their behavior more difficult, for instance, might especially benefit from implementation intention formation. Thus, people who score highly on measures of procrastination, distractability, or self-defensiveness may show higher rates of goal attainment when they form if–then plans compared to people who obtain low scores on these measures. On the other hand, individuals who spontaneously form implementation intentions may garner less advantage from inductions designed to prompt plan formation. Individual differences in conscientiousness, planfulness, or need for cognition could predict spontaneous if–then planning. It is also possible that individual difference variables could be identified that render if–then planning counterproductive. For instance, people who are poor at reality monitoring could form plans that are antithetical to effective goal striving. Similarly, people who set too much store by adherence to plans (e.g., perfectionist individuals) may be prone to self-evaluative ruminations that undermine the effective operation of their plans. Thus, standard individual difference variables could have an important influence on whether and how well implementation intentions are formed and how much of an effect they have on goal achievement.

If one conceives of personality in terms of "intra-individually stable, if...then..., situation–behavior relations" (Mischel & Shoda, 1995, p. 248), the question of how personality and if–then planning work together in the self-regulation of goal striving may get even more interesting. Let us assume that a person has the goal to reduce aggression in relating to others, and he also knows about his respective situation–behavior profile (i.e., he knows what kind of social situations elicit aggressive responses in him and which social situations allow him to stay calm and collected). Given this goal and knowledge, the person can now tailor his implementation intentions to those critical situations specifying any of the following goal-directed responses: "...then I will not get aggressive!" or "...then I will stay calm and collected!" or "...then I will ignore this situation!" Thus, it seems possible that people could maximize the self-regulatory benefits of forming implementation intentions by taking into account their unique chronic if–then (situation–behavior) profiles and specify implementation intentions exactly where they are needed. Exploring interactions between chronic and strategic situation–behavior links constitutes a promising direction for future studies.

The second aspect of moderation concerns degree of plan formation and refers both to the activation level of the if- and then-components of the plan and to the strength of the mental link between the if-component and the then-component of the plan. These features of implementation intentions are responsible for the enhanced identification of specified contextual cues and

automated action control in the presence of these cues, thus determining how well if–then plans facilitate goal attainment. The implication of variations in degree of plan formation is that procedures that enhance the activation level of critical cues or the strength of cue–response associations should thereby increase the impact of implementation intentions on goal striving and goal completion. To date, only a small number of studies have tested this aspect of moderation. For instance, Gollwitzer et al. (2004a) manipulated the strength of participants' commitment to their implementation intentions presuming to thereby strengthen cue–response links. Findings from a cued recall paradigm showed that the high commitment group had superior memory for selected opportunities compared to the low commitment group. Similarly, Milne and Sheeran (2002c) manipulated cognitive rehearsal by having some participants concentrate on the cue–response link during plan formation; participants wrote down their plan to visit a particular website twice, and were instructed to concentrate on the link between the situation and action when they were writing the plan the second time. Another implementation intention group also wrote down their plan twice, but were instructed to take the second write-up of the plan with them and put it in a prominent place at home as a reminder. Findings indicated that participants who rehearsed the cue–response link were more likely to act on their plans compared to both participants who wrote their implementation intention on a reminder note and a control group who did not form implementation intentions (rates of visiting the Web site were 87%, 40%, and 20%, respectively).

Future studies should examine the effectiveness of strategies to aid encoding of if–then plans (e.g., different types of cognitive rehearsal, surprise recall tasks or plan reminders) and strategies to increase commitment to these plans (e.g., inducing anticipated regret about not following one's plan or making one's commitment public) in order to ensure that opportunities are highly accessible and opportunity–action links are strong. Some individuals are likely to be more in need of such strategies than others because people differ in their ability to generate strong if–then links when asked to form implementation intentions (Gollwitzer, Grant, & Oettingen, 2004b). But even if people's original if–then links are weak, it seems possible to strengthen these links by having people act repeatedly on their implementation intentions. Research by Orbell and Verplanken (2005) observed that whenever participants performed repeated actions (e.g., flossing one's teeth) on the basis of an implementation intention, they reported experiencing features of habitual action control (e.g., I do it without thinking, I start doing it before I realize I'm doing it, I do it automatically, I do it without having to think consciously, It would require effort not to do it, ...) more so than participants who performed the repeated action on the basis of a mere goal intention. Further research along these lines would be valuable in order to

ensure that implementation intentions are as effective as possible in facilitating the realization of goal intentions for particular people.

V. Conclusions

Goal intentions are not always successfully translated into behavior because merely making a commitment to attain a goal does not necessarily prepare people for dealing effectively with self-regulatory problems in goal striving. This chapter tested the idea that goal striving could benefit from a second act of willing—the formation of if–then plans—that focuses on the enactment of goal intentions. A meta-analysis of 94 studies showed that forming an implementation intention makes an important difference to whether or not people achieve their goals. This finding was robust across variations in study design, outcome measurement, and domains of goal attainment. Moreover, if–then planning facilitated goal striving no matter what self-regulatory problem was at hand. Medium-to-large effects were obtained in relation to initiating goal striving, shielding goals from unwanted influences, disengaging from failing goals, and preserving self-regulatory capability for future goal striving. There was also strong support for the if–then component processes. People who form implementation intentions are in a good position to recognize opportunities to act and respond to these opportunities swiftly and effortlessly. Thus, this chapter shows that the concept of implementation intentions is valuable both in understanding the processes of goal attainment and in providing a self-regulatory strategy to help people reach their goals. Notwithstanding the self-regulatory benefits of implementation intentions demonstrated here, there is considerable scope for further research to exploit the potential of if–then planning and to understand how implementation intentions can best be deployed to facilitate intention realization. Such research would seem to be a worthwhile goal pursuit for both basic and applied psychologists.

Acknowledgments

Appendix I

EXAMPLES OF POSSIBLE IMPLEMENTATION INTENTIONS GEARED AT RESOLVING THE FOUR PROBLEMS OF GOAL STRIVING

1. Failing to get started
   a. Remembering to act
      To achieve the goal intention of sending a birthday card on time: *And if I walk by the institute's mail box, then I will drop in my card!*
   b. Seizing opportunities
      To achieve the goal intention of complaining about poor service: *And if I see the manager walk into the restaurant, then I will go over to him and complain about the poor service!*
   c. Overcoming initial reluctance
      To achieve the goal intention of completing course work on time: *And if it is Saturday morning at 10 a.m., then I will sit down at my computer and make an outline for my essay!*

2. Getting derailed
   a. Suppressing unwanted attention responses
      To achieve the goal intention of behaving calmly in the face of scary spider pictures: *And if I see a spider, then I will ignore it!*
   b. Suppressing unwanted behavioral responses
      To achieve the goal intention of behaving calmly in the wake of being insulted: *And if I feel my anger rise, then I will tell myself to stay calm and not aggress back!*
   c. Blocking detrimental self-states
      To block the negative influence of ego-depletion on solving difficult anagrams: *And if I have solved one anagram, then I will immediately move onto the next one!*
   d. Blocking adverse contextual influences
      To block the negative influence of loss framing on negotiation outcomes when having to share an attractive commodity (e.g., a fictitious island in the Lake of Constance): *And if I receive a proposal on how to share the island, then I will offer a cooperative counterproposal!*

3. Not calling a halt

   To prevent escalation of commitment to a certain strategy of performing a general knowledge test: *And if I receive disappointing feedback, then I will switch to a different strategy!*

4. Overextending oneself

   To prevent the emergence of ego-depletion in the wake of controlling one's emotions, such as not laughing at amusing cartoons: *And if an amusing scene is presented, then I will tell myself "these are just stupid, silly jokes!"*

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