

# Journal of Personality and Social Psychology

## **Consider It Done! Plan Making Can Eliminate the Cognitive Effects of Unfulfilled Goals**

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Online First Publication, June 20, 2011. doi: 10.1037/a0024192

### CITATION

Masicampo, E. J., & Baumeister, R. F. (2011, June 20). Consider It Done! Plan Making Can Eliminate the Cognitive Effects of Unfulfilled Goals. *Journal of Personality and Social Psychology*. Advance online publication. doi: 10.1037/a0024192

# Consider It Done! Plan Making Can Eliminate the Cognitive Effects of Unfulfilled Goals

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Unfulfilled goals persist in the mind, as asserted by ample theory and evidence (e.g., the Zeigarnik effect). The standard assumption has been that such cognitive activation persists until the goal is fulfilled. However, we predicted that contributing to goal pursuit through plan making could satisfy the various cognitive processes that usually promote goal pursuit. In several studies, we activated unfulfilled goals and demonstrated persistent goal activation over time. Unfinished goals caused intrusive thoughts during an unrelated reading task (Studies 1 and 5B), high mental accessibility of goal-related words (Studies 2 and 3), and poor performance on an unrelated anagram task (Study 4). Allowing participants to formulate specific plans for their unfulfilled goals eliminated the various activation and interference effects. Reduction of the effects was mediated by the earnestness of participants' plans: Those who ultimately executed their plans were those who also exhibited no more intrusions (Study 4). Moreover, changes in goal-related emotions did not appear to be a necessary component of the observed cognitive effects (Studies 5A and 5B). Committing to a specific plan for a goal may therefore not only facilitate attainment of the goal but may also free cognitive resources for other pursuits. Once a plan is made, the drive to attain a goal is suspended—allowing goal-related cognitive activity to cease—and is resumed at the specified later time.

*Keywords:* goal pursuit, self-regulation, plan making, motivation

*Supplemental materials:* <http://dx.doi.org/10.1037/a0024192.supp>

The human mind is remarkably well designed for goal pursuit. Attention (Moskowitz, 2002), perception (Bruner & Goodman, 1947; Lambert, Solomon, & Watson, 1949; Maner et al., 2005), thoughts (Klinger, 1977), and attitudes (Ferguson & Bargh, 2004) all become tuned to help one pursue a goal. The mind vigorously promotes this intense focus on a goal, protecting it from distractions (Shah, Friedman, & Kruglanski, 2002) and resuming it after it has been interrupted (Wicklund & Gollwitzer, 1981). Even when one is not consciously working toward a goal, the mind keeps the goal active in the unconscious (Klinger, 1975; Zeigarnik, 1927), maintaining vigilance for opportunities to fulfill it (Goschke & Kuhl, 1993; Moskowitz, 2002).

Thus, once a goal is chosen, the mind has many processes to promote its pursuit. At what point do these subside? The obvious answer is that they cease when the goal is attained. This has been favored in theories of goal pursuit (Klinger, 1975) and has found support in empirical research (Förster, Liberman, & Higgins,

2005). However, the present investigation tested the hypothesis that many goal promotion processes cease long before attainment, in particular, when a plan is made.

Planning has been studied recently in the form of implementation intentions, which are highly specific prescriptions for what to do under what circumstances (Gollwitzer, 1999). Such plans turn control of goal pursuit over to automatic, unconscious processes, which can resume goal pursuit at the appropriate time or place specified in the plan. Once a plan is made, the unconscious knows how and when to act, and so in a sense the uncertainty of the unfinished task is resolved. The implication for the current work is that a plan may render many of the cognitive activities related to the goal unnecessary. We hypothesized that making a plan for a goal would therefore stop various goal-related cognitive processes, even though the goal remains unfulfilled.

## Making Plans for Action

If most human behavior were guided by one or two goals, it might be effective for mental processes to promote each goal until attainment. But at any given time, the average North American student reports 15 ongoing personal projects (Little, 1988), not to mention the more short-term goals, such as getting dressed and brushing teeth. Even if the unconscious mind has the capacity to promote all 15 goals simultaneously (Dijksterhuis, Aarts, & Smith, 2005), the limited resources of the executive function cannot pursue multiple goals at once (James, 1890). Even more important, when the executive is working toward one goal, it cannot function effectively if it is frequently bombarded with distracting reminders

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This research was supported in part by a grant from the Templeton Foundation. Thanks to Teresa Chimienti, Samantha Fisch, Kaylla Futch, Shaun Harkin, Mike Hoesten, Kelsey Muldoon, Maggie Murphy, Jessica Patz, Allison Ross, Kayla Sedgwick, Erin Sweeney, and Chris Thorstenson for their suggestions and help with data collection.

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of the other 14 (Masicampo & Baumeister, 2011). This creates a dilemma: How can the person pursue multiple goals despite the limited resources of the executive function?

One elegant solution to the action control dilemma has been proposed by Gollwitzer and his associates (Gollwitzer, 1999; Gollwitzer & Schaal, 1998). Essentially, the effortful control of goal pursuit can be ended by passing control over to automatic responses linked to situational cues. The crucial step in this transfer is the formation of a specific behavioral plan, often in the form of “if [or when] *X* happens, I will do *Y*.” Many studies have confirmed that such plans produce much more favorable and reliable outcomes than broad intentions to pursue a goal (Gollwitzer & Sheeran, 2006; Webb & Sheeran, 2006).

The inclusion in one’s plans of how, when, and where one will act is crucial if a plan is to produce the benefits revealed in prior work (e.g., Gollwitzer, 1999). As stated above, specific plans work well because they transfer control of goal pursuit to the automatic system. In order for that transfer to occur, the automatic system must know how and when to respond. Inclusion of such information allows plans to be executed even if mental resources are low (Webb & Sheeran, 2003) or one is distracted (Brandstätter, Lengfelder, & Gollwitzer, 2001). A specific plan is like a script that a person can follow mindlessly to completion.

### Post-Plan Reductions in Goal-Related Cognition

Because plans are executed without requiring much care or effort, we expected that many of the cognitive processes that serve goal pursuit might be reduced after plans are made. Indeed, if those various cognitive processes are no longer necessary, they may cease altogether. If so, that would reveal one exception to the notion that unfulfilled goals remain active in the mind until completion or disengagement (Förster, Liberman, & Friedman, 2007; Förster et al., 2005; Klinger, 1975; Martin & Tesser, 1989). The core hypothesis for the present work was therefore that much of the cognitive activity associated with goals may cease once a plan is made, even though the goal remains unfulfilled.

The hypothesis that planning reduces goal-related cognition is highly counterintuitive, because a plan brings the goal closer to fruition, and many accounts have assumed that goal focus increases as one approaches fulfillment (Lewin, 1935; Miller, 1944). A semantic spreading account is also consistent with the hypothesis that a plan could increase the goal’s influence. Elaborating on a goal by making a plan should, if anything, make the goal more active and accessible in the mind (Craig & Lockhart, 1972).

Yet the reduction in cognitive activity seems precisely the function of forming specific plans. If the mental apparatus is to function effectively at pursuing multiple goals with limited cognitive resources, then it is imperative to reduce cognitive work on some goals well before they are attained. Once a plan is formed, the need to search for means to reach that goal is sharply reduced. One needs only to watch for the already identified circumstances for implementing the plan (e.g., Webb & Sheeran, 2007). Most cognitive resources can profitably be redirected to other pursuits.

### The Present Research

In several studies, we activated unfulfilled goals and examined the extent to which those goals persisted in the mind, remaining

active in memory and intruding during subsequent tasks. We examined whether thoughts of unfulfilled goals intruded during reading tasks (Studies 1 and 5B), remained highly accessible in memory over time (Studies 2 and 3), and interfered with performance on a problem-solving task that was unrelated to the goal (Study 4). In each study, we also examined whether the various goal-related effects were eliminated by allowing participants to form plans for their goals.

Our emphasis was on highly specific plans of action, which facilitate goal pursuit much more than do broad, generic intentions (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997). Therefore, in each of the present studies, we asked participants to commit to plans that specified how, when, and where they would attain their goals.

The present work also examined various aspects of the mechanism underlying the hypothesized effects. We predicted that plans would cause goal activation to cease because control of goal pursuit is passed over to the automatic system. If that is true, reductions in goal activation should occur specifically among people who ultimately execute their plans, a pattern that we tested in Study 4. Moreover, some theories of goal accessibility posit a tension that keeps unfulfilled goals active in the mind (e.g., Lewin, 1935), and so we examined whether a reduction in such tension (i.e., anxiety) after plans are made might contribute to changes in cognition (Studies 5A and 5B). Together, the six studies sought to examine and clarify the effect of plans on goal-related cognitive activity. The main hypothesis was that plans would drastically reduce the cognitive activity that typically accompanies unfulfilled goals.

### Study 1: Eliminating Intrusive Thoughts

Study 1 served as an initial test of the hypothesis that making a plan for a goal could eliminate thoughts of unfulfilled goals (akin to Zeigarnik intrusions) and their side effects. First, we activated unfulfilled goals and sought to show that thoughts of those goals would intrude during a later reading task, thereby reducing reading comprehension. The novel hypothesis was that allowing participants to make plans for their unfulfilled goals would eliminate those effects.

Participants wrote about two important tasks that they needed to complete. Some participants then formed a plan to fulfill those. In a control condition, participants wrote about tasks that they had recently completed. During a later reading task, we assessed mind wandering, defined as the tendency to attend to matters unrelated to a current task, with a paradigm adapted from Smallwood, McSpadden, and Schooler (2008). We also obtained self-reports of intrusive goal-related thoughts and conducted a test of reading comprehension. We predicted that participants writing about unfulfilled tasks would exhibit more intrusive thoughts about those tasks, more mind wandering, and less reading comprehension than would control participants. The more novel prediction was that formation of plans for completing the unfulfilled tasks would eliminate those effects. In that condition, then, reading performance would be good and would not be perturbed by intrusive thoughts of the unfulfilled goals.

## Method

Participants were 73 undergraduates (49 women,  $M_{\text{age}} = 19.2$  years,  $SD_{\text{age}} = 1.71$ ) who arrived at the lab individually for a study dealing ostensibly with two different topics: daily tasks and reading comprehension. All tasks and instructions were administered on a computer through MediaLab (Jarvis, 2008). Each participant was randomly assigned to one of three conditions: unfulfilled tasks, plan, or control. In the unfulfilled tasks condition, participants were asked to think of two tasks or errands that they needed to complete. They were asked to select tasks that were important, needed to be completed in the next few days, and were not a part of their regular routine (i.e., they did not complete them on a daily or weekly basis). In addition, it was indicated that they should not yet know when, where, or how they would complete the tasks. Participants described the two tasks, explained their importance, and indicated what would happen if they did not complete them. Participants also indicated the importance of completing each task on a scale from 1 (*not at all important*) to 7 (*very important*).

The plan condition was identical to the unfulfilled tasks condition except that participants were asked to make plans to complete each task. Participants were asked to indicate in detail how, when, and where they would complete the tasks. Participants in the unfulfilled tasks condition and the plan condition indicated to what extent they expected to be able to complete each task on scales from 1 (*not at all expect*) to 7 (*very much expect*). We calculated the average expectation of the two tasks for each participant. An independent samples  $t$  test indicated no significant difference in expectations between the unfulfilled tasks group ( $M = 6.28$ ,  $SD = 0.75$ ) and the plan group ( $M = 6.28$ ,  $SD = 0.65$ ,  $t < 0.1$ ,  $p = .98$ ).<sup>1</sup>

The control condition was similar to the unfulfilled tasks condition except that participants were asked to describe two tasks that they completed in the last several days. All instructions in that condition were therefore in the past tense (e.g., “What would have happened if you did not complete the tasks?”). As in the unfulfilled tasks and plan conditions, control participants indicated the importance of completing each task. We calculated the average importance of the two tasks for each participant. An analysis of variance (ANOVA) indicated no significant variation in task importance between the unfulfilled tasks group ( $M = 6.04$ ,  $SD = 0.99$ ), the plan group ( $M = 6.50$ ,  $SD = 0.62$ ), and the control group ( $M = 6.32$ ,  $SD = 0.96$ ,  $F < 1.4$ ,  $p = .26$ ).

All participants then completed a reading comprehension task for which they read the first 3,200 words of *The Case of the Velvet Claws* by Erle Stanley Gardner. This task was adapted from previous work on mind wandering (Smallwood et al., 2008). The experimenter told participants that they would be reading a text from a popular novel and that they would later answer questions about the plot. The experimenter asked participants to focus all of their attention on the task, but the experimenter acknowledged that people often zone out while reading. The experimenter told participants that they would be asked about their attention at various points throughout the task. Participants were told that they would occasionally see a prompt asking them to indicate whether their attention had wandered from the story. Participants familiarized themselves with a sample prompt so that, during the actual task, they could answer it quickly and return to the reading. The prompt asked “Prior to the appearance of this screen, was your attention on- or off-task?” One response option stated “I was reading the

text and was very much paying attention to the story.” A second response stated “I was reading the text, but my attention was elsewhere.”

Participants read one word at a time, moving to the next word by hitting the space bar. Prompts appeared four times to assess whether participants’ attention had wandered from the story. After the reading, participants indicated on scales from 1 (*not at all*) to 7 (*very*) how well they were able to focus on the story and to what extent they were distracted by thoughts of the tasks they had written about earlier. Participants also answered eight reading comprehension questions (see online supplementary material). After participants filled out a demographics sheet, they were probed for suspicion with a funneled debriefing procedure. The experimenter explained the nature of the study and dismissed participants from the lab.

## Results

Four participants suspected that the two parts of the study were related. Each guessed that our prediction was that writing about unfinished tasks would distract them during the reading. Those participants were excluded, thus leaving 69 participants in the final analysis.

The tasks and errands that participants described were similar across the three experimental conditions. The various types of tasks along with examples are available in the online supplementary material. There was no significant variation across the three conditions in prevalence of any of the five types of tasks ( $\chi^2_s < 3.06$ ,  $ps > .21$ ). Hence, the types of tasks that participants described did not differ by condition.

**Zeigarnik intrusions, focus, and mind wandering.** The main measure of activation from unfulfilled goals was the extent of participants’ Zeigarnik intrusions: Participants reported to what extent they were distracted during the reading by thoughts of the tasks they had written about earlier. Results from an ANOVA revealed a significant effect of condition on self-reported intrusive thoughts,  $F(2, 68) = 4.67$ ,  $p = .013$ ,  $\eta_p^2 = .13$ . A planned comparison indicated that participants in the unfulfilled tasks group reported being significantly more distracted by task-related thoughts ( $M = 3.00$ ,  $SD = 1.90$ ) than did participants in the control group ( $M = 1.82$ ,  $SD = 1.44$ ),  $F(1, 66) = 7.46$ ,  $p < .01$ ,  $\eta_p^2 = .10$ . Those in the plan group reported significantly fewer task-related thoughts ( $M = 1.77$ ,  $SD = 1.06$ ) than did those in the unfulfilled tasks group,  $F(1, 66) = 6.41$ ,  $p = .014$ ,  $\eta_p^2 = .09$ . There was no difference between those in the plan group and those in the control group ( $F < 0.01$ ,  $p = .93$ ). Forming plans for one’s tasks thus eliminated Zeigarnik intrusions.

<sup>1</sup> That plans did not affect goal-related expectations replicates findings in previous research. Planning has been found to have no effect on how confident people are that they will attain their goals, people’s attitudes toward the goals, and to what extent people endorse the intention to attain the goals (Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 1999; Sheeran, Webb, & Gollwitzer, 2005; Webb & Sheeran, 2008). The conclusion from such findings has been that specific plans facilitate success not by altering feelings, attitudes, motivations, or expectations but rather by creating automatic, goal-directed responses to situational cues. The key component is thus one of preparation rather than expectation.

We also measured to what extent people reported being able to focus on the reading. A planned comparison indicated that the difference between the unfulfilled tasks and control groups was approaching significance,  $F(1, 66) = 2.70, p = .11, \eta_p^2 = .04$ , so that those in the unfulfilled tasks group were less able to focus ( $M = 4.61, SD = 1.70$ ) than those in the control group ( $M = 5.29, SD = 1.56$ ). An additional comparison indicated a significant difference between the unfulfilled tasks and plan groups,  $F(1, 66) = 4.22, p = .044, \eta_p^2 = .06$ , so that participants in the plan group were significantly more able to focus ( $M = 5.56, SD = 0.86$ ) than those in the unfulfilled tasks group.

Participants were categorized according to whether their minds had wandered at some point during the reading task, as indicated by at least one mind-wandering response across the four prompts. A chi-square that included only the unfulfilled tasks and plan groups was significant,  $\chi^2(1) = 4.11, p = .043$ , indicating that more participants in the unfulfilled tasks group (65.2%) than in the plan group (33.3%) mind wandered. Neither group differed significantly from the control group (50%;  $\chi^2s < 1.25, ps > .26$ ).

The total number of mind-wandering reports out of four was compared between groups. A planned comparison between the unfulfilled tasks and plan groups approached significance,  $F(1, 66) = 2.79, p = .10, \eta_p^2 = .04$ , such that participants in the unfulfilled tasks group exhibited marginally more instances of mind wandering ( $M = 1.49, SD = 1.31$ ) than did participants in the plan group ( $M = 0.78, SD = 1.22$ ). Neither of those groups differed significantly from the control group ( $M = 1.25, SD = 1.48, Fs < 1.4, ps > .25$ ).

**Reading comprehension.** The total number of correct responses out of eight served as the dependent measure of reading comprehension. ANOVA results revealed a significant effect of condition on number of correct responses,  $F(2, 68) = 3.93, p = .024, \eta_p^2 = .11$ . A planned comparison indicated that participants in the unfulfilled tasks group answered significantly fewer questions correctly ( $M = 6.13, SD = 1.46$ ) than did participants in the control group ( $M = 6.93, SD = 0.94$ ),  $F(1, 66) = 6.37, p = .014, \eta_p^2 = .09$ . Even more important, those in the plan group performed significantly better ( $M = 6.94, SD = 0.87$ ) than those in the unfulfilled tasks group,  $F(1, 66) = 5.29, p = .025, \eta_p^2 = .07$ . There was no difference in performance between the plan group and the fulfilled tasks group ( $F < .01, p = .96$ ). Plans thus eliminated the interference in reading comprehension that was caused by reflecting on unfulfilled tasks.

**Mediation analysis.** We tested whether Zeigarnik intrusions mediated the effect of the manipulation on reading comprehension. As noted above, participants in the control and plan groups differed neither in reading comprehension nor in reports of intrusive thoughts. To simplify the mediation analyses, we therefore collapsed across those two conditions, comparing them with the unfulfilled tasks condition.<sup>2</sup> Regression analyses indicated that condition predicted both intrusive thoughts,  $b = 1.20, t(67) = 3.08, p < .01$ , and reading comprehension,  $b = -.80, t(49) = 2.82, p < .01$ . In addition, intrusive thoughts, the mediating variable, predicted reading comprehension,  $b = -.312, t(49) = -3.90, p < .001$ . When the measure of intrusive thoughts was included simultaneously with condition in the regression model, the effect of condition on reading comprehension was no longer significant,  $b = -.49, t(68) = -1.72, p = .09$ . A Sobel test (Sobel, 1982) confirmed that the effect of condition on reading

comprehension was fully mediated by intrusive task-related thoughts ( $z = -2.41, p = .016$ ; see Figure 1).

## Discussion

Participants who reflected on two important but unfinished tasks were distracted during a later attempt to read a novel. They were more bothered by intrusive thoughts of their incomplete tasks than were control participants, and their reading comprehension suffered as a result. Thus, we replicated persistent activation from unfulfilled goals in the context of Zeigarnik intrusions and interference with reading comprehension.

More important, these impairments were eliminated among other participants who also reflected on their unfinished tasks but then made plans to complete them. Those participants reported no more intrusive thoughts than control participants, who had reflected on tasks they had already completed. Moreover, participants who made plans were better able to focus, exhibited fewer instances of mind wandering, and comprehended more of the reading passage than participants who did not plan for their tasks.

These findings lend initial support to the notion that forming a plan can eliminate cognitive activity from unfulfilled goals. By specifying how, when, and where they would complete their unfinished tasks, participants eliminated the disturbing and intrusive thoughts that can result from unfulfilled goals. It is noteworthy that neither those in the unfulfilled tasks condition nor those in the plan condition had reached their goals or done any actual (i.e., material) work toward attaining them. Still, planned (rather than actual) progress was sufficient to eliminate the goal-related intrusions.

## Study 2: Eliminating the Persistent Accessibility of the Goal

In Study 2, we sought further evidence of reductions in cognitive activity from unfulfilled goals. The study examined goal-related activity in terms of accessibility in memory rather than intrusive thoughts. We sought to show that making a specific plan could counteract the increase in goal accessibility associated with unfulfilled goals.

The incomplete goal to do well on an upcoming exam was activated, and we expected that the goal would remain accessible in memory after a delay and during an ostensibly unrelated task (Förster et al., 2005). Some participants, however, were asked to form a specific plan to do well on the exam. The prediction was that goal accessibility would be high among participants who reflected on the upcoming exam but not among those who made a plan.

A contrary prediction could be made on the basis of simple accessibility. Thinking about the upcoming test would make it

<sup>2</sup> We also conducted the mediation analyses without collapsing across plan and control conditions. Those analyses required focusing only on two conditions at a time. A mediation analysis focusing only on the plan and unfulfilled tasks conditions was marginally significant ( $z = 1.86, p = .064$ ). A mediation analysis focusing only on the control and goal conditions was significant ( $z = -2.02, p = .043$ ). Therefore, intrusive thoughts fully mediated (or nearly fully mediated) the effect of plan making on reading comprehension, regardless of the comparison group.

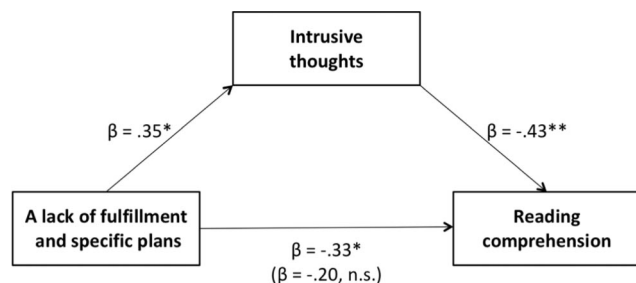


Figure 1. The lack of reading comprehension among participants in the unfulfilled tasks group (relative to those in the plan and control groups) was fully mediated by intrusive thoughts of the unfulfilled tasks. Standardized regression coefficients are reported. n.s. = nonsignificant. \*  $p < .05$ . \*\*  $p < .01$ .

salient and therefore increase its accessibility. Making a plan should constitute even more thinking about the exam and therefore might increase its accessibility further. Our expectation, however, was that plan making would decrease accessibility. The prediction was thus based on the assumption that making a plan is different from other sorts of thinking.

## Method

Sixty-eight undergraduates (47 women,  $M_{\text{age}} = 18.8$  years,  $SD_{\text{age}} = 1.36$ ) were randomly assigned to one of three questionnaire conditions: goal, plan, or control. The study was run 2 weeks before final examinations. Participants in the goal and plan conditions completed a questionnaire asking them to describe what they considered to be their most important upcoming final exam. Participants described the exam's format, the topics to be covered in the exam, and when the exam was scheduled. Participants responded to the item "How important is it to you that you do well on this exam?" on a scale that ranged from 1 (*not at all*) to 7 (*very*). Participants in the goal group ( $M = 6.78$ ,  $SD = 0.42$ ) and the plan group ( $M = 6.78$ ,  $SD = 0.43$ ) rated the goal to do well on the exam as very important. Participants in the plan condition were then instructed to form a plan for the goal. They were asked to specify what they would do to ensure a satisfactory performance on the exam and when and where they would do it.

Participants in the control condition described the social events they would be attending in the coming weeks and answered questions about the event they felt most obligated to attend. As a filler and distracter task, all participants then wrote for several minutes about what they do during a typical weekday.

Accessibility of the goal was measured with a word completion task. Participants were presented with a list of 12 incomplete words, with instructions to complete each one by replacing the blank spaces with letters. Each item had multiple answers, and three of the items could be solved either with a word related to doing well on an exam or with a neutral word. Higher accessibility of thoughts pertaining to the upcoming test would presumably be reflected in producing more solutions relevant to earning a good grade on the test. The words of interest were *test* (TE \_ T), *exam* (EX \_ \_), and *grade* (GRA \_ E). All participants worked on the word completion task, completed a demographics form, and were debriefed and dismissed from the study.

## Results

Total number of responses related to doing well on a final exam served as the dependent measure of goal accessibility. A one-way ANOVA indicated significant variation among the three conditions,  $F(2, 67) = 6.58$ ,  $p < .01$ ,  $\eta_p^2 = .17$ . A planned comparison indicated that participants in the exam condition created more goal-related words ( $M = 1.96$ ,  $SD = 0.97$ ) than did participants in the control condition ( $M = 1.04$ ,  $SD = 0.76$ ),  $F(1, 65) = 13.08$ ,  $p < .001$ ,  $\eta_p^2 = .17$ . More important, participants in the plan condition created fewer exam-related responses than did participants in the goal condition ( $M = 1.39$ ,  $SD = 0.98$ ),  $F(1, 65) = 4.05$ ,  $p = .048$ ,  $\eta_p^2 = .06$ . The plan condition did not differ significantly from the control condition ( $F < 1.7$ ,  $p = .20$ ), and so goal accessibility did not appear to persist over time for participants who formed a plan for the goal.

## Discussion

Reflecting on the unfulfilled goal to do well on an exam caused that goal to remain highly accessible in memory over time. However, making a specific plan to meet the goal eliminated that effect. Those in the plan group showed no evidence of heightened goal-related accessibility. Indeed, participants in the plan group were not different in that regard from control participants who wrote about an upcoming social event. These data provide converging evidence that making a plan can eliminate cognitive activity from unfulfilled goals.

Making a plan is thus different from other forms of thought. Thinking about the exam in general heightened its accessibility. But when such thinking was followed by making a specific plan, the accessibility went back down. Standard models of accessibility might well have predicted the opposite result. After all, planners thought more about their goal than did nonplanners. Yet the additional thinking involved in making a plan led to a reduction in accessibility. Plan making may thus be a distinct and unusual kind of thinking that allows a person to move past (rather than dwell on) personal tasks and goals.

### Study 3: Eliminating the Persistent Accessibility of Goal Means

Study 3 measured the persistent accessibility of various means of attaining an unfulfilled goal. This innovation allowed us to test an alternative explanation for the results in Study 2. Our preferred explanation was that plans reduced thoughts about an unfulfilled goal. An alternative explanation, however, is that plans simply caused people to think about the goal in a different way. Plans could have caused people to focus on goal execution rather than their desire to fulfill the goal. Thus, plan making could have caused participants to focus on goal-related actions (e.g., Trope & Liberman, 2003; Vallacher & Wegner, 1987) rather than the goal itself. That possibility was not ruled out in Study 2 because, although it examined words related to the broader goal (*grade*, *exam*, and *test*), it did not examine goal-related actions (e.g., *read* or *study*). Study 3 therefore focused on accessibility of means to attain an unfulfilled goal. If both the desired end state (Study 2) and potential means for attaining it (Study 3) become less acces-

sible after a plan is made, that would imply that plans reduce overall attention to unfulfilled goals.

Study 3 was also designed to address and rule out a potential alternative explanation for its anticipated results. We predicted that participants who made a plan for a goal, relative to those who made no plan, would exhibit less accessibility of goal-related actions. Our reasoning was that the person no longer needs to think about the goal once a plan is made. An alternative explanation for the expected results could be that participants who plan for a goal simply become more narrow-minded in their pursuit. That is, they become focused on a single means and ignore all others.

Prior work has shown that, after a person commits to a means for attaining a goal, the mind becomes more focused on that means and inhibits thoughts of alternative means (a process termed *goal shielding*; Shah et al., 2002). A person who is studying in the library in order to do well on an exam automatically inhibits thoughts of alternative actions (e.g., hiring a tutor), which would otherwise be an unnecessary distraction. It is possible that people who plan for a goal exhibit the same goal-shielding pattern. They may become more focused on the means they plan to pursue while inhibiting alternatives. If so, that would contradict our hypothesis that a plan reduces accessibility of a goal. Instead, it suggests that the accessibility of the goal simply becomes more narrowly focused. The implications of the two explanations are quite different. Our hypothesis is that, once a plan to fulfill a goal is made, the goal is exerting much less of an influence on a person's attention. The goal-shielding explanation implies that the mind is still very much attending to the goal, albeit by focusing on a specific goal-related action.

The present study was designed so that predictions made by the goal-shielding explanation and those made by our preferred explanation would diverge. We measured in those in the plan group the accessibility of both the focal means (i.e., the one chosen in the plan) and a number of alternative means. Our prediction was that planners, relative to nonplanners, would show a uniform reduction in accessibility of all goal means. The goal-shielding explanation, in contrast, would predict heightened accessibility of the focal means and reduced accessibility of alternatives. We tested for both patterns of activation.

Two additional innovations were included. One was to examine importance of the goal. Previous research has found that the psychological effects of a goal are strongest among people who value the goal highly (for a review, see Förster et al., 2007). Indeed, both the tendency for incomplete goals to intrude into the mind (Marrow, 1938a, 1938b; Zeigarnik, 1938) and the benefits of plan making (Sheeran, Webb, & Gollwitzer, 2005) are moderated by goal importance. In the present study, we examined the goal to exercise, and we expected that the effects of our manipulations would be specific to those for whom the goal was important.

A second innovation was to include a measure of perceived goal progress. Our preferred hypothesis has been that making a plan for a goal reduces goal activation by delaying goal pursuit. A plan is made, and so one need not focus on the goal until the later time point at which one's plan is to be executed. An alternative hypothesis, however, holds that planning creates an illusion of further progress, even though no material progress has been made. If plans create an increased sense of progress, people who plan may feel less urgency toward the incomplete goal (e.g., Zhang, Fishbach, & Dhar, 2007) and thoughts of the goal may be reduced. We there-

fore measured perceived progress to examine whether changes in progress mediated any effect of plans on goal accessibility.

The procedure for Study 3 was similar to that of Study 2 except that the main dependent variable was accessibility of means to attain the goal. In addition, we focused on the goal to get regular exercise. Participants wrote about that goal, and some participants made a plan to fulfill it. A control group wrote about the goal to do well in school. Accessibility of exercise means was later measured with a word completion task. A pilot study indicated that most people within our population of interest would select one of four means if asked to make a plan to exercise: taking a walk, going for a run, working out at the gym, or playing a sport. The word completion task therefore contained four critical items that could be completed with a word representing one of the four means identified in the pilot study. Those words were *walk*, *run*, *gym*, and *sports*. This measure of accessibility allowed us to assess whether making a plan reduced the accessibility of all means, which was our prediction, or just those means irrelevant to one's plan, which would be evidence of goal shielding.

## Method

Participants were 126 undergraduates (91 women, 2 not reported,  $M_{\text{age}} = 18.8$  years,  $SD_{\text{age}} = 2.40$ ) who arrived at the lab individually for a study dealing ostensibly with examining people's life habits. Participants were seated at a computer, and all tasks and instructions were administered through MediaLab (Jarvis, 2008).

Participants were randomly assigned to one of three conditions: goal, plan, or control. Participants in the goal and plan conditions first read a paragraph describing cultural trends toward living actively and getting regular exercise. Participants then responded to the item "How important is it to you that you that you live actively and get regular exercise?" on a scale that ranged from 1 (*not at all*) to 7 (*very*). Participants were then asked to make lists of the active and inactive behaviors they had engaged in during the previous 2 weeks. This task was included to immerse the participants more fully in thoughts of the goal to get regular exercise, and inclusion of behaviors inconsistent with the goal was aimed at creating a sense of incompleteness of the goal (e.g., Moskowitz, 2002).

In the plan condition only, participants were instructed to make a plan to do one specific thing in the next 2 days that would allow them to live actively and get exercise. Participants were told that the act could be something simple (e.g., walking to class) but that they should think of a single, specific act that they would be willing and likely to do. Participants described the planned act, including when and where it would take place.

The procedure for the control condition was comparable to that for the goal condition except that participants wrote about the goal to do well academically. First, control participants read a paragraph describing the importance of working hard and doing well in college. Participants then indicated how important it was for them to do well academically. Participants were also asked to make lists of behaviors they had engaged in during the previous 2 weeks that were consistent or inconsistent with that goal.

After the manipulation, all participants indicated how much progress they felt they had made toward meeting their goals on a scale that ranged from 1 (*none*) to 7 (*very much*). A thoughtful

reflection task then served to create a distracting delay between the experimental manipulation and the measure of accessibility. The reflection task was ostensibly for a related but different line of work. Participants were asked to imagine themselves 20 years from the present moment and to spend some time writing about various aspects of their imagined future lives. This included writing about future relationships, jobs, homes, and beliefs and values.

Participants then worked on the word completion task and completed a demographics questionnaire. In the control condition only, the questionnaire included a measure of importance of the goal to exercise, which was identical to the exercise importance item that goal and plan participants received earlier in the study. Participants were probed for suspicion, debriefed, and dismissed from the lab.

## Results

### Persistent accessibility from incomplete exercise goals.

The data from two participants were omitted for reasons discussed later in this section. With our final data set, our first step was to test for high accessibility of the unfulfilled exercise goal. The main measure of goal accessibility was total number of exercise means produced in the word completion task. An ANOVA that examined accessibility as a function of condition revealed significant variation among the three conditions,  $F(2, 124) = 3.07, p = .05, \eta_p^2 = .05$ . A planned comparison tested whether means of exercise remained highly accessible over time among those in the goal group. Indeed, means accessibility was higher in the goal condition ( $M = 2.45, SD = 0.95$ ) than in the control condition ( $M = 1.91, SD = 1.06$ ), even after a distracting delay,  $F(1, 122) = 5.73, p = .018, \eta_p^2 = .05$ .

We also tested whether persistence of the goal in memory was moderated by goal importance, as has been found in prior work (Marlow, 1938a, 1938b; Zeigarnik, 1938). We used a regression analysis that focused only on those in the goal and control conditions. The regression model included condition, importance of the exercise goal, and a Condition  $\times$  Importance interaction term as its predictors. The overall model was significant ( $R^2 = .17, p = .001$ ). The main effect of condition was significant,  $\beta = .28, t(83) = 2.78, p < .01$ , as was the main effect of exercise importance,  $\beta = .28, t(83) = 2.74, p < .01$ . These effects were qualified by a significant Condition  $\times$  Importance interaction,  $\beta = .21, t(83) = 2.02, p = .047$ .

To clarify the nature of the Condition  $\times$  Importance interaction, we analyzed the effect of condition at high (one  $SD$  above the mean) and low (one  $SD$  below the mean) levels of goal importance. Across all participants, the mean level of goal importance was 5.63, and the standard deviation was 1.12. Hence, the values for high and low importance were within range of the 7-point scale that was used. Among participants with a high level of goal importance, the effect of condition was highly significant,  $\beta = .48, t(83) = 3.37, p = .001$ , so that the goal was more accessible among participants in the goal condition than among participants in the control condition. Among participants with a low level of goal importance, there appeared to be no significant effect of condition on accessibility ( $t < 0.6, p = .61$ ). Thus, means of exercise remained highly accessible over time among those in the goal group, but only if they valued the goal highly.

**Reduction of accessible means due to plan making.** To examine the effect of plan making on means accessibility, we conducted a regression analysis that included condition, exercise importance, and their interaction in its model. Condition was represented by two contrast-coded predictor variables to represent the three conditions. The main contrast compared the goal condition with the plan condition. We expected that a plan would counteract goal accessibility and that the effect would be specific to participants who highly valued the goal to exercise. Results revealed that the model significantly predicted accessibility of goal means ( $R^2 = .112, p = .014$ ). In addition, there was a significant Condition  $\times$  Importance interaction among those in the goal and plan groups,  $t(124) = 2.26, p = .026$ .

To clarify the nature of the Condition  $\times$  Importance interaction, we used a regression analysis that focused only on those in the goal and plan conditions. We analyzed the effect of plan making at high (one  $SD$  above the mean) and low (one  $SD$  below the mean) levels of goal importance. Participants for whom the goal to exercise was highly important produced fewer exercise means in the plan condition than in the goal condition,  $\beta = -.35, t(81) = -2.21, p = .030$ . In contrast, participants reporting low importance of the goal to exercise showed no effect of the planning manipulation on means accessibility,  $\beta = .18, t(81) = 1.13, p = .26$ . As predicted, furnishing a goal with a plan reduced the accessibility of means to attain the goal, and that effect was specific to those for whom the goal was highly important (see Figure 2).

Further analyses examined whether perceived goal progress mediated the effect of planning on goal accessibility. These analyses focused only on participants reporting high levels of goal importance, who exhibited the hypothesized reduction in goal accessibility. First, participants in the plan condition did indeed report greater perceived goal progress than did participants in the goal condition,  $\beta = .28, t(81) = 2.08, p = .041$ . Second, the effect of goal progress on goal accessibility approached significance,  $\beta = -.27, t(81) = -1.66, p = .10$ , so that greater perceived goal progress predicted less accessibility. Thus, people did consider plans to be a sign of goal progress, and such perceptions of progress appeared to reduce goal accessibility.

However, perceived goal progress did not appear to mediate the effect of plans on accessibility. When perceived goal progress and the independent variable (plan condition vs. goal condition) were included simultaneously as predictors of goal accessibility, the effect of plan making on accessibility was not significantly reduced or eliminated but rather remained significant,  $\beta = -.32, t(81) = -2.01, p = .048$ . A Sobel test (Sobel, 1982) confirmed that perceived goal progress did not mediate the effect of plans on goal accessibility ( $z = -1.30, p = .19$ ), although it did appear to show a trend toward partial mediation. It is possible therefore that perceived goal progress plays a partial role in reducing goal activation. However, in the present study, reductions in goal activation were not explained solely by increases in perceived goal progress. A significant proportion of planners who ceased to exhibit goal accessibility were apparently not under the illusion that they had made further progress toward fulfilling their goal.

**Testing the goal-shielding explanation.** The observed reduction in means accessibility is consistent with the notion that making plans counteracted goal-related cognitive activity. However, an alternative explanation for that result remains. It is possible that plan making did not reduce attention to the goal but



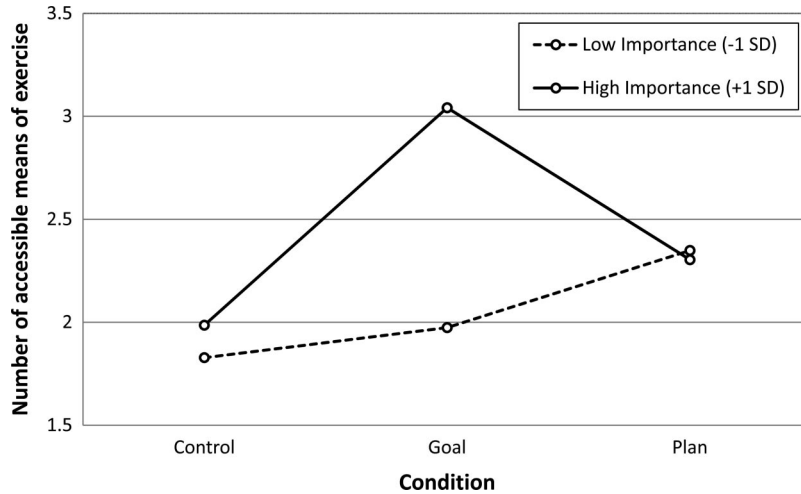


Figure 2. The Zeigarnik effect was replicated among participants in the goal condition and reduced among participants in the plan condition, but these effects occurred only for participants for whom the goal to exercise had high personal importance. *SD* = standard deviation.

rather than plans caused participants to regulate their attention in favor of a single goal-related action. That is, plans may have caused participants to engage in goal shielding. A goal-shielding explanation would predict a similar, overall reduction in means accessibility to the one that we found. Not all means would be less accessible, however, if goal shielding were active. A goal-shielding explanation would predict high accessibility of the focal means (i.e., the means indicated in participants' plans) and inhibition of the three alternatives. We tested for evidence of that pattern.

First, we analyzed participants' plans in order to determine which means was the focal means. Two independent raters read each of the plans that participants had formed. Raters analyzed each plan into one of four means: going for a run, working out at the gym, taking a walk, or playing a sport. Of the 40 participants who made plans to exercise, two chose plans (to do yoga and to go for a bike ride) that were perceived by both raters as not conforming to any of the four categories of means. The data from those participants were excluded from the previous analyses as well as the analyses that follow. The raters' categorizations were identical for 100% of the remaining 38 plans. Of these, 14 were to exercise at the gym, nine were to go for a walk, eight were to go for a run, and seven were to participate in a sport.

A two-level repeated-measures ANOVA was used to test for the pattern of accessibility predicted by goal shielding. Each participant could potentially have supplied a total of four means of exercise in the word completion task. One of those was the means that the participant planned to employ, and the other three were alternatives. The present analysis compared the accessibility of the two types of means. The accessibility of the chosen means was coded as a dichotomous variable (1 for accessible and 0 for not accessible). The accessibility of the three alternative means was coded as the total number of accessible alternatives divided by three. Thus, the accessibilities of the chosen and alternative means were coded with a 0 to 1 scale.

The repeated-measures ANOVA yielded no effect of the type of means (chosen vs. alternative) on accessibility ( $F < 1.3$ ,  $p = .26$ ).

Thus, participants in the plan condition were no more or less likely to list an alternative means ( $M = 0.61$ ,  $SD = 0.34$ ) than to list the means they had selected ( $M = 0.50$ ,  $SD = 0.51$ ). This pattern of accessibility does not support a goal-shielding explanation, which would predict an increased focus on the chosen means and an inhibition of alternatives. Instead, the current results suggest that the effect of plan making on accessibility was uniform across all means, including the focal means.

A correlation analysis served as an additional test for evidence of goal shielding. If goal-shielding processes were active among participants in the plan group, one would expect an inverse relationship between accessibility of the focal means and accessibility of alternatives. To test this, we looked for a negative correlation between accessibility of the focal means and the relative accessibility of alternative means. Again, no significant relationship was found,  $\beta = .18$ ,  $t(37) = 0.80$ ,  $p = .43$ .

We also examined the possibility that exercise importance moderated the goal-shielding effect, just as exercise importance moderated the accessibility effects reported above. It was possible that the expected inverse relationship between the focal means and alternative means was present but only for people high (and not low) in goal importance. Accessibility of the focal means, goal importance, and their interaction were entered into a regression model that predicted the relative accessibility of alternative means. Neither of the main effects nor the interaction approached significance ( $t_s < 0.5$ ,  $p_s > .65$ ).

These results show no sign that plan making modifies means accessibility through goal shielding. Attention was not reallocated to the means that was implicated in participants' plans, as a goal-shielding explanation would predict. Rather, a plan to fulfill a goal seems to have counteracted goal accessibility in all its forms, so that the accessibility of every measured means, including the focal means, was reduced.

## Discussion

Study 3 revealed that a plan can counteract even the accessibility of means to attain a goal. Participants who did not plan for the

goal to exercise showed the standard accessibility effect. Among those participants, various means of exercise, such as playing sports and going for a run, remained highly accessible over time. Formation of a plan, however, counteracted that effect. Means of exercise were significantly less accessible among planners than they were among those who simply reflected on the goal.

The results showed no indication that the effect of planning on goal accessibility was due to goal shielding. Plans did not cause participants to focus more on the planned-for means and to inhibit alternatives, which is what a goal-shielding explanation would predict. Instead, plans appeared to reduce attention to all goal means, including those indicated in participants' plans. This pattern of results is consistent with previous work showing that it is not necessary to keep a planned-for action active in memory in order to execute it later (Webb & Sheeran, 2007). Indeed, making a plan seemed to reduce the accessibility of planned actions as well as potential alternatives.

The present findings do not contradict previous evidence of goal shielding, of course. They merely show that the reductions in accessibility found in these studies are not themselves part of the well-established pattern of goal shielding.

Perceived goal progress did not mediate the effect of plan making on goal accessibility. The results revealed a slight but nonsignificant trend toward partial mediation by perceived goal progress. However, the effect of plans on accessibility remained significant even when controlling for perceived goal progress, suggesting that perceptions of increased progress were not necessary to allow for goal accessibility to be reduced by plan making.

Despite the lack of mediation by perceived goal progress, it is perhaps worth noting one unexpected trend in the current study that appears to be inconsistent with previous work. The current data revealed that as perceived goal progress increased, goal accessibility tended to decrease. That pattern is inconsistent with prior work that has linked greater goal progress to overall increases in goal-related thinking (Liberman & Förster, 2008). The apparent inconsistency may be due to the fact that prior work has defined goal progress as greater proximity (e.g., in time) to the desired end result. When greater progress means that success is close and must be seized, goal focus may be increased (e.g., Liberman & Förster, 2008). But when greater progress means resolving uncertainty (e.g., by planning) and delaying the need for action, goal focus may be lowered.

The results did not support the notion that plans caused participants to shift toward a different level of goal-related thinking. One could predict that plans cause people to focus on lower level actions related to their goals (e.g., means of attainment). One could also predict that plans cause people to focus on higher level aspects of their goals. Indeed, when concentrating at length on lower level actions, one tends naturally over time toward a focus on higher level aspects that provide coherence to the lower levels, a process called emergence (Vallacher & Wegner, 1987). However, neither predicted shift in thinking can account simultaneously for the results of both Studies 2 and 3. Our preferred explanation—that plans decrease overall goal accessibility—can account for the results of both studies, which together revealed less accessibility of lower level aspects (Study 3) and higher level aspects (Study 2) of unfulfilled goals. The most parsimonious explanation seems to be that plans eliminate (and do not merely modify) goal activation.

Study 3 also revealed a moderating role of goal importance. We replicated the persistent accessibility that stems from an unfulfilled

goal and showed that it can be counteracted by forming a plan. We further revealed that these effects were specific to people who highly valued the goal.

Together, these data provide further evidence that a plan can reduce cognitive activity from unfulfilled goals. Among participants who wrote about the goal to exercise, various goal-related actions remained highly accessible over time, but making a plan reduced that effect. Thus, neither a desired end state (Study 2) nor the various means by which one might attain it (Study 3) remained accessible over time after plans had been made. These data are consistent with the central idea that plans reduce the need for many of the cognitive processes that promote attainment of the goal. Once a person forms a plan for an unfulfilled goal, much of the usual goal-related cognitive activity appears to cease.

#### Study 4: Successful Plan Making as Eliminating Task Interference

Study 4 tested a key component of our theory, that plans contribute to goal pursuit and thereby allow a person to focus on alternative tasks and goals. Our main focus in the study was thus to show that reductions in goal-related cognitive activity are part of a functional and adaptive planning process, because people actually do carry out the plans they make. Indeed, a skeptic could argue that plan making in the previous studies did not serve any genuine function of promoting goal attainment. Participants' plans may have indicated procrastination or a glib declaration to act at some later time, rather than any meaningful change to future behavior. Study 4 addressed that ambiguity. It sought evidence of a link between reduced goal activation and later execution of plans.

Our measure of goal activation was task interference. Prior work has shown that cognitive activity from unfulfilled goals can hinder performance on other tasks (Kuhl & Helle, 1986; Masicampo & Baumeister, 2011). In the present study, it was expected that an unfulfilled goal would interfere with performance on a subsequent problem-solving task but that allowing participants to plan for the goal would counteract that effect (so performance would be fine). We also expected that the reduction in interference would be mediated by the earnestness of participants' plans. That is, we predicted that problem solving would be improved (and thus interference would be reduced) specifically among participants who were strongly committed to (and ultimately executed) their plans.

The procedure for Study 4 involved activating an incomplete goal and suggesting to participants one useful strategy for fulfilling it. Some participants committed to pursuing the goal (goal condition). Others committed to pursuing the goal and to using the specific strategy that was suggested to them (plan condition). A control condition had no incomplete goal activated. Before participants had the opportunity to fulfill the goal, we measured task interference with an anagram task. We anticipated that the goal group would perform worse on the anagram task than would the control group. Moreover, we predicted that plan making would counteract that interference effect but only if participants' plans reflected a real contribution to goal pursuit.

#### Method

Participants were 97 undergraduates (69 women,  $M_{\text{age}} = 18.5$  years,  $SD_{\text{age}} = 1.27$ ) who took part individually or in groups of up

to 12. Participants were randomly assigned among three conditions: goal, plan, or control. All participants received a packet. The experimenters explained that the packet contained multiple tasks that the participants would have a limited amount of time to complete.

Before they started the packet, participants received written instructions about the final task, which was a brainstorming task. Participants in the control condition were told that the brainstorming task would require them to list as many examples as they could of a given category. They were told to put forth their best effort on the task. They were also told that the optimal method for performing well on the brainstorming task would be to work through each letter of the alphabet individually. That is, they should brainstorm as many examples as they could for each letter, beginning with the letter *A* and continuing with each letter through *Z*. Participants were told they should adopt that strategy. Control participants were then asked to form the intention to do well on the task by committing to the following statement: "I will try my best on the final task."

Participants in the goal condition were given instructions similar to those for the control condition, but (unlike in the control condition) participants in the goal condition were also told the specific topic of the brainstorming task. They were told they would list as many examples of sea creatures as they could. They also learned of the optimal strategy and were told that they should adopt it. Participants in the goal condition were asked to commit to the following statement: "I will try my best on the final task."

The plan condition was identical to the goal condition except that participants committed to a specific plan for their later performance. These participants committed to the following statement: "I will try my best on the final task. When I get to the final task, I will write down the letters of the alphabet and will list sea creatures for each one." Thus, those in the plan condition committed to a plan that focused not merely on effort but on exactly how they would execute the task (in the form of "when *X* happens, I will do *Y*"; Gollwitzer, 1999).

All participants then worked on the tasks. First, participants were given 5 min to solve as many anagrams as they could out of a set of 25. Then participants were given 5 min to list as many sea creatures as they could. Participants who adopted the optimal strategy (regardless of condition) listed an average of 21.6 sea creatures ( $SD = 12.9$ ), and those who did not use the strategy listed an average of 18.9 ( $SD = 10.2$ ). The difference between those groups was not significant,  $F(1, 96) = 1.24, p = .27$ . The trend was however in the direction suggesting that the recommended strategy was effective, and so the cover story about the optimal strategy was at least plausible. After the brainstorming task, participants filled out a demographics questionnaire. They were debriefed and were dismissed from the study.

## Results

### Replication and reduction of the goal interference effect.

Unfulfilled goals tend to persist in the mind over time, and one consequence of that is interference with performance on other, unrelated tasks (Kuhl & Helle, 1986; Masicampo & Baumeister, 2011). We expected that the incomplete goal of listing sea creatures would interfere with the ability to solve anagrams. Number of anagrams solved served as the dependent measure, with lower numbers suggesting greater interference.

Results from an ANOVA indicated significant variation in anagrams solved among the three conditions,  $F(2, 96) = 3.34, p = .040, \eta_p^2 = .07$ . The goal group ( $M = 6.55, SD = 4.59$ ) solved significantly fewer anagrams than the other two groups together,  $F(1, 94) = 5.68, p = .019, \eta_p^2 = .06$ , and it trended toward solving fewer anagrams than did the control group ( $M = 8.39, SD = 4.40$ ),  $F(1, 94) = 2.50, p = .12, \eta_p^2 = .03$ . Thus, activation of the incomplete goal in the absence of a plan to fulfill it interfered with performance on another task.

Most important, participants in the plan group solved significantly more anagrams ( $M = 9.55, SD = 4.98$ ) than did participants in the goal group,  $F(1, 94) = 6.60, p = .012, \eta_p^2 = .07$ . This indicated that planning counteracted interference from the unfulfilled goal. There was no difference in performance between the control and plan groups,  $F(1, 94) = 1.00, ns$ . Thus participants who formed a plan to attain an incomplete goal performed no differently than participants for whom the goal was never made active. These findings replicate the pattern from Studies 1–3: Unfulfilled goals stimulate persistence of the goal in the mind, but making a plan eliminates that effect.

**Implementation of plans.** To examine the success of participants' plans, we assessed the rate at which participants within each condition implemented the optimal strategy for the brainstorming task. An ANOVA indicated significant variation among the three conditions,  $F(2, 96) = 30.48, p < .001, \eta_p^2 = .39$ . A planned contrast indicated that, although all participants were encouraged to implement the optimal strategy, participants in the plan condition were more likely to do so (70%) than participants in the control (6%) and goal (13%) conditions,  $F(1, 94) = 60.16, p < .001, \eta_p^2 = .39$ . A comparison showed no difference between the control and goal groups ( $F < 1, p = .45$ ). Thus, participants who planned to adopt the optimal strategy were more likely to do so than other participants.

We also assessed whether successful plan making mediated the reduction in interference that was caused by plan making. Our hypothesis was that committing to a plan eliminates goal-related cognitive activity because it satisfies the need to contribute further thoughts and attention to goal pursuit. If that hypothesis is true, the reduced interference among participants in the plan condition should be specific to those who formed effective, helpful plans. Our measure of effective plan making was whether participants implemented the optimal strategy that was suggested to them.<sup>3</sup>

To test for mediation, we ran a number of regression analyses that focused only on participants in the plan and goal conditions. First, we tested whether the independent variable (condition) predicted both the dependent variable (anagram performance) and the mediating variable (implementation of the strategy). Regression analyses indicated that the plan group performed better than the goal group on the anagram task,  $b = 3.00, t(62) = 2.50, p = .015$ , and that the plan group implemented the optimal strategy more than did the goal group,  $b = .57, t(62) = 5.53, p < .001$ . We also

<sup>3</sup> To be sure, implementation of the strategy occurred after the anagram task, which was our measure of interference. Thus, implementation of the strategy cannot technically mediate the effect on interference in the truest sense. However, later implementation serves as a very close approximation of plan commitment insofar as people can implement a strategy only if they have remained strongly committed to doing so in the period leading up to it.

examined whether the mediating variable predicted the dependent variable. Indeed, implementation of the optimal strategy significantly predicted anagram performance,  $b = 3.04$ ,  $t(62) = 2.51$ ,  $p = .015$ , so that participants who implemented the strategy solved more anagrams correctly than participants who did not implement the strategy. Last, when both the experimental condition and the mediating variable were including as predictors, the effect of condition was no longer significant,  $b = 1.90$ ,  $t(61) = 1.30$ ,  $p = .20$ . A Sobel test (Sobel, 1982) indicated that the effect of plan making on anagram performance was fully mediated by successful implementation of the optimal strategy ( $z = 2.28$ ,  $p = .022$ ; see Figure 3). Thus, a plan counteracted goal interference only to the extent that it represented a real contribution to later goal pursuit.

## Discussion

Once again, plan making was found to counteract interference from an incomplete goal. Participants with an incomplete goal solved fewer anagrams than did other participants. Moreover, formation of a plan counteracted that effect.

The more novel finding was that the reduction in interference was specific to participants who ultimately executed their plans. This may seem counterintuitive. Forming a plan and remaining committed to it would seem a burden on the mind. The results, however, revealed the opposite pattern: Commitment to a later behavior was linked to reduced rather increased strain on mental resources.

These data are consistent with the idea that plans contribute to goal pursuit by relinquishing control of the goal to the automatic system. One specifies an action to be carried out later, and the mind executes it as an automatic response to the appropriate situational cue. Hence, a plan eliminates the need for further involvement from thoughts and attention. The present study provided evidence of that mechanism. It showed that plans both reduced goal-related cognition and contributed significantly to later goal pursuit. Those who planned for an incomplete goal, relative to those who formed no plan, were much more likely to employ what was described as the optimal strategy for attaining it. Moreover, it was among participants who followed through with their plans that interference from the unfulfilled goal was reduced.

## Studies 5A and 5B: Plans, Intrusive Thoughts, and Goal-Related Emotions

As a final step, we examined whether changes in emotion play a key role in reducing goal-related cognition when a plan is made. It is possible that reflecting on unfulfilled goals makes people feel anxious and nervous and that making a plan alleviates those feelings. If so, such changes in emotion could contribute to the effects that were observed in Studies 1–4. People may have thought less about their unfulfilled goals in part because they felt less anxious about these goals.

Studies 5A and 5B therefore examined the link between emotion and reductions in activation from unfulfilled goals. Emotion could play any of a number of roles. First, changes in emotion could serve as one contributing factor to the observed effects of plans on cognition. That is, plans might cause both emotion effects (reduced anxiety) and self-regulation effects (transfer of action control to the automatic system), and each of those effects could reduce goal-directed cognitive activity. Second, emotion effects could completely account for the effect of plans on goal-related cognition. It is possible, for example, that plans reduce anxiety and that such decreases in anxiety cause less thinking about unfulfilled goals regardless of whether plans are executed later. That would be an alternative explanation to the one that we have preferred, which is that plans reduce goal-related cognition by contributing to and delaying goal pursuit. A third possibility is that emotion is not significantly affected by planning and therefore does not play a major role in reducing goal-related cognition. That is, plans might reduce goal-directed cognition regardless of emotions. Studies 5A and 5B tested for evidence of the various, potential roles of emotion.

## Study 5A: Plans and Emotions

Study 5A served as an initial examination of the role of emotion in reducing cognitive activation from unfulfilled goals. Participants wrote about unfulfilled tasks, and some participants were asked to form plans to attain them. Others wrote about tasks that they recently completed. Participants then indicated to what extent they felt various emotions when reflecting on the tasks they wrote about.

**Method.** One-hundred and seventy-four participants (118 women,  $M_{\text{age}} = 34.1$  years,  $SD_{\text{age}} = 12.7$ ) were recruited through Amazon's Mechanical Turk (see Buhrmester, Kwang, & Gosling, 2011) to complete an online questionnaire in exchange for monetary compensation. The questionnaire began with the same manipulation as the one administered in Study 1. Participants reflected on two unfulfilled tasks (unfulfilled tasks condition). Other participants reflected on two unfulfilled tasks and then formed specific plans for how they would complete them (plan condition). In a third condition, participants wrote about two tasks that they had recently completed (control condition). Participants reported on a number of emotions immediately upon completion of the manipulation. Participants indicated to what extent they felt anxious, nervous, content, and confident when reflecting on the two tasks they had written about. Participants responded using scales that ranged from 1 (*not at all*) to 7 (*very much*).

**Results.** Data were not used from six participants who failed to form specific plans for their goals. Those participants failed to

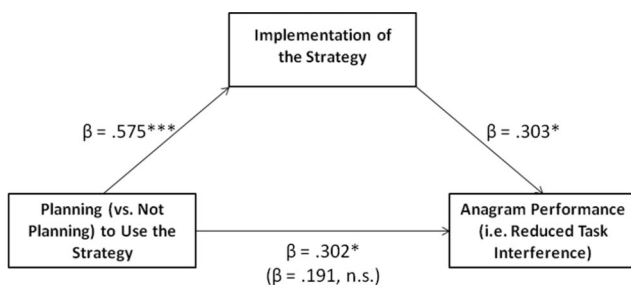


Figure 3. The beneficial effect of plans on anagram performance was fully mediated by implementation of the optimal strategy. Standardized regression coefficients are reported. n.s. = nonsignificant. \*  $p < .05$ . \*\*\*  $p < .001$ .

list specific times and places for completing their tasks, or else they listed multiple potential courses of action. Exclusion of those participants left 168 participants in the final analyses.

The types of tasks that were listed by participants along with examples are described in the online supplementary material. There was no significant variation across the three conditions in prevalence of any of the various types of tasks ( $\chi^2$ s < 2.55,  $ps$  > .28). Hence, the types of tasks that participants generated did not differ by condition.

The means of the four emotions reported across the three conditions are displayed in Table 1. Planned comparisons revealed that participants in the unfulfilled tasks group reported being significantly more anxious and significantly less content than did participants in the control group ( $F$ s > 4.70,  $ps$  < .03,  $\eta_p^2$ s > .02). There were no differences between the unfulfilled tasks group and the control group in self-reported nervousness or confidence ( $F$ s < .03,  $ps$  > .88). Thus, unfulfilled tasks, relative to fulfilled tasks, caused more anxiety and less contentment.

More important, there were no differences between the unfulfilled tasks group and the plan group in reports of any of the four emotions ( $F$ s < 2.13,  $ps$  > .14). Rather, the plan group (relative to the control group) exhibited emotion effects that mirrored those of the unfulfilled tasks group. Much like the unfulfilled tasks group, the plan group reported significantly greater anxiety and significantly less contentment than did the control group ( $F$ s > 4.30,  $ps$  < .04,  $\eta_p^2$ s > .02). Also, as with the unfulfilled tasks group, the plan group exhibited no differences with the control group in reported nervousness or confidence ( $F$ s < 1.00,  $ps$  > .32).

### Study 5B: Plans, Intrusive Thoughts, and Emotions After a Delay

In Study 5A, we found no evidence of significant changes in emotion as a result of having formed a plan. Still, plan participants reported their emotions immediately upon making their plans, at which point participants might still have been immersed in feelings of urgency and anxiety toward their goals. However, after a delay (and hence after being given ample opportunity to move past any initial anxiety), planners might feel better about their prospects and

anxiety might be reduced. One innovation in Study 5B was therefore to include a task between the manipulation and the dependent measure of emotion.

A second innovation over Study 5A was to attempt to replicate the reduction of task-related thoughts as a result of plan making. The delay that was used was therefore a reading task similar to that used in Study 1. Participants' emotions were measured after the reading task, and participants were asked to what extent they were bothered by task-related thoughts during the reading.

A third innovation allowed us to more clearly delineate the type of thinking that counteracts goal activation. Our claim has been that making a specific plan reduces goal activation, and we have emphasized commitment not only to what one will do but to when and where one will do it. Such specificity enables one to transfer control of goal pursuit to the automatic system, thereby reducing thoughts of the goal. In an attempt to demonstrate that point more clearly, we allowed participants in the unfulfilled task group to reflect on various ways they could attain their incomplete tasks, but we did not ask them to commit to a specific plan to use any one of them. It was expected that, absent that specificity, goal activation among the unfulfilled task group would remain, whereas activation would be reduced among people who made more specific commitments.

**Method.** Eighty participants (53 women,  $M_{\text{age}} = 37.1$  years,  $SD_{\text{age}} = 11.8$ ) who were recruited through Amazon's Mechanical Turk completed an online survey in exchange for monetary compensation. The initial task was a modified version of the manipulation used in Study 1. Participants in the unfulfilled task condition reflected on one task they had to complete in the coming days. Those participants then listed multiple possible courses of action for completing the task, but they did not commit to using any one of them. Participants in the plan condition, in contrast, reflected on a task they had to complete in the coming days and made a specific plan for how they would complete it. Participants in the control condition reflected on one task they had recently completed.

Participants then read the first 600 words of *The Case of the Velvet Claws* by Erle Stanley Gardner. Upon completion of the reading, participants indicated how anxious, nervous, content, and confident they felt when thinking about the task they had written about earlier. Participants also indicated to what extent they were thinking about that task during the reading. All dependent measures were assessed on scales from 1 (*not at all*) to 7 (*very much*).

**Results.** Data from three participants were excluded from the final analyses. Two participants in the plan group failed to specify when and where they would execute the goal-directed actions they had listed. One participant in the unfulfilled task group failed to list multiple potential actions for completing the task. That participant listed only one action, which therefore resembled formation of a specific plan. Elimination of those three participants left 77 participants in the final analyses.

The types of tasks that participants listed are described in the online supplementary material. There was no significant variation across the three conditions in prevalence of any of the six types of tasks ( $\chi^2$ s < 4.76,  $ps$  > .09). Thus, the types of tasks that participants described did not differ by condition.

A one-way ANOVA revealed a significant effect of condition on self-reports of task-related thoughts,  $F(2, 76) = 4.06$ ,  $p = .021$ ,  $\eta_p^2 = .10$ . A planned comparison revealed that participants in the unfulfilled task group reported more task-related thoughts ( $M =$

Table 1  
Mean Emotion Measures, Studies 5A and 5B

Emotion	Condition		
	Control	Unfulfilled tasks	Plan
Study 5A			
Anxious	3.15 <sub>a</sub> (2.00)	4.11 <sub>b</sub> (1.84)	4.06 <sub>b</sub> (1.91)
Nervous	2.88 <sub>a</sub> (2.20)	2.91 <sub>a</sub> (1.80)	3.33 <sub>a</sub> (1.98)
Confident	5.42 <sub>a</sub> (1.53)	5.47 <sub>a</sub> (1.23)	5.26 <sub>a</sub> (1.42)
Content	5.35 <sub>a</sub> (1.55)	3.67 <sub>b</sub> (1.83)	4.13 <sub>b</sub> (1.96)
Study 5B			
Anxious	1.95 <sub>a</sub> (1.32)	3.63 <sub>b</sub> (1.54)	3.32 <sub>b</sub> (2.08)
Nervous	1.90 <sub>a</sub> (1.25)	2.43 <sub>a</sub> (1.56)	2.63 <sub>a</sub> (1.76)
Confident	6.25 <sub>a</sub> (0.97)	4.91 <sub>b</sub> (1.60)	5.50 <sub>ab</sub> (1.14)
Content	5.89 <sub>a</sub> (1.41)	3.63 <sub>b</sub> (1.90)	4.32 <sub>b</sub> (2.06)

*Note.* Standard deviations are in parentheses. Within each row, different subscripts indicate that the means were significantly different ( $p < .05$ ).

3.37,  $SD = 1.70$ ) than did participants in the control group ( $M = 2.60$ ,  $SD = 1.82$ ), and that difference approached significance,  $F(1, 74) = 2.81$ ,  $p = .098$ ,  $\eta_p^2 = .04$ . More important, participants in the plan group ( $M = 2.14$ ,  $SD = 1.36$ ) reported significantly fewer task-related thoughts than did participants in the unfulfilled task group,  $F(1, 74) = 7.64$ ,  $p = .007$ ,  $\eta_p^2 = .09$ . Thus, Study 5B replicated the elimination of intrusive thoughts about an unfulfilled task after a specific plan is made.

Further analyses tested for differences in emotion. The means for each reported emotion across the three conditions are displayed in Table 1. Simple comparisons revealed that participants in the unfulfilled task group reported significantly more anxiety, less confidence, and less contentment regarding their tasks than did participants in the control group ( $F_s > 12.7$ ,  $p_s < .001$ ,  $\eta_p^2_s > .14$ ). Those in the unfulfilled task group did not report more nervousness than did those in the control group,  $F(1, 74) = 1.48$ ,  $p = .23$ .

More important, there were no differences in reports of any of the four emotions between the unfulfilled task group and the plan group ( $F_s < 2.6$ ,  $p_s > .11$ ). Moreover, the plan group (relative to the control group) showed emotion effects that were similar to those exhibited by the unfulfilled task group. Those in the plan group were significantly more anxious,  $F(1, 74) = 7.12$ ,  $p = .009$ ,  $\eta_p^2 = .09$ , and significantly less content,  $F(1, 74) = 7.50$ ,  $p = .008$ ,  $\eta_p^2 = .09$ , than those in the control group. Those in the plan group were also less confident than those in the control group to a marginally significant degree,  $F(1, 74) = 3.30$ ,  $p = .074$ ,  $\eta_p^2 = .04$ . There was no difference in nervousness between the plan group and the control group,  $F(1, 74) = 2.37$ ,  $p = .13$ .

## Discussion

Across Studies 5A and 5B, there were no effects of plan making on emotion. Reflecting on unfulfilled goals caused greater anxiety and less contentment than did reflecting on fulfilled goals, and making a plan did not alleviate those effects. These results contradict alternative explanations for the results of Studies 1–4 that feature changes in emotion caused by planning.

It did not matter at what time point the emotion measure took place. Regardless of whether emotions were measured immediately after participants made their plans or after a delay, emotions appeared not to be affected by plans. Furthermore, differences in emotion were absent even though significant cognitive effects were apparent. In Study 5B, plan participants reported significantly fewer intrusive thoughts during a reading task than did participants who formed no plan, even though plan participants were just as anxious as non-planners. A reduction in anxiety therefore does not appear to be necessary for plans to reduce goal-related cognitive activity.

Study 5B also demonstrated the importance of specificity in reducing cognitive activity from unfulfilled goals. Participants who reflected on the various ways they could fulfill their goals still reported significantly more intrusive thoughts about their goals than did control participants. Plan participants, however, who committed to a specific, future course of action, did not show that same effect. Plans must be highly specific to eliminate thoughts of unfulfilled goals.

## General Discussion

The present research examined a phenomenon known to psychology for almost a century: The persistence in the mind of unfulfilled tasks and goals (e.g., Zeigarnik, 1927). Our findings suggest the pattern has not been fully understood. Quite reasonably, the standard assumption has been that incomplete goals remain active in the mind until they are fulfilled (e.g., Förster et al., 2007), but the present studies showed that goal activation can cease much sooner. Once a specific plan for a goal is made, goal-related cognitive activity is drastically reduced.

Five experiments in the present investigation replicated persistent activation and interference from unfulfilled goals. That pattern was revealed in mind wandering during reading (Studies 1 and 5B), word fragment completions indicating high accessibility of the goal (Study 2 and 3), and decrements in performance on other tasks (Studies 1 and 4). The more novel contribution of the experiments was to show that the activation and interference effects abruptly ceased among participants who formed plans for their unfulfilled goals. The intrusive thoughts and persistence in memory stopped even though the person had not done the work of reaching the goal. Hence, the present results suggest a revision of the standard view of goal accessibility as continuing until the goal is reached.

In Study 2, for example, participants focused on an important, upcoming exam for which they needed to study. Those who merely reflected on the importance of the exam exhibited high accessibility of the goal after a delay, whereas those who made a plan did not. Neither group had done the slightest bit of studying for the exam. It thus appeared that the function of sustained goal accessibility was not to get the person to study. The persistence in memory stopped before any actual studying took place. Apparently, goal accessibility was satisfied by simply making a plan to study later on.

The studies we reported all linked goal activation to planning in various ways and with various clarifications. In Studies 1 and 5B, participants selected tasks from their own lives that needed to be done, and then how much people's minds wandered while reading a novel that had nothing to do with the unfulfilled tasks was measured. Unfulfilled tasks made people's minds wander, thereby reducing their ability to comprehend the novel. But participants who made a plan to get their personal tasks done were able to read with less mind wandering. Despite having had an unfulfilled goal activated, they were relatively well able to concentrate on material that had nothing to do with that goal.

Studies 2 and 3 examined goal accessibility. In Study 2, thoughts about an upcoming exam intruded on a word completion task, indicating that exam-related thoughts were highly accessible. This effect was eliminated among participants who made a plan for when and how to study for the exam. Study 3 examined the accessibility of means of goal achievement. It used one goal that most young people embrace (to live a fit and healthy life) but that remains unfulfilled for most. Reflecting on this unfulfilled goal caused the various means of reaching it to become highly accessible, as indicated by answers on a word completion task. Once again, having made a plan eliminated the effect. The unique contribution of Study 3 was to show a drop in thoughts about all possible means of goal attainment and not merely alternative means to the one the person had planned to use. It thus showed that

the effects of plans on eliminating goal-related cognitive activity could not be reduced to the well-established pattern of goal shielding. Study 3 also showed that the various effects were obtained mainly among participants for whom the unfulfilled goal had high personal importance.

Study 4 replicated the effects of plans with an experimentally assigned task. An unfulfilled goal interfered with performance on a separate, unrelated task (solving anagrams), but making a plan once again eliminated the effect. More important, Study 4 showed that most participants did actually follow the plans they had made, and the degree to which they followed their plans was closely linked to the improvement in performance on the anagrams. Thus, the more people made plans that they were actually going to use, the more they were freed from intrusive thoughts while working on the unrelated task. It seems that what reduced cognitive activity from unfinished tasks was making highly specific plans that were actually going to be used to finish those tasks.

Last, Studies 5A and 5B found no changes in emotion as a result of plans. Unfulfilled tasks caused more anxiety and less contentment than did fulfilled ones. More important, plans did not alleviate anxiety or restore contentment. That was the case even though plans were effective at reducing intrusive thoughts during a reading task. Hence, plans can reduce thoughts of unfulfilled goals without necessarily altering goal-related emotions. The mere commitment to future goal-directed action is sufficient to reduce goal-related thoughts regardless of one's emotions.

## Implications

The present work revealed that people can commit to acting on a goal while simultaneously becoming more open to other pursuits. We found that when people formed a specific and effective plan, goal pursuit was suspended: Cognitive resources were reallocated to other, irrelevant tasks, and goal-directed action was delayed until execution of the specified plan. It is worth remarking on the distinction between this pattern of goal-related activity and that found in recent work on optimistic planning in goal pursuit. Zhang et al. (2007), for example, found that future plans can be detrimental to goal pursuit. They revealed that plans for the future can increase perceived goal progress, thereby decreasing the urgency of the goal and causing goal-inconsistent behavior. The present work dovetails nicely with that work in revealing the different consequences that result from two subtly different types of thoughts about the future: outcome-based thoughts and process-based thoughts.

The future-directed thinking that Zhang et al. (2007) examined approximated an outcome-based form of thinking (e.g., Taylor, Pham, Rivkin, & Armor, 1998). Zhang et al. examined thoughts that promoted optimistic expectations about future outcomes, such as by asking participants to describe how it would feel to complete a future workout (Study 2). Such outcome-based simulations have been shown to decrease goal-directed actions in the short and long term (Oettingen & Mayer, 2002; Pham & Taylor, 1999; Taylor et al., 1998). Consistent with that pattern, Zhang et al. found that reflecting on future success caused participants to be more optimistic about their progress and therefore to cease engaging in goal-directed behavior. Participants no longer felt a sense of urgency about the goal to exercise, and so they openly expressed an

interest in eating unhealthy food. Whether delayed benefits were present (i.e., whether participants exhibited an increase in exercise much later) was not measured, but past work suggests that long-term benefits as a result of the outcome simulations were unlikely (Oettingen & Mayer, 2002; Taylor et al., 1998).

The present work, in contrast, examined process-based rather than outcome-based thinking. Participants reflected on and committed to a specific plan for attaining their goals, which has been shown to greatly increase rather than decrease goal achievement (Gollwitzer, 1999; Taylor et al., 1998). The innovation of the present work was to suggest that, in addition to increasing goal attainment, commitment to specific plans can free cognitive resources for other pursuits. In our studies, the amount of thoughts and attention that unfulfilled goals demanded was drastically reduced once a plan was made, and performance on other, irrelevant tasks was significantly improved.

Our work therefore revealed how planning for the future can positively impact goal management. Zhang et al. (2007) showed, quite importantly, that a focus on future successes can be costly. Our work complements theirs by showing that thoughts of the future can be employed in a subtly different but hugely consequential manner. Our focus was on thoughts of future, goal-directed actions. By committing to specific plans of action, people can facilitate goal attainment, and, at the same time, limited cognitive resources can be better regulated to serve their multiple pursuits.

Future work may examine additional features of plan making that allow for cognitive resources to be redirected to other pursuits. We emphasized that plans ought to specify both a specific goal-directed action and when and where it will be executed (e.g., Gollwitzer, 1999). Study 5B helped to demonstrate that point. That study showed that reflecting on various potential plans of action was not sufficient to reduce activation from unfulfilled goals. Rather, one must have committed to a specific plan of action that one would execute. Study 4 suggested a further constraint, by implying that making an ineffective plan also was not sufficient. The mediation model in Study 4 showed that it was those who made successful plans in particular who ceased to exhibit interference from unfulfilled goals. To be sure, whether plans were successful was not experimentally manipulated, and so a causal effect of plan effectiveness was not demonstrated conclusively. Still, Studies 4 and 5B together suggest that goal activation may be reduced more by plans that contribute to goal pursuit than by vague and less helpful goal-related thinking.

Other factors may also determine whether a plan will counteract cognitive activation from a goal. As noted above, plans should focus not only on outcomes, lest they decrease one's motivation to pursue the goal. Instead, plans should focus on how the goal will be executed. Along those lines, successful plan making may require that a person simulate the planned-for behaviors. Indeed, evidence suggests that the power of future-directed thinking lies in large part in the ability to simulate future actions (e.g., Baumeister & Masicampo, 2010). If so, that may explain why specificity in one's plans is important (e.g., as demonstrated in Study 5B). By simulating a specific plan of action, responses can be altered in service of the goal, thereby enabling a person to focus on other tasks in the interim.

Future work may also examine whether plan structure is important for reducing cognitive effects of unfulfilled goals. Most of the

studies in the present paper called for plans that specified how, when, and where goals would be executed. Otherwise, no specific structure was imposed on people's plans. In contrast, other work has called for plans in the form of if-then statements (e.g., "If  $x$  happens, then I will do  $y$ !"); Gollwitzer, 1999). The present work revealed that such if-then commitments were not necessary to eliminate activation of unfulfilled goals. Still, prior work has revealed benefits of if-then plans over and above the type of plans used in the present work (Oettingen, Hönig, & Gollwitzer, 200). It is therefore possible that if-then plans may have even stronger deactivating effects on unfulfilled goals than those that were observed presently.

Some degree of optimism about one's plans may also be important. If the plan is not optimistic enough, it may make goal pursuit seem more daunting, thereby increasing anxiety and focus on the goal. A plan may have to be well within a person's ability in order to have the effects observed in the present work.

Although the present work examined how eliminating cognitive activation from unfulfilled goals can be beneficial, future work may examine whether it is sometimes maladaptive. The present studies revealed that plan making allows a person to focus on other tasks unrelated to the unfulfilled goal. At the same time, however, plans may push a goal out of one's mind, thereby making it more difficult to notice and seize new opportunities for fulfilling the goal (Masicampo & Baumeister, in press). Future work may elaborate on the consequences of committing to plans for one's goals, including by examining both the costs and the benefits that doing so provides (e.g., Bayuk, Janiszewski, & Leboeuf, 2010; Parks-Stamm, Gollwitzer, & Oettingen, 2007).

**Relevance for conscious-unconscious interactions.** The findings from this investigation may shed light on how conscious and unconscious processes interact and complement each other in goal pursuit. Some theorists have concluded that unconscious systems regulate goal pursuit regardless of conscious thought (Bargh, 2007), due to research showing that many aspects of goal pursuit are initiated and guided by unconscious processes (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001; Bargh & Morsella, 2008). From that perspective, intrusive thoughts about unfulfilled goals are merely signs that the unconscious is continuing to work toward those goals. The conscious intrusions themselves serve no function. An alternative view, however, is that the intrusions represent a means by which the unconscious gets the conscious mind to help resolve the unfulfilled goal. The present findings are consistent with the second view. One way that conscious thought contributes to goal pursuit, according to various theories, is through anticipating and planning for the future (Baumeister, Masicampo, & Vohs, 2011; Schacter & Addis, 2007; Suddendorf, 2006). We found that once conscious plans for unfulfilled goals were made, the intrusive thoughts from those goals ceased. The implication is that the purpose of the intrusions was satisfied by plan making. The unconscious manages goal pursuit (Bargh, 2007), but sometimes it calls on the conscious mind to help by formulating plans.

The present results are thus compatible with views advocated by Bargh (2007); Bargh and Morsella (2008), and others holding that automatic, unconscious processes may generally be the direct causes of behavior. In order to do so, however, it may be useful or even necessary for the unconscious to have highly specific directives for action. Conscious thought may in that respect be useful

for translating broad intentions and abstract values into specific plans (Baumeister et al., 2011). The thought "I should exercise" may be disturbing to the unconscious because it calls attention to unmet goals, and so in a sense it leaves the powerful unconscious mind not knowing how to proceed. But once the conscious mind articulates "I will go jogging tomorrow after my sociology class," the unconscious knows precisely how to proceed. It no longer needs to bother the conscious mind with intrusive thoughts about exercise. It can wait until sociology class is over, whereupon the exercising plan will be implemented.

The present results may also point to a limitation of self-organization as described in dynamical systems theories (Carver & Scheier, 2002; Kelso, 1995). Self-organization refers to the automatic bottom-up process by which stable, high-order states emerge from multiple, interacting lower level processes. In most cases, the unconscious achieves self-organization quite well, including in the realm of goal pursuit (Carver & Scheier, 2002). The present work, however, suggests that interrupted goals represent a special case that exceeds the self-organizing capacity of the unconscious. Only when a conscious plan is made does an unfulfilled goal seem to settle into a stable state. Until then, the disturbance from unfulfilled goals seems to persist in the mind, intruding into one's thoughts and interfering with other tasks.

**Other ways to reduce goal activation.** One limitation of the present work is that it focuses only on planning, and so it does not address whether other processes could also satisfy intrusions from unfulfilled goals. To make a plan is only one of many contributions that a person can make to goal pursuit. One may facilitate goal pursuit in others ways, such as by delegating tasks to others (Fitzsimons & Finkel, 2011). So long as urgency of the goal is lessened and the need to act delayed, goal accessibility may be reduced.

Goal activation may be reduced in a number of ways that do not involve progress toward attainment. Someone in need of exercise can recall a short walk taken hours before and decide that that was enough activity for the day. That would be quite different from planning, but it too could indicate that action need not be taken in the present moment. Another option could be to rationalize that the goal is not important and therefore disengage from the goal entirely. That would be arguably much less productive than planning. Nevertheless, it indicates an alternative thought process that could signal that the goal is no longer a pressing concern. That is, it could induce a sense of closure to one's thought processes surrounding the goal, and that could therefore lead to suppression or inhibition of goal-directed thinking (e.g., Liberman, Förster, & Higgins, 2007; Martin, 1986). How these and other processes affect goal pursuit, including the persistent activation of unfulfilled goals, requires further exploration.

## Conclusion

The human mind is remarkably persistent in its pursuits, often even disturbingly so. Intrusive thoughts remind people of their unfulfilled goals, including to the point of interfering with other tasks. The present results, however, suggest an alternative possibility.

By planning for their goals, people can better manage their multiple pursuits. It has been well documented that specific plans increase success (Gollwitzer, 1999), doing so in part by making



goal pursuit more automatic. Once a detailed plan has been made, one no longer has to think about the goal to execute it (Brandstätter et al., 2001). Apparently, a plan reduces the amount of thoughts and attention that are typically recruited in service of an unfulfilled goal. Thoughts of an incomplete goal will not interfere with current concerns so long as a plan has been made to see the goal through later on.

The capacity to plan may be crucial to human nature, inasmuch as planning and thinking ahead is a uniquely human capacity (Suddendorf, 2006). Plan making may be particularly important for self-regulation and multiple goal management. Although most animals are defined by a few simple needs and goals, humans often pursue well over a dozen goals at a time (Little, 1988). The ability to plan ahead for each goal may be critical for pursuing so many goals at once. If the mind had to focus on each goal through attainment, the pursuit of any one goal would need to compete with all the other goals for limited cognitive resources. The formation of a plan may help to avoid this problem. A plan increases one's odds of attaining a goal and simultaneously reduces the cognitive activities that promote the goal. By suspending cognitive activity, one can minimize competition and reduce the potential for distraction and interference. Thus, the ability to plan ahead may be crucial for enabling the wide variety of pursuits that define human life.

## References

- Bargh, J. A. (2007). Social psychological approaches to studying consciousness. In P. Zelazo, M. Moscovitch, & E. Thompson (Eds.), *The Cambridge handbook of consciousness* (pp. 553–567). New York, NY: Cambridge University Press.
- Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81*, 1014–1027. doi:10.1037/0022-3514.81.6.1014
- Bargh, J. A., & Morsella, E. (2008). The unconscious mind. *Perspectives on Psychological Science, 3*, 73–79. doi:10.1111/j.1745-6916.2008.00064.x
- Baumeister, R. F., & Masicampo, E. J. (2010). Conscious thought is for facilitating social and cultural interactions: How mental simulations serve the animal–culture interface. *Psychological Review, 117*, 945–971. doi:10.1037/a0019393
- Baumeister, R. F., Masicampo, E. J., & Vohs, K. D. (2011). Do conscious thoughts cause behavior? *Annual Review of Psychology, 62*, 331–361. doi:10.1146/annurev.psych.093008.131126
- Bayuk, J. B., Janiszewski, C., & Leboeuf, R. A. (2010). Letting good opportunities pass us by: Examining the role of mind-set during goal pursuit. *Journal of Consumer Research, 37*, 570–583. doi:10.1086/654892
- Brandstätter, V., Lengfelder, A., & Gollwitzer, P. M. (2001). Implementation intentions and efficient action initiation. *Journal of Personality and Social Psychology, 81*, 946–960. doi:10.1037/0022-3514.81.5.946
- Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal and Social Psychology, 42*, 33–44. doi:10.1037/h0058484
- Buhrmester, M. D., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6*, 3–5. doi:10.1177/1745691610393980
- Carver, C. S., & Scheier, M. F. (2002). Control processes and self-organization as complementary principles underlying behavior. *Personality and Social Psychology Review, 6*, 304–315. doi:10.1207/S15327957PSPR0604\_05
- Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671–684. doi:10.1016/S0022-5371(72)80001-X
- Dijksterhuis, A., Aarts, H., & Smith, P. K. (2005). The power of the subliminal: Subliminal perception and possible applications. In R. Hassin, J. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 77–106). New York, NY: Oxford University Press
- Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effects of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology, 87*, 557–572. doi:10.1037/0022-3514.87.5.557
- Fitzsimons, G. M., & Finkel, E. J. (2011). Outsourcing self-regulation. *Psychological Science, 22*, 369–375. doi:10.1177/0956797610397955
- Förster, J., Liberman, N., & Friedman, R. S. (2007). Seven principles of goal activation: A systematic approach to distinguishing goal priming from priming of non-goal constructs. *Personality and Social Psychology Review, 11*, 211–233. doi:10.1177/1088868307303029
- Förster, J., Liberman, N., & Higgins, E. T. (2005). Accessibility from active and fulfilled goals. *Journal of Experimental Social Psychology, 41*, 220–239. doi:10.1016/j.jesp.2004.06.009
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*, 493–503. doi:10.1037/0003-066X.54.7.493
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology, 73*, 186–199. doi:10.1037/0022-3514.73.1.186
- Gollwitzer, P. M., & Schaal, B. (1998). Metacognition in action: The importance of implementation intentions. *Personality and Social Psychology Review, 2*, 124–136.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology, 38*, 69–119. doi:10.1016/S0065-2601(06)38002-1
- Goschke, T., & Kuhl, J. (1993). Representation of intentions: Persisting activation in memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*, 1211–1226. doi:10.1037/0278-7393.19.5.1211
- James, W. (1890). *The principles of psychology: Vol. 1*. New York, NY: Holt. doi:10.1037/10538-000
- Jarvis, B. G. (2008). MediaLab (Version 2008.1.33) [Computer software]. New York, NY: Empirisoft.
- Kelso, J. A. S. (1995). *Dynamic patterns: The self-organization of brain and behavior*. Boston, MA: MIT Press.
- Klinger, E. (1975). Consequences of commitment to and disengagement from incentives. *Psychological Review, 82*, 1–25. doi:10.1037/h0076171
- Klinger, E. (1977). *Meaning and void: Inner experience and the incentives in people's lives*. Minneapolis: University of Minnesota Press.
- Kuhl, J., & Helle, P. (1986). Motivational and volitional determinants of depression: The degenerated-intention hypothesis. *Journal of Abnormal Psychology, 95*, 247–251. doi:10.1037/0021-843X.95.3.247
- Lambert, W. W., Solomon, R. L., & Watson, P. D. (1949). Reinforcement and extinction as factors in size estimation. *Journal of Experimental Psychology, 39*, 637–641. doi:10.1037/h0060637
- Lewin, K. (1935). *A dynamic theory of personality: Selected papers* (D. K. Adams & K. E. Zener, Trans.). New York, NY: McGraw-Hill.
- Liberman, N., & Förster, J. (2008). Expectancy, value and psychological distance: A new look at goal gradients. *Social Cognition, 26*, 515–533. doi:10.1521/soco.2008.26.5.515
- Liberman, N., Förster, J., & Higgins, E. T. (2007). Completed vs. interrupted priming: Reducing accessibility from post-fulfillment inhibition. *Journal of Experimental Social Psychology, 43*, 258–264. doi:10.1016/j.jesp.2006.01.006
- Little, B. R. (1988). Personal projects analysis: Trivial pursuits, magnificent obsessions, and the search for coherence. In D. Buss & N. Cantor

- (Eds.), *Personality psychology: Recent trends and emerging directions* (pp. 15–31). New York, NY: Springer-Verlag.
- Maner, J. K., Kenrick, D. T., Becker, D. V., Robertson, T. E., Hofer, B., Neuberg, S. L., . . . Schaller, M. (2005). Functional projection: How fundamental social motives can bias interpersonal perception. *Journal of Personality and Social Psychology, 88*, 63–78. doi:10.1037/0022-3514.88.1.63
- Marrow, A. J. (1938a). Goal tensions and recall: I. *Journal of General Psychology, 19*, 3–35. doi:10.1080/00221309.1938.9711185
- Marrow, A. J. (1938b). Goal tensions and recall: II. *Journal of General Psychology, 19*, 37–64. doi:10.1080/00221309.1938.9711186
- Martin, L. L. (1986). Set/reset: Use and disuse of concepts in impression formation. *Journal of Personality and Social Psychology, 51*, 493–504. doi:10.1037/0022-3514.51.3.493
- Martin, L. L., & Tesser, A. (1989). Toward a motivational and structural theory of ruminative thought. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 306–326). New York, NY: Guilford Press.
- Masicampo, E. J., & Baumeister, R. F. (2011). Unfulfilled goals interfere with tasks that require executive functions. *Journal of Experimental Social Psychology, 47*, 300–311. doi:10.1016/j.jesp.2010.10.011
- Masicampo, E. J., & Baumeister, R. F. (in press). Committed but closed-minded: When making a specific plan for a goal hinders success. *Social Cognition*.
- Miller, N. E. (1944). Experimental studies of conflict. In J. M. Hunt (Ed.), *Personality and the behavior disorders* (Vol. 1, pp. 431–465). New York, NY: Ronald Press.
- Moskowitz, G. B. (2002). Preconscious effects of temporary goals on attention. *Journal of Experimental Social Psychology, 38*, 397–404. doi:10.1016/S0022-1031(02)00001-X
- Oettingen, G., Hönig, G., & Gollwitzer, P. M. (2000). Effective self-regulation of goal attainment. *International Journal of Education Research, 33*, 705–732.
- Oettingen, G., & Mayer, D. (2002). The motivating function of thinking about the future: Expectations versus fantasies. *Journal of Personality and Social Psychology, 83*, 1198–1212. doi:10.1037/0022-3514.83.5.1198
- Orbell, S., Hodgkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin, 23*, 945–954. doi:10.1177/0146167297239004
- Parks-Stamm, E. J., Gollwitzer, P. M., & Oettingen, G. (2007). Action control by implementation intentions: Effective cue detection and efficient response initiation. *Social Cognition, 25*, 248–266. doi:10.1521/soco.2007.25.2.248
- Pham, L. B., & Taylor, S. E. (1999). From thought to action: Effects of process- versus outcome-based mental simulations on performance. *Personality and Social Psychology Bulletin, 25*, 250–260. doi:10.1177/0146167299025002010
- Schacter, D. L., & Addis, D. R. (2007, January 4). The ghosts of past and future: A memory that works by piecing together bits of the past may be better suited to simulating future events than one that is a store of perfect records. *Nature, 445*, 27. doi:10.1038/445027a
- Shah, J. Y., Friedman, R., & Kruglanski, A. W. (2002). Forgetting all else: On the antecedents and consequences of goal shielding. *Journal of Personality and Social Psychology, 83*, 1261–1280. doi:10.1037/0022-3514.83.6.1261
- Sheeran, P., & Orbell, S. (1999). Implementation intentions and repeated behaviour: Augmenting the predictive validity of the theory of planned behaviour. *European Journal of Social Psychology, 29*, 349–369.
- Sheeran, P., Webb, T. L., & Gollwitzer, P. M. (2005). The interplay between goal intentions and implementation intentions. *Personality and Social Psychology Bulletin, 31*, 87–98. doi:10.1177/0146167204271308
- Smallwood, J., McSpadden, M., & Schooler, J. W. (2008). When attention matters: The curious incident of the wandering mind. *Memory & Cognition, 36*, 1144–1150. doi:10.3758/MC.36.6.1144
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology 1982* (pp. 290–312). Washington, DC: American Sociological Association.
- Suddendorf, T. (2006, May 19). Foresight and evolution of the human mind. *Science, 312*, 1006–1007. doi:10.1126/science.1129217
- Taylor, S. E., Pham, L. B., Rivkin, I. D., & Armor, D. A. (1998). Harnessing the imagination: Mental simulation, self-regulation, and coping. *American Psychologist, 53*, 429–439. doi:10.1037/0003-066X.53.4.429
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110*, 403–421. doi:10.1037/0033-295X.110.3.403
- Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review, 94*, 3–15. doi:10.1037/0033-295X.94.1.3
- Webb, T. L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology, 39*, 279–286. doi:10.1016/S0022-1031(02)00527-9
- Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin, 132*, 249–268. doi:10.1037/0033-2909.132.2.249
- Webb, T. L., & Sheeran, P. (2007). How do implementation intentions promote goal attainment? A test of component processes. *Journal of Experimental Social Psychology, 43*, 295–302. doi:10.1016/j.jesp.2006.02.001
- Webb, T. L., & Sheeran, P. (2008). Mechanisms of implementation intention effects: The role of goal intentions, self-efficacy, and accessibility of plan components. *British Journal of Social Psychology, 47*, 373–395. doi:10.1348/014466607X267010
- Wicklund, R. A., & Gollwitzer, P. M. (1981). Symbolic self-completion, attempted influence, and self-deprecation. *Basic and Applied Social Psychology, 2*(2), 89–114. doi:10.1207/s15324834basps0202\_2
- Zeigarnik, B. (1927). Über das Behalten von erledigten und unerledigten Handlungen [On the retention of completed and uncompleted transactions]. *Psychologische Forschung, 9*, 1–85.
- Zeigarnik, B. (1938). On finished and unfinished tasks. In W. D. Ellis (Ed. & Trans.), *A source book of gestalt psychology* (pp. 300–314). New York, NY: Harcourt Brace.
- Zhang, Y., Fishbach, A., & Dhar, R. (2007). When thinking beats doing: The role of optimistic expectations in goal-based choice. *Journal of Consumer Research, 34*, 567–578. doi:10.1086/520071

Received June 5, 2010

Revision received April 23, 2011

Accepted April 24, 2011 ■