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Counteracting Obstacles With Optimistic Predictions

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This research tested for counteractive optimism: a self-control strategy of generating optimistic predictions of future goal attainment in order to overcome anticipated obstacles in goal pursuit. In support of the counteractive optimism model, participants in 5 studies predicted better performance, more time invested in goal activities, and lower health risks when they anticipated high (vs. low) obstacles in pursuing their goals. These predictions in turn motivated pursuing the goals. These studies further revealed that emphasizing accuracy in predictions reverses the effect of anticipated obstacles on predictions and negatively affects the process of overcoming obstacles in goal pursuit.

Keywords: goals, self-control, self-regulation, optimism

In the course of pursuing their everyday goals, people often anticipate obstacles, hindrances, or complications that may undermine goal attainment. For example, potential homeowners may be concerned that vacation expenses may interfere with their goal of saving for a new house, or students may worry that an interesting television show could undermine their goal of completing their coursework on time. Although people are typically optimistic about their future goal attainment (Buehler, Griffin, & Ross, 1994; Dunning, Meyerowitz, & Holzberg, 1989; Shepperd, Ouellette, & Fernandez, 1996; Weinstein, 1980), it is less clear how the anticipation of specific obstacles may influence people's level of optimism in predictions and what behavioral consequences making such predictions may have.

To address this issue, in this article we provide a self-control analysis of the impact of anticipated obstacles on individuals' predictions of future goal pursuit and, subsequently, their actual effort investment in these goals. For example, we examined whether students who anticipate watching an interesting television show will predict that they need more or less time to complete their homework that night and how these predictions might in turn affect their actual effort to complete the assignments. Similarly, we asked whether anticipated obstacles in preventing diseases make people more or less optimistic about their personal risk level and how these predictions might in turn affect their subsequent health behaviors.

Counteractive Control

People exercise self-control when they anticipate obstacles in the pursuit of important goals (Gollwitzer, Bayer, & McCulloch, 2005; Loewenstein, 1996; Mischel, Cantor, & Feldman, 1996; Muraven & Baumeister, 2000; Rachlin, 2000; Thaler & Shefrin, 1981). Such obstacles may be inherent to the goal pursuit—for example, when the goal is difficult or uninteresting and pursuing it requires overcoming these immediate costs (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Brehm, 1966; Higgins & Trope, 1990). Alternatively, obstacles may stem from the presence of competing motivations or temptations, as a person's pursuit of these tempting activities comes at the price of forgoing the more important goal (Mischel & Ayduk, 2004).

Research on counteractive control addresses the self-control operations people employ to prevent obstacles from undermining their goal attainment (Fishbach & Trope, 2005; Fishbach, Zhang, & Trope, 2009; Trope & Fishbach, 2000). According to this research, the anticipation of obstacles triggers self-control operations designed to maintain a person's motivation toward a goal that provides long-term benefits. Specifically, counteractive control operations act on the motivational strengths of action alternatives: They increase the strength of the goal and decrease the strength of interfering alternatives. The magnitude of the counteractive operation in turn corresponds to the magnitude of the obstacle, such that stronger obstacles trigger stronger counteractive responses. For example, a student will exercise greater self-control when studying in a dorm full of video games than in the library, because the presence of tempting distractions poses a threat to the goal of studying.

Self-control operations can take different forms. For instance, anticipating a self-control problem, individuals may choose to impose penalties for failing in goal pursuit, make rewards contingent on success, or limit the presence of tempting items from their environment (e.g., cigarettes, alcohol, and high-calorie food) in order to make a self-control act irreversible (Ainslie, 1975; Becker, 1960; Green & Rachlin, 1996; Rachlin & Green, 1972; Schelling, 1978, 1984; Strotz, 1956; Thaler, 1991; Thaler & Shefrin, 1981). In addition, individuals often employ more subtle strategies that modulate the psychological meaning of their actions (Fishbach, Friedman, & Kruglanski, 2003); for example, they elaborate on what makes pursuing the goal more valuable (Fishbach et al., 2009; Kuhl, 1986; Mischel, 1984; Myrseth, Fishbach, & Trope, 2009), or they employ an abstract, cognitive, and "cool" representation of the self-control problem, which facilitates goal adherence

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(Fujita, Trope, Liberman, & Levin-Sagi, 2006; Mischel & Ayduk, 2004).

Whereas existing research addresses self-control operations that modulate the availability and mental representation of choice alternatives, the present investigation addresses how performance expectations can be employed as a self-control instrument to motivate goal pursuit. Specifically, we explore *counteractive optimism*—a strategy of generating more optimistic predictions of future goal attainment in response to anticipated obstacles. We propose that such counteractive optimistic predictions help maintain the motivation to pursue a goal when anticipated obstacles may undermine the goal's successful attainment.

Counteractive Optimism

Thinking about and predicting future outcomes are basic human tendencies. People constantly assess their ability to carry out certain actions (i.e., self-efficacy; Bandura, 1997); the likelihood that some events will occur (Heckhausen, 1991; Oettingen & Wadden, 1991); the consequences of actions (Mischel, 1966; Rotter, 1954); and, in general, the positivity or negativity of the days to come (Scheier & Carver, 1992). A major characteristic of these predictions is that they tend to be optimistic. For example, people estimate health risks as lower than they actually are (Taylor & Gollwitzer, 1995) and underestimate task completion times ("the planning fallacy"; Buehler et al., 1994; Burt & Kemp, 1994). In addition, according to research on comparative optimism (Weinstein, 1980), people expect to outperform their counterparts on various future tasks (e.g., athletic competitions; Allison, Messick, & Goethals, 1989; Brown, 1986; Chambers & Windschitl, 2004; Kruger & Dunning, 1999; Kunda, 1987; Svenson, 1981).

These optimistic predictions often increase people's motivation to attain them; hence, they function as performance standards that direct efforts toward meeting the standard (Ajzen, 1985; Armor & Taylor, 2002; Atkinson & Feather, 1966; Gollwitzer, 1990; Heath, Larrick, & Wu, 1999; Kruglanski, 1996; Oettingen & Mayer, 2002; Sherman, Skov, Hervitz, & Stock, 1981). A more optimistic prediction translates into a more challenging standard, which evokes more effort in meeting the standard. In addition, the optimistic predictions increase beliefs of self-efficacy and improve progress monitoring, both of which facilitate goal pursuit (Bandura, 1997; Schunk, 1995). For example, in Sherman's (1980) research, people were overly optimistic when asked to predict their tendency to engage in a socially desirable act, and stating such optimistic predictions had a self-fulfilling prophecy, such that those who predicted the likelihood they would agree to volunteer in a charitable activity were more likely to actually participate than those who made no predictions.

However, it is still unclear in the existing literature whether people voluntarily make optimistic predictions as a self-control strategy in order to motivate effort investment and, if they do, under what conditions. We propose that because high performance standards elicit greater effort (Locke & Latham, 1990; Wright & Brehm, 1989), people engage in counteractive optimism: They strategically and counteractively predict better or faster future goal attainment when they foresee obstacles in goal pursuit. Specifically, according to counteractive optimism, when people anticipate high (vs. low) obstacles, they predict better performance, which in turn increases effort investment in pursuing this goal. For example, we expect that when people anticipate that certain distractions may delay the completion of an important task, they predict an earlier completion time than if they do not anticipate the distractions. This more challenging self-imposed deadline motivates people to raise their effort and minimizes the impact of the distractions on the actual completion time.

Predicting better performance in response to anticipated obstacles is optimistic because individuals expect better outcomes when "the going gets tough"; that is, the goal pursuit becomes more difficult and, given the same level of effort investment, the likelihood of success decreases. For example, a person is optimistic if she believes her personal risk level for a particular health problem is lower if her gender or ethnicity puts her at a higher risk level. The basic unit of comparison for the counteractive optimism hypothesis involves predictions a person makes when she anticipates low versus high obstacles in goal pursuit. If the person expects better performance when doing well is objectively more difficult, and if such predictions motivate effort investment, the person exhibits counteractive optimism. With this in mind, we note that counteractive optimism does not necessarily increase the discrepancy between anticipated and actual outcomes (see, e.g., Byram, 1997; Kruger, 1999; Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000), because even though obstacles directly decrease the likelihood of successful outcomes, counteractive optimism increases effort investment, which increases pursuit of these outcomes. As a result of counteractive optimism, a person could even improve the actual outcomes by anticipating obstacles, because she will work harder to achieve the goal.

We further predict that because counteractive optimism is an instrumental self-control response, we should observe this prediction pattern only when individuals believe the obstacles are under their personal control. If the obstacle is beyond a person's control, it should not activate counteractive optimism, because self-control operations offer little instrumental value in protecting goal attainment. For example, when anticipating obstacles to maintaining good health, only those who believe their health conditions depend on their behaviors (vs. genes) would state optimistic predictions of healthy food consumption and exercising and alter their behaviors accordingly. In addition, as we discuss in the next section, counteractive optimism depends on whether a person is concerned about motivating actions or about being accurate in the predictions.

Accurate Versus Optimistic Predictions

Counteractive optimism increases a person's motivation to pursue a goal, but this motivational benefit may come at the expense of stating a potentially less accurate prediction. The presence of obstacles increases the difficulty of pursuing a goal, and unless a person exerts more effort, a more conservative rather than optimistic prediction will be more accurate. For example, if a person expects certain obstacles to interfere with task completion time, she should predict a later completion time if she wishes to be accurate, because she can secure meeting the later deadline even if she fails to increase her efforts.

Providing accurate predictions is often socially desirable, as the importance of coordination often exceeds that of improving individual performance. Accurate predictions facilitate planning among people, and they minimize the potential conflicts between sequential tasks. In addition, accurate predictions are valued by others, who would often incentivize accuracy (Chen, Shechter, & Chaiken, 1996; Kruglanski, 1989; Tetlock, 1983) and criticize miscalibrated predictions (Connolly & Dean, 1997; Hall, 1980; Hiroto & Seligman, 1975). Indeed, employers, parents, and educators often encourage others to provide accurate predictions of their task completion times or level of performance, and they may further condition social and material incentives on meeting self-imposed deadlines or standards of performance.

Whenever the incentives for providing an accurate prediction outweigh the incentives for improving performance, people will not counteract obstacles with optimistic predictions, because they cannot be sure they will invest additional effort. Rather, people may try to correct for the negative impact of obstacles by stating a more conservative, that is, a "safer," prediction that is easier to meet. In support of this idea, research has shown that people switch to more realistic (less positive) thinking when accuracy matters (e.g., switch from an implementing to a deliberative mind set; Taylor & Gollwitzer, 1995). We predict that when accuracy is of considerable importance, people will adjust their predictions downward to account for obstacles rather than counteract them. Then, because less optimistic standards also set less motivating standards, we further expect individuals who make conservative predictions to invest less effort in pursuing the goal, because they expect to meet a less demanding standard.

It is interesting that a desire to be accurate might not improve one's actual accuracy, and these "safer" predictions may nonetheless be biased compared with actual performance. Specifically, because people withdraw effort as a result of stating a more conservative prediction, the prediction–performance discrepancy (i.e., the optimism bias) remains intact. For the same reason, we expect that counteractive optimistic predictions do not necessarily increase the size of the prediction–performance discrepancy, because people work harder after making an optimistic prediction.

In what follows, we report five studies that tested for counteractive optimism. These studies manipulated the anticipated level of obstacles in the pursuit of a goal and the incentive to perform well versus state an accurate prediction. The studies tested the hypothesis that high (vs. low) obstacles will produce more optimistic predictions and greater effort investment in goal-related tasks unless participants are concerned about the accuracy of their predictions, in which case high (vs. low) obstacles will produce more conservative predictions and reduce effort investment.

Study 1: Optimistic Predictions Increase Task Persistence

We conducted Study 1 to test whether people predict they will do better on a task that is supposedly more (vs. less) challenging and whether stating these predictions increases effort investment in the more challenging task. We hypothesized that unless participants stated their performance predictions, the presence of challenges alone would not increase their effort investment, because obstacles or challenges do not increase effort directly but rather only through the operation of self-control.

We manipulated anticipated challenge by inviting Study 1 participants to complete a lexical (anagram) task we described as either difficult or easy. Previous research (Higgins & Trope, 1990) has shown that task difficulty and the resultant lower attainment expectancy pose an obstacle. Before completing the task, half of the participants predicted their performance level relative to other participants (a comparative judgment; e.g., Weinstein, 1980). We used a comparative judgment because to outperform others, one needs to invest extra effort. Therefore, enunciating a better (vs. similar) performance relative to others sets a standard that would motivate the person to work harder.

Next, the participants completed the task, which was moderately difficult and partially unsolvable. We assessed participants' performance motivation by the amount of time they persisted in trying to solve this task (e.g., Muraven, Tice, & Baumeister, 1998). We hypothesized that participants who stated their performance predictions would display a pattern of counteractive optimism: They would expect to do better when they anticipated the task would be difficult rather than easy. Consequently, they would persist longer on a task they expected would be difficult (vs. easy). We also predicted that, in contrast, anticipated difficulty would not affect persistence among those who did not make predictions and were therefore less prepared to overcome the obstacle.

Method

Participants. We recruited 191 undergraduate students from the University of Texas (102 women, 89 men) to complete the study for partial class credit and an opportunity to win a monetary prize. There was no effect for gender in this study or in subsequent studies; thus, we omit it from further analysis.

Procedure. This study used a 2 (anticipated obstacle level: high vs. low) $\times$ 2 (prediction of performance: yes vs. no) between-subjects design. Participants completed the study on a computer in individual study spaces. The study was titled "Verbal Abilities" and included completion of an anagram task. Onscreen instructions explained that the anagram task required rearranging the letters of several target words into up to three new words that contained an identical letter combination (e.g., *times* can make *items, mites,* and *emits; seat* can make *east, teas,* and *eats*). Participants' task was to come up with as many valid solutions as they could for each word. We emphasized the importance of successful performance by having all participants read that performance on an anagram task is a reliable measure of verbal ability. We further offered them a performance-based bonus: They read that the top 25% of performers would enter a lottery for two $50 gift cards, and the 2nd quartile of performers would enter a lottery for two $25 gift cards.

Next, we manipulated anticipated obstacles to success by advising participants in the high-obstacle condition that "based on the experience of our past participants, the task will be relatively difficult." Participants in the low-obstacle condition read that the task would be relatively easy. Participants in the two prediction conditions further read that the researchers wanted to know how well they expected to perform in the task. They stated their predictions on the following comparative judgment scale: "I expect to do better than _____ % of all participants in this task" (e.g., Svenson, 1981; Zuckerman & Jost, 2001). The rest of the participants continued directly to the anagram task without stating their performance predictions.

All participants then completed the anagram task. On each of the eight trials, a target word appeared at the top of the screen with three blank spaces below it. Participants could generate up to three solutions before they clicked *continue* to move on to the next trial. Overall, of the eight trials, six had three correct solutions (e.g., *rose*, *reader*), one trial had two correct solutions, and the last trial had no correct solutions. By embedding these unsolvable items, we ensured that no one was able to successfully complete the task, allowing us to assess effort investment by the time participants persisted on the task. After participants completed the anagram task, the experimenter debriefed and dismissed them.

Results and Discussion

Participants who made predictions displayed the above-average effect (Svenson, 1981), expecting on average they would do better than 50% of the participants ($M = 61\%$, $SD = 20$), $t(96) = 5.00$, $p < .01$. More important, among those who made predictions, we obtained a pattern of counteractive optimism: Those who expected a difficult task predicted a better comparative performance ($M = 66\%$, $SD = 19$) than those who expected an easy task ($M = 54\%$, $SD = 23$), $t(95) = 2.67$, $p < .05$.

We assessed participants' task motivation by the total amount of time they persisted on the anagram task. An analysis of variance (ANOVA) of persistence yielded the hypothesized Performance Prediction × Expected Difficulty interaction, $F(1, 187) = 6.23$, $p < .05$. As shown in Figure 1, among those who predicted their performance before commencing the task, anticipating a difficult task increased persistence ($M = 7.91$ min, $SD = 3.64$) compared with anticipating an easy task ($M = 6.29$ min, $SD = 3.02$), $t(95) = 2.15$, $p < .05$. In contrast, among those who did not make predictions, there was no effect for anticipated difficulty on persistence (difficult task: $M = 6.76$ min, $SD = 3.42$; easy task: $M = 7.37$ min, $SD = 3.28$), $t(92) = -1.34$, *ns*.[1]

We assumed that participants' performance predictions would motivate persistence on the unsolvable task. Indeed, among those who predicted their performance level, predictions were positively related to the time they persisted on the anagram task, $r = .20$, $p < .05$.

These results provide initial support for counteractive optimism: Participants predicted they would perform better than others, and even more so when they anticipated that the task would be difficult than when they anticipated that the task would be easy. In turn, these participants invested more effort in the anagram task that was said to be difficult (vs. easy). In contrast, the participants who did not state predictions did not invest more effort in the anagram task we said would be difficult (vs. easy). This pattern further rules out a potential alternative that participants adjusted their effort not because of the counteractive optimistic predictions but because they perceived that high effort would be necessary for tackling a difficult task. If the latter were the case, we would have observed an increased effort from all participants who expected a difficult task, and not just the ones who stated a prediction. Thus, we can conclude that the increases in effort were consequences of the counteractive optimistic predictions; when such predictions were absent, participants did not increase effort. Results from this study further highlight one important distinction between counteractive optimism and achievement motivation (Atkinson & Feather, 1966), in particular, the energization model (Wright & Brehm, 1989). Whereas the latter predicts a direct positive impact of task difficulty on increasing effort, we found that only if people engage in counteractive optimism do they increase their efforts when expecting a more difficult task.

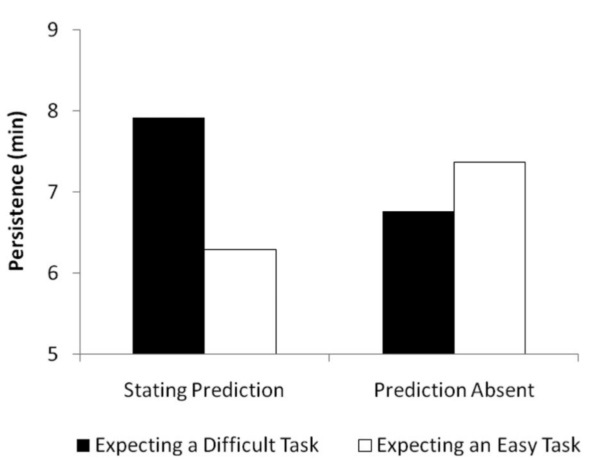

Figure 1. Task persistence as a function of anticipated obstacle (expecting an easy vs. a difficult task) and whether participants predicted their performance level.

It is important to note that stated predictions motivated performance although participants made those predictions on a scale that was different from the one we used to assess effort investment. They made the stated predictions on comparative judgment scales, whereas we assessed participants' performance according to their persistence. We can therefore conclude that predictions motivate effort investment even if individuals cannot directly measure their effort against the standard, for example, by matching the amount of time they spend on the task to how long they predicted they would persist at it.

In the following studies, we tested the tradeoff between making predictions as a self-control device and making predictions for the sake of accuracy. We hypothesized that people counteract obstacles with optimism when the importance of being accurate is relatively low. When accuracy matters, they state safer predictions that they expect will be easy to meet. Then anticipated obstacles will result in more conservative, rather than optimistic, predictions. Specifically, in Study 2, we tested whether people counteract obstacles by planning to devote more time to goal-related activities and less time to competing tempting activities. We expected that this pattern would emerge as long as people were not trying to be accurate.

Study 2: Academic Versus Leisure Activities

Study 2 participants were undergraduate students who predicted the amount of time they would spend on academic, goal-related activities versus nonacademic, leisure activities. To succeed academically, these students wished to spend more time studying (i.e., pursuing the goal) and less time on leisure (i.e., pursuing the temptation). We operationalized anticipated obstacles as aware-

[1] Although our predictions refer to task persistence, we also collected data on task performance (i.e., the number of words participants generated). Similarly, we obtained a Prediction × Expected Difficulty interaction for performance, $F(1, 187) = 5.73$, $p < .05$. However, the number of words participants generated was not related to persistence ($r = .08$, *ns*), suggesting that variables other than the amount of effort participants invested in the task influenced performance (e.g., linguistic skills). Thus, we omit this variable from further consideration.

ness of the self-control conflict between the two types of activities. We hypothesized that those who were aware of the conflict would predict more time invested in academics and less in leisure compared with those who were less aware of the conflict. We further hypothesized that this pattern would disappear when we encouraged participants to give an accurate prediction.

Specifically, we manipulated awareness of the conflict by varying the order of the predictions. Participants who first predicted the time spent on academics were unaware of the self-control conflict until they got to the second set of items, which asked them to predict the time spent on leisure. Conversely, those who first predicted the time spent on leisure were unaware of the self-control conflict until they got to the second set of items, which asked them to predict the time spent on academics. We manipulated the accuracy motivation by soliciting rough versus accurate predictions. We expected a pattern of counteractive optimism for rough predictions but not for accurate ones.

Method

Participants. We recruited 104 undergraduate students from the University of Chicago (56 women, 48 men) to participate in the study in exchange for monetary compensation.

Procedure. This study used a 2 (sequence: first prediction [low awareness of conflict]; second prediction [high awareness of conflict]) × 2 (target of prediction: academic vs. leisure activities) × 2 (accuracy motivation: high vs. low) mixed design, with the target of prediction manipulated as a within-subjects factor and the other two variables as between-subjects factors. When participants arrived in the lab, they received a survey on college students' time allocation. The survey listed different activities, and the participants' task was to indicate the average amount of time (in hours) they expected to spend per day on each activity during the forthcoming week. On the basis of a pilot study (which showed that homework and reading class-related materials are seen as academic activities and that Internet surfing and hanging out with friends are seen as leisure activities, and the two types of activities conflict each other), the specific activities in the survey were two academic activities (homework and reading class-related materials) and two leisure activities (surfing the Internet and hanging out with friends).

To manipulate participants' accuracy motivation, we solicited either rough or accurate predictions (Petty, Harkins, & Williams, 1980). Participants in the low-accuracy condition read that the researchers were planning to have a large number of participants for this study, and therefore, a rough estimate from each participant should be sufficient. Participants in the high-accuracy condition read that as a result of budget constraints, the researchers could run only a limited number of participants for the study, and thus they should try to be as accurate as possible in their predictions, avoiding both overestimation and underestimation.

To manipulate participants' awareness of the self-control conflict, we varied the order of the questions in the survey. Participants either predicted the amount of time they would spend on the two leisure activities followed by the two academic-related activities, or they made the predictions in the reverse order. Completion of the first two (academic or leisure) activities reminded participants of the self-control conflict when they allocated time to the other, competing activities. After participants stated their predictions, the experimenter debriefed and dismissed them.

Results and Discussion

Manipulation check. We conducted a manipulation check of the order manipulation ($n = 40$ undergraduate students) with a 2 (sequence: first prediction [low awareness of conflict]; second prediction [high awareness of conflict]) × 2 (target of estimates: academic vs. leisure activities) mixed design, with sequence manipulated between subjects and target of estimates within subjects. Participants completed the same survey as the participants in the main experiment, except after providing estimates for each group of activities (academic and leisure), they indicated the extent to which they experienced a conflict between these and the other type of activities. Specifically, they rated the following question on 7-point scales (1 = *not at all*; 7 = *very much*): "To what extent were you concerned that leisure [or academic] activities would interfere with your academic [or leisure] pursuit when making the preceding two predictions?"

An ANOVA of participants' experienced conflict between academic and leisure activities yielded a main effect of sequence, $F(1, 36) = 10.85$, $p < .01$, and no interaction between sequence and target of prediction. In general, participants reported experiencing greater conflict between the two types of activities when answering the second group of questions (either academic or leisure activities; $M = 4.05$) than when answering the first group of questions, $M = 2.70$, $t(38) = 2.69$, $p < .05$, thus validating our manipulation of awareness of conflict.

Predictions. We averaged participants' predicted times for the two academic activities and separately for the two leisure activities. A repeated measure ANOVA yielded a main effect for target of prediction, $F(1, 100) = 4.42$, $p < .01$, indicating that participants expected to invest more time on leisure activities ($M = 2.78$ hr, $SD = 1.18$) than on academic activities ($M = 2.42$ hr, $SD = 1.01$), and there were no other main effects. More important, this analysis yielded a Sequence × Target of Prediction × Accuracy Motivation interaction, $F(1, 100) = 12.09$, $p < .01$.

To explore the source of the three-way interaction, we conducted separate analyses for rough versus accurate predictions (see Figure 2). Beginning with rough predictions, an ANOVA yielded a Target × Sequence interaction, $F(1, 42) = 9.39$, $p < .01$. Further analyses revealed that participants predicted that they would spend more time on academic activities when they were presented second and, thus, participants were aware of the conflict ($M = 3.08$ hr, $SD = 1.03$) than when they were presented first and, thus, participants were less aware of the conflict ($M = 2.42$ hr, $SD = 1.14$), $t(44) = 2.03$, $p < .05$. However, participants predicted they would spend less time on leisure activities when they were presented second (high awareness, $M = 2.28$ hr, $SD = 0.915$) than when they were presented first (low awareness, $M = 3.09$ hr, $SD = 1.41$), $t(44) = 2.29$, $p < .05$. Awareness of a self-control conflict appears to elicit predictions that are affected by the status of the activity: more time spent on goals and less time spent on temptations.

Another ANOVA, conducted in the accuracy condition, yielded a marginally significant Target × Sequence interaction, $F(1, 54) = 2.78$, $p = .098$. Participants predicted that they would spend less time on academic activities when they were presented second (high awareness, $M = 1.99$ hr, $SD = 0.76$) than when they were

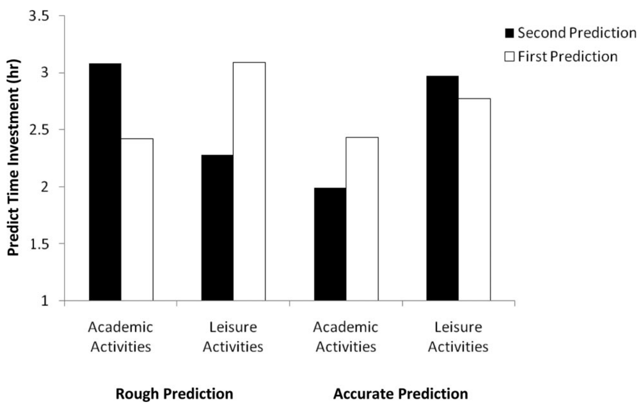

Figure 2. Predicted time invested in academic and leisure activities as a function of question sequence (first prediction: low awareness of conflict; second prediction: high awareness of conflict) and accuracy motivation (accurate vs. rough prediction).

presented first (low awareness, $M = 2.43$ hr, $SD = 0.88$), $t(56) = 1.99$, $p = .05$. They further predicted spending a similar amount of time on leisure activities when they were presented second (high awareness, $M = 2.97$ hr, $SD = 1.27$) and first (low awareness, $M = 2.77$ hr, $SD = 1.07$), $t < 1$, *ns*.

These results demonstrate the moderating role of accuracy motivation. Only when participants were relatively unconcerned about being accurate did their predictions display a counteractive optimism pattern: They predicted spending more time studying and less time on leisure activities when they were aware (vs. less aware) of the self-control conflict, which poses an obstacle for goal attainment. This pattern changed when accuracy was emphasized: Participants predicted spending less time on studying when they were aware (vs. less aware) of the conflict, and there was no effect for leisure activities.

In this study, we assessed only participants' predictions and not actual time investment; therefore, we were unable to calculate the optimism bias—the difference between predicted and actual pursuit. We also recognize potential limitations: Rather than reflecting performance standards, the predictions could have reflected wishful thinking, which substituted for actions, or participants could have made them in order to feel good (e.g., Greenwald, 1980). Although it is reasonable to assume that predictions at least partially acted as performance standards to motivate action, as Study 1 demonstrates (see also Armor & Taylor, 2002), in what follows, we explore more directly whether counteracting obstacles with optimism is indeed a self-control device that motivates effort investment. Specifically, we examine whether this pattern of predictions emerges only for controllable obstacles, when optimistic predictions can be instrumental by motivating action.

Study 3: Perceived Control Over Health Risks

To test whether counteractive optimism depends on individuals' sense of control over their outcomes, we asked participants in Study 3 to estimate their likelihood of suffering from high cholesterol. Similar to optimistic predictions of future goal attainment, low estimates of risk level serve as a self-control device to the extent that they motivate prevention behaviors, such as healthy eating and exercising, which can reduce a person's risk level. We manipulated perceived control by conveying information that high cholesterol is either an inherited (low control) or an acquired (high control) health risk. We manipulated the perceived obstacle by conveying information that participants' gender was at either a higher or a lower risk for getting high cholesterol compared with the other gender. Finally, we manipulated participants' accuracy motivation by emphasizing or downplaying the importance of giving an accurate risk estimate. The dependent measures were participants' estimations of their own risk level for getting high cholesterol and their intention to exercise—an activity that reduces the risk of high cholesterol.

We hypothesized that participants who believed that they had control over the risk and were less concerned about providing accurate predictions would counteract the risk with optimism: They would predict a lower personal risk when statistically their gender was at a high (vs. low) risk. We further hypothesized that participants' risk estimates would correspond to their exercise intentions, such that predicting low risk would motivate exercising.

Method

Participants. We recruited 389 University of Texas undergraduate students (242 women, 147 men) to participate in the study in exchange for partial course credit.

Procedure. This study used a 2 (perceived control: high vs. low) × 2 (risk level: high vs. low) × 2 (accuracy motivation: high vs. low) between-subjects design. Participants completed this study on college students' health-related knowledge in an experimental lab.

Upon arriving at the lab, participants learned they would be participating in a study on students' understanding of published medical information and self-assessed health risks. Participants then read printed information on high cholesterol, a condition we described by its medical name, "low-density lipoprotein (LDL)," in order to minimize the influence of prior knowledge on their behavioral control over this condition. Our pilot data ($n = 46$) indicated that 93.5% of the sampled population had never heard of LDL, and among those who had heard the term (6.5%), no one indicated they were familiar with the medical condition associated with it.

All of the participants received a brochure describing diseases related to LDL. The brochure was allegedly distributed by the National Center for Health Education. They read that

> Low-density lipoprotein (LDL) is a sterol found in the cell membranes of all body tissues, and transported in the blood plasma of all animals. When the LDL level in your blood is high, it builds up in the walls of your arteries, and causes "hardening of the arteries" so that arteries become narrowed and blood flow to the heart is slowed down or blocked. In the United States over 75% of the population over the age of 45 may suffer from some type of LDL-related disease.

We manipulated perceived control by describing high LDL either as an acquired or as an inherited health risk. Specifically, participants in the high perceived-control condition read,

> High levels of LDL are caused primarily by one's lifestyle, including dieting and exercising habits. Regular exercise is particularly important in reducing one's chance of getting high LDL, because it can

> prevent the accumulation of saturated fat, which is an important material for the synthesis of LDL.

The participants in the low perceived-control condition read,

> Unlike acquired diseases, the main cause of high levels of LDL is inherited genetic patterns and is determined exclusively by genome. The gene pattern remains unchanged in one's growth and as a result, after-birth activities rarely change the accumulation of this type of lipoprotein caused by the gene. In other words, the probability that a person may get high LDL in a lifetime is largely independent of one's post-birth efforts such as exercise.

The rest of the information was identical across conditions and described the symptoms of diseases related to high LDL.

The last part of the information manipulated the perceived risk level by suggesting a gender difference in susceptibility to the high LDL. Recall that participants read that, on average, a person's chance of getting some sort of high-LDL–related disease by the age of 45 is 75%. Half of the participants went on to read that women were much more likely to get this type of disease than men, whereas the others read that men were more at risk. Specifically, they read,

> Years of research also provide evidence for the difference between genders in inheriting LDL-related disease. Statistically, women [men] are more likely to inherit genes that may lead to high levels of LDL in blood than men [women]. Studies have shown that by the age of 45, women [men] are almost twice as likely as men [women] to have borderline high LDL.

Regardless of their gender, we placed half of the participants in a high-risk condition and led them to believe they were at a high level of risk compared with the other gender, and we placed the other half in a low-risk condition and led them to believe they were at a low level of risk.

Participants then completed a survey titled "Self-Assessment of Health Conditions," which we used to assess their estimated likelihood of getting high LDL. Similar to Study 2, we manipulated participants' motivation to give an accurate prediction. Participants in the high-accuracy condition read that accuracy was important because we could have only a limited number of participants, whereas those in the low-accuracy condition read that giving an accurate prediction was not important because we would have a large number of participants. Participants predicted their own susceptibility on a comparative judgment scale: "My chance of getting high LDL when I am over the age of 45 will be higher than _______ percent of the people of the same age." We embedded this question among several filler questions.

Finally, as part of a questionnaire that collected demographic information, we measured participants' exercising intentions—an activity that reduces the risk of getting high cholesterol. Our pilot data indicated that undergraduate students in our sampled population exercise regularly; thus, we could ask them whether they intended to exercise more or less than their usual routine. Specifically, participants listed the number of hours they planned to exercise the following week (open-ended question). We presented this item after some routine demographic questions, such as gender and age, and questions about their lifestyle, such as study habits (e.g., frequency of studying in the library). Upon completion of the survey, participants were asked to guess the purpose of the study, which none of them were able to do. Two weeks after the experiment, we contacted all participants again and provided a detailed debriefing of the experiment. We made sure each of them received accurate information on the disease and the experimental manipulations.

Results and Discussion

An analysis of estimated likelihood of getting high LDL replicated the comparative optimism bias (Weinstein, 1980). Participants estimated their likelihood of getting high LDL (M = 29%, SD = 21) as lower than 50%, $t(388) = 20.06$, $p < .01$.

To test our hypothesis, we first categorized participants into the high- or low-risk condition according to the combination of their gender and the information they received. The high-risk condition included (male and female) participants who read that their gender was at a higher risk than the other gender, and the low-risk condition included participants who read that their gender was at lower risk.

An ANOVA of participants' estimates yielded the Perceived Control × Risk Level × Accuracy Motivation three-way interaction, $F(1, 381) = 5.16$, $p < .05$, suggesting that participants' estimates followed different patterns, depending on whether perceived control was high or low (Figure 3, Panel A). There were no main effects in this analysis.

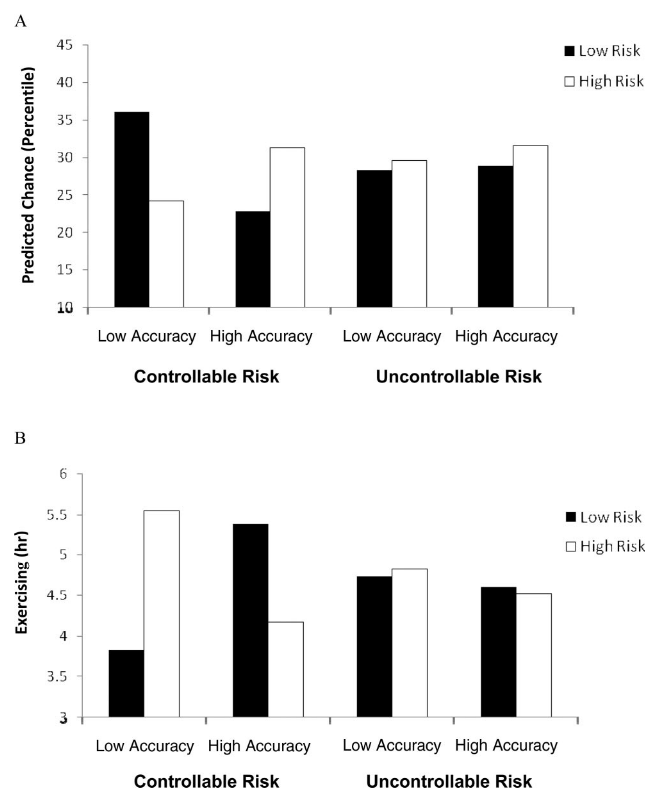

Figure 3. Predicted chance of getting high cholesterol ("LDL"; Panel A) and planned exercising (Panel B) as a function of risk level (high vs. low risk), perceived control (controllable vs. uncontrollable risk), and accuracy motivation (high vs. low accuracy).

To explore the source of the three-way interaction, we conducted separate analyses within each perceived control condition. Beginning with high perceived control, an ANOVA yielded a Risk Level × Accuracy Motivation interaction, $F(1, 190) = 11.51$, $p < .01$. Further analyses revealed that those who provided a rough estimate believed they would be less likely to get high LDL when their gender was at high risk ($M = 24\%$, $SD = 16$) than when their gender was at low risk ($M = 36\%$, $SD = 24$), $t(98) = 2.86$, $p < .05$. This pattern confirms the counteractive optimism hypothesis. Conversely, participants who tried to provide accurate predictions believed that they would be more likely to get high LDL when their gender was at high risk ($M = 31\%$, $SD = 23$) than when their gender was at low risk ($M = 23\%$, $SD = 19$), $t(92) = 1.96$, $p = .05$. Next, an ANOVA of estimates in the low-perceived-control condition yielded no main effect or interaction. In particular, we found no evidence for counteractive optimism when high LDL seemed beyond a person's control.

We further analyzed each participant's exercising plans. An analysis of the amount of time participants planned to exercise during the following week yielded a Perceived Control × Risk Level × Accuracy Motivation three-way interaction, $F(1, 381) = 4.47$, $p < .05$. As shown in Figure 3, Panel B, when perceived control was high, we obtained a Risk Level × Accuracy Motivation interaction, $F(1, 190) = 11.51$, $p < .01$. Participants who gave a rough estimate of risk planned to exercise more when they were at high risk ($M = 5.55$ hr, $SD = 3.44$) than low risk ($M = 3.83$ hr, $SD = 2.60$), $t(98) = 2.82$, $p < .01$. Conversely, participants who tried to give an accurate estimate intended to exercise less when they were at high risk ($M = 4.17$ hr, $SD = 2.28$) than low risk ($M = 5.38$ hr, $SD = 1.33$), $t(92) = 2.00$, $p < .05$. Also consistent with our theorizing, analysis of exercising intentions when perceived control was low yielded no effect for risk level or accuracy motivation, because in this condition participants did not associate exercising with reducing the risk.

We predicted that the decrease in risk estimates would be associated with an increase in exercising intentions, but only to the extent that the risk could be reduced by regular exercising. Accordingly, in the high-perceived-control condition, the estimates of getting high LDL were negatively correlated with the amount of time participants intended to spend exercising during the following week, $r = -.19$, $p < .05$, suggesting that participants who provided low-risk estimates were more interested in exercising. Consistent with our prediction, a similar analysis in the low-perceived-control condition yielded a nonsignificant correlation between estimated risk level and exercising, $r = -.12$, *ns* (although note that this correlation level was not significantly different from that in the high-perceived-control condition).

Taken together, these results demonstrate that in a domain where people are generally optimistic, as when estimating health risks, they express counteractive optimism only if the risk is under behavioral control and they are not trying to be accurate. Under these conditions, people estimate their relative-to-others risk as lower when they learn about their high (vs. low) risk. These low risk estimates are instrumental in motivating behavioral changes—in particular, exercising. Because we found that higher risk is associated with greater exercising plans only when exercising is effective, we can further conclude that risk estimates motivate action rather than substitute for it or reflect wishful thinking and dismissal of negative information.

In a follow-up survey, we found that participants' exercising plans were associated with their actual exercise. Ten days after the initial experimental session (before the full debriefing), we e-mailed participants a short survey about their lifestyle. The critical item asked them about their exercise over the preceding week ("How many hours did you spend in the gym last week?"). We were able to solicit responses from 138 out of 385 participants, similarly distributed across all conditions,[2] and found that actual exercise time was strongly associated with predicted times, $r = .49$, $p < .01$. We can thus infer that participants' behavioral intentions predicted actual actions.

We set our next study to test for the effect of anticipated obstacles on predicted and actual performance. In that study, we explicitly manipulated participants' priorities—better performance versus accurate prediction—and examined whether anticipated obstacles increase effort investment when providing an accurate prediction is not a priority.

Study 4: Persistence on a Difficult Task

Participants in Study 4 completed a variant of an anagram task while listening to background music they expected to either help or harm their performance. We manipulated the incentive to perform well versus provide accurate predictions by offering participants either a performance bonus or an accuracy bonus. Thus, unlike in previous studies in which we assumed a tradeoff between motivating and accurate predictions, in this study, we manipulated these independently. We hypothesized that participants to whom we offered a bonus for achieving better performance would provide more optimistic predictions when they expected greater obstacles (posed by harmful vs. helpful music) and that the reverse would be true for those to whom we offered a bonus for making an accurate prediction. In addition, we expected participants' effort investment in the task, measured by the amount of time they persisted, to follow their predictions.

Method

Participants. We recruited 85 undergraduate students from the University of Chicago (35 women, 50 men) to participate in the study in return for monetary compensation.

Procedure. This study used a 2 (anticipated obstacle: high vs. low) × 2 (incentive: better accuracy vs. better performance) between-subjects design. Participants completed the study on computers in individual study spaces.

An experimenter explained that the purpose of the study was "to investigate how certain music influences creativity" and that participants would be completing a text-twist task while listening to music through headphones. The text-twist task was a variant of an anagram task. Participants' on-screen instructions informed them their task was to generate as many words as they could, using a subset of eight given letters. They read that their performance would be evaluated by the number of distinctive words they generated for each set of letters. For example, they read that for the

[2] We had between 15 and 20 participants in each of the eight experimental conditions (15 in three conditions, 17 in one condition, 18 in two conditions, and 20 in two conditions). The response rate was not significantly different across conditions, $\chi^2(1) = .77$, *ns*.

set “E, E, N, S, L, I, T, D,” they could generate “see,” “line,” “steel,” and so on. They further read that they would have no time limit for completing the task, but once they hit *continue*, they would have to move on to the next set and could not go back. Similar to Study 1, we were able to infer participants’ motivation to do well by the amount of time they persisted in the task.

We manipulated high (vs. low) anticipated obstacles by informing participants that “recent published studies reported that background music during a creativity task could improve (vs. harm) performance.” Expecting the music to help (vs. harm) performance meant participants faced either an easy task, where they got an external assistant, or a difficult task that required overcoming an external barrier.

Next, participants had to predict how well they would perform on the task compared with other participants. Before they stated their predictions, we manipulated their incentives by offering either an accuracy bonus or a performance bonus (all participants received a base of $4). Participants in the better-accuracy condition read that if their predictions turned out to be no more than 5% off (below or above) their actual performance, they would receive a $2 bonus, and if their predictions were no more than 10% off, they would receive a $1 bonus. Participants in the better-performance condition read that they would receive a performance bonus if they could outperform other participants, and for every 5% they performed above the average performance, their compensation would increase by $0.20. The two payment systems made the bonus contingent on either accurate predictions or better performance while keeping the maximum payment equal across conditions. After reading these instructions, participants indicated their predictions by completing the comparative judgment scale: “I will perform better than ____% of all participants.”

Finally, all participants completed the text-twist task. The task included eight trials. Each trial had a set of eight letters that appeared at the top of the screen. Participants could fill in as many words as they could generate in the space below. Participants also had the option to click *continue* at the bottom of the screen at any time to move on to the next trial. After they completed the task, the experimenter gave each participant the full bonus in addition to their base compensation and then debriefed and dismissed them.

Results and Discussion

Across conditions, participants’ predictions displayed the above-average effect (Svenson, 1981): They predicted they would perform better than 50% of all participants (M = 68%, range = 20%–95%, SD = 14), $t(105) = 13.07$, $p < .01$.

In support of the hypothesis, an ANOVA of participants’ predicted performance yielded the Obstacles Level × Objective interaction, $F(1, 102) = 11.26$, $p < .01$. As Figure 4, Panel A shows, when we rewarded better performance, participants predicted they would do better when they expected the music to harm their performance (M = 73%, SD = 14) than when they expected the music to help their performance (M = 65%, SD = 15), $t(53) = 2.03$, $p < .05$. Conversely, when we rewarded accuracy of the prediction, participants predicted they would do better when they expected the music to help their performance (M = 70%, SD = 9) than when they expected the music to harm their performance (M = 61%, SD = 13), $t(49) = 2.89$, $p < .05$. We found no main effects in this analysis.

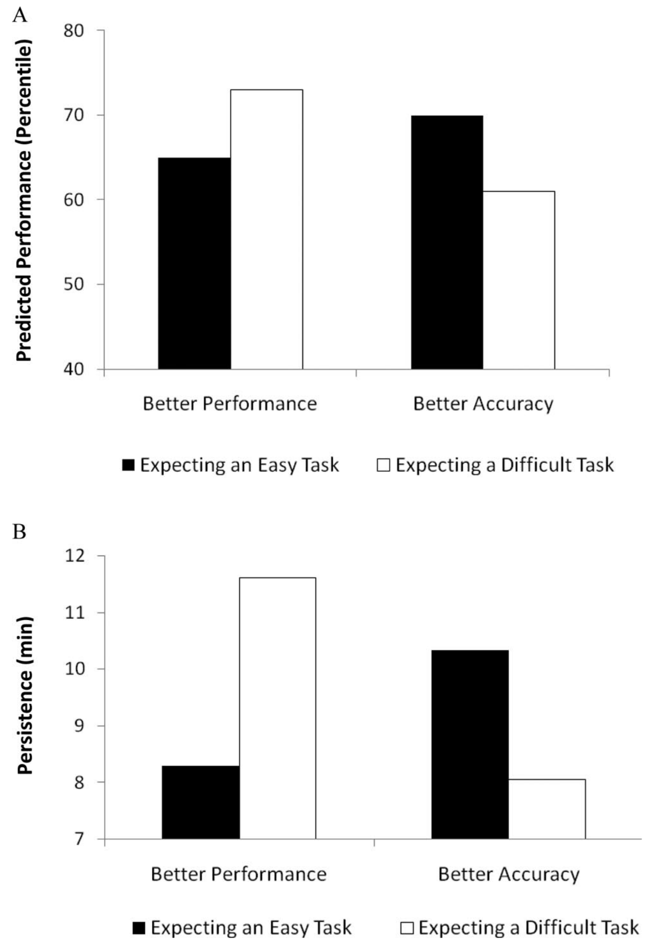

Figure 4. Predicted task performance (Panel A) and actual time persistence (Panel B) as a function of anticipated obstacle level (expecting an easy vs. a difficult task) and incentive (better performance vs. better accuracy).

Next, similar to Study 1, we analyzed the total time participants persisted in the task as an indicator of their performance motivation. An ANOVA of persistence yielded the Obstacle Level × Objective interaction, $F(1, 102) = 9.81$, $p < .01$. As Figure 4B shows, when we rewarded better performance, participants persisted longer on the task when they expected the music to harm their performance (M = 11.62 min, SD = 5.83) than when they expected the music to help their performance (M = 8.29 min, SD = 3.82), $t(53) = 2.45$, $p < .05$. In contrast, when we rewarded accurate predictions, participants persisted for less time when they expected the music to harm their performance (M = 8.05 min, SD = 4.51) than when they expected the music to help their performance (M = 10.34 min, SD = 3.68), $t(49) = 1.99$, $p = .05$.[3]

Similar to Study 1, we further found that predictions were positively related to the time the participants persisted in the task,

[3] We obtained a similar but nonsignificant pattern for task performance (i.e., the number of words participants generated), $F(1, 102) = 2.30$, p = .13. Similar to Study 1, the number of words participants generated was not related to persistence (r = .14, *ns*), suggesting that variables other than the amount of effort participants invested in the task influenced performance.

$r = .23$, $p < .05$. Thus, stating optimistic predictions potentially motivated effort investment in the task.

These results confirm that the effect of anticipated obstacles on predictions and task persistence depends on whether performance or accuracy of predictions takes priority. When better performance takes priority, people predict better performance and persist longer on a task if they anticipate greater obstacles. In contrast, when accuracy of the prediction takes priority, people predict worse performance and persist for a shorter period of time if they anticipate obstacles.

In our last study, we explored the effect of counteractive optimism on setting and meeting deadlines for oneself (see also the planning fallacy, Buehler et al., 1994). We predicted that when people expect obstacles to interfere with task completion time, they set an earlier deadline for themselves compared with when they do not foresee such obstacles. These earlier deadlines in turn motivate people to invest more effort and finish the task sooner to meet this more challenging deadline. We tested this possibility in a study that held the actual obstacle level constant while varying the level of anticipated obstacles. By doing so, we expected those who anticipate obstacles (vs. not) to finish the task sooner, because differences in completion times will reflect participants' effort investment in the task. As before, this effect should emerge only as long as participants are less concerned about the accuracy of the prediction (i.e., their self-imposed deadline).

Study 5: Predicting Task Completion Time

Participants in Study 5 predicted the amount of time they would need to complete a take-home test they expected to be either easy or difficult. We then measured the actual amount of time they took to complete the test. Because compensation was conditional on test completion, finishing the test sooner was a desirable goal, and the perceived difficulty of the test constituted an obstacle to a speedy completion. We hypothesized that participants who were less concerned about the prediction's accuracy would predict an earlier completion time when they learned the test was difficult and therefore more time consuming (vs. easy) but that the reverse would be true for participants concerned about providing accurate predictions. We further expected these predictions to act as a self-imposed deadline, thereby motivating participants to turn in their tests by that predicted time. Specifically, we expected predictions to mediate test completion times.

Method

Participants. We recruited 64 University of Chicago students (34 women, 30 men) to participate in the study in return for monetary compensation. Another 24 participants, who were distributed across all four conditions, chose not to complete the take-home test, and we excluded them from the study. This attrition rate (27%) is common for studies that involve take-home tasks (e.g., Choi & Yoon, 2005; Meston, Heiman, Trapnell, & Paulhus, 1998).

Procedure. This study used a 2 (anticipated obstacle level: high vs. low) $\times$ 2 (accuracy motivation: high vs. low) between-subjects design. Upon participants' arrival, an experimenter explained that the purpose of the study was to pretest a Graduate Record Examination (GRE)-style test for future experiments—and that their task was to complete the test at home. An instruction sheet described the general procedures and included some "screening questions," which we used to measure predicted completion times. Specifically, participants read that the test included approximately100 multiple-choice questions, with an equal number of verbal and quantitative reasoning problems, and that because of space limitations in the research lab, the researchers needed participants to complete the test at home. They further read that they would receive compensation after submitting their typed answers using an experimenter-provided e-mail account.

Next, participants read that they had to estimate when they expected to complete the test. Before they provided their estimates, we manipulated the perceived obstacle level and accuracy motivation. First, we manipulated perceived obstacle level by describing the test either as easy or as difficult. Specifically, participants in the low-obstacle condition read that "previous participants reported having no problems completing the test in a timely fashion because they found the test to be easy." In contrast, participants in the high-obstacle condition read that "previous participants had problems completing the test in a timely fashion because they found the test to be difficult." Second, we manipulated participants' accuracy motivation by either emphasizing or downplaying the importance of giving an accurate prediction. Participants read that outside reviewers would evaluate their answers; therefore, the experimenters needed to know when participants expected to submit their answers so they could schedule the reviewing accordingly. In the low-accuracy condition, participants learned the experimenters needed "only a general idea of progress and therefore, just a rough estimate of completion time." In the high-accuracy condition, participants read that "because rescheduling the reviewers would be difficult and costly, an accurate estimate of when they would submit their answers was important." The instructions further emphasized that being accurate meant neither underestimating nor overestimating completion time.

Participants then provided their predictions by listing when (date and hour) they expected to complete the test and submit the answers. Next, they left the lab with the GRE-style test. After the participants completed the test and submitted their answers, an experimenter contacted them to compensate and debrief them.

Results and Discussion

We calculated the amount of time participants estimated they would need (number of hours) by subtracting the experiment time (the time they signed out of the lab) from their predicted completion time. An initial analysis revealed that both the estimated completion times (kurtosis > 1; Wilk-Shapiro test $w(64) = .91$, $p < .01$; Kolmogorov-Smirnov $z(64) = 1.38$, $p < .05$) and actual completion times (kurtosis > 1; Wilk-Shapiro test $w(64) = .88$, $p < .01$; Kolmogorov-Smirnov $z(64) = 1.35$, $p = .05$) were highly skewed; therefore, we submitted them to a standard log-transformation. We report times after reverse transformation to hours.

An ANOVA of participants' estimated completion times yielded the hypothesized anticipated Obstacle Level $\times$ Accuracy Motivation interaction, $F(1, 60) = 10.80$, $p < .01$. As Figure 5, Panel A shows, participants who made rough estimates predicted they would need less time to complete the test when they anticipated the test would be difficult ($M = 29$ hr, $SD = 25$) than when they

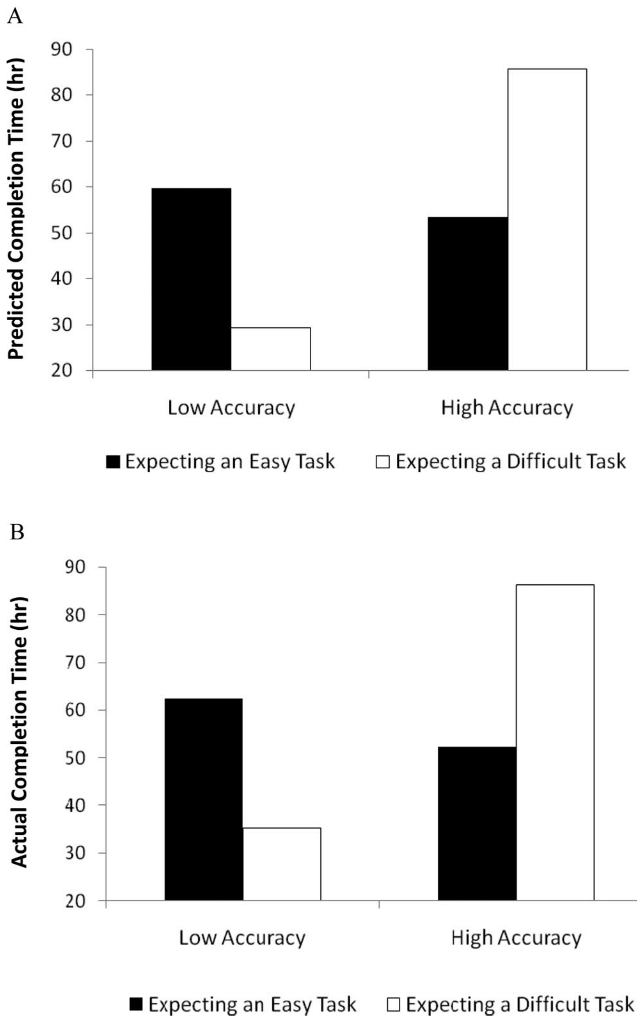

Figure 5. Predicted task completion time (Panel A) and actual task completion time (Panel B) as a function of anticipated obstacle (expecting an easy vs. a difficult task) and accuracy motivation (low vs. high accuracy).

anticipated it would be easy (M = 60 hr, SD = 35), $t(31) = 2.51$, $p < .05$, a pattern that reflects counteractive optimism. Conversely, participants who tried to be accurate predicted that they would need more time to complete the test when they anticipated the test would be difficult (M = 86 hr, SD = 42) than when they anticipated it would be easy (M = 53 hr, SD = 47), $t(29) = 2.17$, $p < .05$.

We next analyzed the amount of time participants actually took to finish the test. Notably, participants' predicted completion times (M = 59 hr, SD = 44) were very close to their actual completion times (M = 57 hr, SD = 42). An ANOVA of actual completion time (number of hours) yielded a similar anticipated Obstacle Level × Accuracy Motivation interaction, $F(1, 60) = 9.37$, $p = .01$. As Figure 5, Panel B shows, participants who made rough estimates took less time to complete the allegedly difficult test (M = 35 hr, SD = 27) than the allegedly easy test (M = 62 hr, SD = 45), $t(31) = 2.00$, $p = .05$. In contrast, participants who tried to be accurate took more time to complete the allegedly difficult test (M = 86 hr, SD = 46) than the allegedly easy test (M = 52 hr, SD = 41), $t(29) = 2.01$, $p = .05$. There was no speed–accuracy trade-off. Thus, the conditions varied by the time participants took to complete the task and not by the rate of correct responses.

We hypothesized that when accuracy is less of a concern, participants' optimistic predictions motivate effort, such that predictions mediate the negative effect of increased anticipated obstacles on decreased actual completion times. A mediation analysis of the data from the low-accuracy condition supports this hypothesis. Directly, obstacle level (high vs. low) decreased the time participants took to complete the test ($\beta = -.33$, $p = .05$). Indirectly, obstacle level decreased the amount of time participants estimated they would need to complete the test ($\beta = -.44$, $p < .05$), which in turn positively predicted the amount of time they actually took to complete the test ($\beta = .84$, $p < .01$). When we included both obstacle level and participants' estimated times as predictors, the effect of obstacle level became nonsignificant ($\beta = .04$, *ns*), whereas the estimates remained a significant predictor of completion time ($\beta = .86$, $p < .01$), Sobel test $t = 2.60$, $p < .05$.

It is interesting that participants' accurate predictions also influenced their performance, such that stating more conservative predictions in response to anticipated obstacles slowed down completion times. Specifically, in the accuracy condition, obstacle level directly increased the time participants took to complete the test ($\beta = .37$, $p < .05$). Indirectly, obstacle level increased the amount of time participants estimated they would need to complete the test ($\beta = .34$, $p < .06$), which in turn increased the amount of time they actually took to complete the test ($\beta = .93$, $p < .01$). When we included both obstacle levels and participants' estimated times as predictors, the effect of obstacle level became nonsignificant ($\beta = .06$, *ns*), whereas the estimates remained a significant predictor of completion time ($\beta = .91$, $p < .01$), Sobel test $t = 1.96$, $p = .05$.

To summarize, when accuracy was low priority, participants predicted they would complete a test sooner when they anticipated it would be difficult (vs. easy), and, indeed, they completed the test sooner. Conversely, when accuracy was high priority, participants predicted they would need more time when they anticipated the test would be difficult (vs. easy) and, indeed, they took longer to complete the test. These differences in test completion times reflect a difference in the time participants started to work on the test, or in the time they spent working on the test, or both. Although we cannot distinguish between these two sources of improved performance in this particular situation, they would both be beneficial to successfully meeting the goal, as long as participants who finish earlier do not make more mistakes in the test. We further demonstrate that the amount of time participants predicted they would need for the test mediated the amount of time participants took to complete the test. We can therefore conclude that predictions function as self-imposed deadlines, and when they are optimistic, they spur movement toward goal attainment.

It is notable that participants across all conditions received the same test, such that their anticipated obstacles did not correspond to actual level of difficulty when completing the test. By controlling for the actual difficulty level, we can safely attribute the observed difference in completion times to participants' motivation to complete the test. However, whenever the obstacles are real, we reason that counteractive optimism does not necessarily improve performance but rather maintains the same level of performance as in the absence of actual obstacles.

General Discussion

The anticipation of obstacles in goal attainment triggers counteractive self-control operations designed to secure the motivation to adhere to the goal (Fishbach & Trope, 2005; Fishbach et al., 2009; Myrseth et al., 2009; Trope & Fishbach, 2000). This article addresses the counteractive self-control function of performance predictions. We propose that because high performance standards increase effort (Brehm & Self, 1989; Oettingen & Mayer, 2002; Taylor & Brown, 1988), people strategically predict better performance to motivate effort when they anticipate obstacles that may interfere with their upcoming goal pursuit. This impact of anticipated obstacles is reversed, however, when people are most concerned about accurately predicting performance. When stating accurate predictions takes priority, people generate more conservative predictions when anticipating the obstacles in order to account for the negative impact, and, in turn, their motivation to perform well decreases.

We found support for the counteractive optimism model across five studies. Specifically, participants in Study 1 predicted that they would get better scores on a task they expected to be more difficult. In turn, among those who stated predictions, anticipating difficulties increased task persistence. Studies 2–5 documented the effect of anticipated obstacles, depending on whether participants wished to improve performance or prediction accuracy. Thus, undergraduate students in Study 2 predicted that they would invest more time on academic activities and less time on leisure activities when they were aware of the time conflict between the two activities than when they were less aware of it. This effect of the time conflict manipulation was reversed when we emphasized the value of providing accurate predictions. Study 3 demonstrated that counteractive optimism is instrumental, and, therefore, people provide optimistic predictions only when they believe they can do something to overcome the obstacle and not when perceived control is low. Specifically, participants estimated their personal risk for suffering from high cholesterol as lower if their gender put them at a higher risk, but only as long as they believed they could control the risk through behavioral change (vs. that it depended on genetic factors) and as long as they were not concerned about giving an accurate prediction. Otherwise, they estimated their personal risk to be higher if their gender put them at a higher risk level. An important finding is that those who predicted a lower personal risk level also reported a higher intention of undergoing behavioral change to reduce the risk (i.e., increased exercising).

Study 4 documented actual effort investment following counteractive optimism. Participants who wished to motivate performance predicted higher task scores when they expected to complete the task while listening to interfering (vs. assisting) background music. Subsequently, they persisted longer on the task. Conversely, participants who wished to be accurate predicted lower task scores when they expected interfering (vs. assisting) background music and subsequently persisted less on a task. Finally, Study 5 documented the mediational role of the optimistic predictions in goal pursuit. Participants who wished to motivate performance predicted finishing a take-home test sooner when they believed the test would be difficult (vs. easy) and, as a result, they completed it sooner. This pattern reversed for participants who were concerned about the accuracy of their predictions: They estimated taking more time to finish a test they believed to be difficult (vs. easy) and, as a result, they finished it later.

Taken together, these studies found consistent support for counteracting various obstacles with optimistic predictions, including obstacles inherent to pursuing the goal (e.g., task difficulty) and those posed by the presence of competing motivations (e.g., leisure activities in Study 2). We further documented different forms of counteractive predictions: high estimates of performance levels and low estimates of completion times and risks. These optimistic predictions increase task motivation, which we assessed using behavioral intentions, task persistence, and task completion time.

It is important to note that, because we held the actual obstacle level constant in all five of our studies, counteractive optimism always improved performance. However, we believe its function is often to maintain (rather than improve) the same level of performance in the presence of obstacles as when obstacles are absent. When people face actual obstacles, counteractive optimism increases effort and ensures that the obstacles do not undermine one's performance, but does not necessarily improve performance because the negative effect of obstacles and the positive effect of the optimism prediction may cancel each other out. However, in many life situations, as in our studies, people face the same objective obstacle but vary in their subjective assessment of the threat. Because the strength of the counteractive response is proportional to the anticipated, rather than actual, level of the obstacle, the net result would therefore depend on the joint outcome of the objective obstacle and the increase in one's effort as a result of stating an optimistic prediction.

Alternative Interpretations

The present findings support the predictions put forth by a counteractive optimism model and cannot be explained by the existing theory of self-regulation. Thus, for example, although research on goal setting has found that challenging standards increase effort investment (Locke & Latham, 1990), this stream of research remains largely silent on whether people voluntarily self-impose standards to overcome obstacles. In exploring how people set performance standards, other research has found that the value of the goal and feasibility of goal attainment jointly determine the choice of which goal or performance standard to adopt (e.g., Bandura, 1986, 1997; Heckhausen, 1991; Locke & Latham, 1990). For example, the value-expectancy model (Vroom, 1964) attests that individuals choose to adopt certain goals or performance standards based on the cognitive appraisal of the value of the goal and an assessment of their chances of attaining it. The social–cognitive model (Bandura, 1997) echoes this analysis by suggesting that a person's likelihood of adopting a certain performance standard increases as a function of perceived self-efficacy. On the basis of these perspectives, anticipated obstacles in goal pursuit result in adopting a lower performance standard (i.e., setting an easier goal) in order to maintain the same level of expectancy of meeting the standard. In contrast to these approaches, the counteractive optimism model suggests that low feasibility of a goal can lead to the adoption of an even higher performance standard. An optimistic standard, according to our analysis, is a self-control device individuals employ to battle potential obstacles in goal pursuit. Accordingly, as we demonstrate, perceived feasibility negatively affects performance standards only when the cost of a failed prediction is relatively high. Whenever the priority is to maintain high performance despite obstacles, individuals choose to commit to higher performance standards when doing well is more difficult.

Another perspective on self-imposed standards suggests that when anticipating obstacles in goal pursuit, people may focus on managing their emotional experience and, in particular, on avoiding devastation, which has negative emotional and motivational consequences. For example, people may prepare for possible low performance by setting an unrealistically low expectation (i.e., defensive pessimism; Norem & Cantor, 1986). Alternatively, they can downplay the obstacles and hold an illusory optimistic view about their future success (Taylor & Brown, 1988). In contrast to these approaches, the counteractive optimistic prediction improves performance rather than securing the emotional response. Therefore, individuals set high (rather than low) expectations when they anticipate obstacles, and they do not ignore these obstacles in their assessment of future outcomes.

Consistent with our approach, other research has explored self-regulatory operations that help individuals overcome obstacles instead of managing their emotional reaction to them. For example, research on implementation intentions (Gollwitzer, 1990) attests that when anticipating obstacles, people plan to act upon encountering specified opportunities and, thus, reduce the probability of forgoing the opportunities. Alternatively, people could engage in mental contrasting (Oettingen, Pak, & Schnetter, 2001), a strategy of comparing fantasies about a positive future with negative aspects of reality (i.e., the presence of obstacles) in order to increase the motivation to act. In addition, people sometimes engage in mental simulation of the process of goal pursuit and overcoming obstacles in order to increase their motivation to tackle the difficulties (Taylor, Pham, Rivkin, & Armor, 1998). One common property of these self-regulation strategies is that they operate on the specific obstacle itself. For example, the mental simulation of the process of overcoming the obstacle would be different if a student anticipates that a test will be difficult than if he anticipates that distractions will be nearby. Similarly, the implementation intention would be different if a person plans to resist one type of obstacle versus another. Counteractive optimism, in contrast, operates on the outcome of self-regulation and is therefore not specific to a particular obstacle. For example, the student who expects to do well on the test can protect herself from different types of obstacles by predicting sufficient learning and a high grade. Thus, the use of counteractive optimism is particularly beneficial when unexpected changes arise in the form of the obstacle, because it maintains the motivation through the outcome of the self-regulation rather than devising strategies that focus on the specific obstacle itself.

The Value (and Cost) of Optimistic Prediction

Evidence for the advantages of optimism abounds (Aspinwall, Richter, & Hoffman, 2001; Carver & Scheier, 1998; Taylor & Armor, 1996; Taylor & Brown, 1988). Optimism helps individuals cope with adversities and improves persistence toward goal end states. Indeed, individuals often acknowledge the benefits of optimistic predictions and prefer erring on the side of optimism over being accurate (Armor, Massey, & Sackett, 2008). Our current results extend the existing knowledge by suggesting that task features, such as anticipated problems, may evoke optimism, which functions as a self-control device to counteract obstacles.

This self-control analysis has specific implications for understanding the role of self-control in maintaining health-promoting behaviors. Substantial evidence in both medical and psychological research supports the positive correlations between generalized optimism and better health outcomes. For example, individuals who display positive expectations are more likely to actively cope in adapting to a disease (Carver et al., 1993), and those who are optimistic adhere more to health-protective practices (Taylor et al., 1992; see also Gudas, Koocher, & Wypij, 1991; Mann, 2001). The present research attests that people use optimistic expectations as a self-control device to promote health behaviors. For example, participants in Study 3 who learned they were at risk for high cholesterol predicted low personal risk levels, which they followed up by increasing their exercise routine. We can similarly hypothesize that predicting health outcomes such as losing weight, overcoming addiction, or adhering to medical routines in response to anticipated obstacles (e.g., the presence of fatty foods, addictive substances, or busy schedule) may prove useful in overcoming these obstacles.

This self-control account has further important implications for the direction of optimism—that is, whether being optimistic means predicting greater or lesser pursuit of an activity. We found that people predict that they will work harder and succeed in the pursuit of activities that facilitate higher order goals and minimize the pursuit of interfering, tempting activities. Because the status of any given activity as a goal or temptation depends on the specific self-control situation, we expect the direction of an optimistic prediction to change accordingly. For example, when viewed against the goal of expanding knowledge, leisure reading facilitates the goal, but the same activity becomes a temptation or a hindrance when viewed against the potentially more important goal of studying for an exam. Accordingly, an optimistic self-prediction of the amount of time a person will invest in leisure reading will depend on which goal is accessible: People could overestimate leisure-reading time when they evaluate it in the context of the knowledge expansion goal but underestimate leisure-reading time when they evaluate it in the context of the studying goal.

This research has further implications for the optimism bias and, in particular, the cost of making overly optimistic predictions. Research on the optimism bias proposes cognitive accounts (Buehler et al., 1994; Kahneman & Tversky, 1979) and motivational accounts (Buehler, Griffin, & MacDonald, 1997; Dunning, 1999; Kunda, 1990; Weinstein & Klein, 1996) for people's optimism bias, and, in general, these accounts refer to a bias in the retrieval and use of information. Thus, when people formulate predictions about future goal attainment, they give insufficient attention to information that is inconsistent with their desired outcomes and therefore make a prediction on the basis of a biased set of inputs. For example, Kunda (1990) found that when people intend to arrive at a particular conclusion, they retrieve and use information that best supports the desired conclusion and discount inconsistent input, allowing them to justify the desired conclusion. Along a similar line of reasoning, Newby-Clark and colleagues (2000) found that people focus on smooth and optimistic scenarios and disregard pessimistic scenarios when they predict task completion times, and this biased input accounts for their persistent optimism. In general, this previous research predicts that when the obstacles that may undermine the pursued goal are made salient, people will adjust their predictions downward and become less optimistic.

The counteractive optimism model adds to the literature by offering an instrumental view of optimism. We suggest people may strategically use more optimistic standards as a self-control device to counteract obstacles. Therefore, anticipated obstacles or distractions do not necessarily make people less optimistic about their future goal pursuits. Instead, the responses to anticipated obstacles depend on the priority in predictions: When people use predictions as a performance standard to motivate themselves, obstacles make them more optimistic; conversely, when the priority in a prediction is to be accurate, obstacles make people less optimistic.

This new perspective on optimism is congruent with some puzzling findings in the existing literature. For example, previous research has found that people's optimism bias about their future task completion time is largely uninfluenced by reminders of pessimistic task completion scenarios or obstacles (Newby-Clark et al., 2000). According to our model, when participants in those studies pictured potential obstacles to completing the task, such scenarios may have equally activated participants' motivation to secure higher levels of performance and their motivation to be accurate, because neither motive was emphasized. As a result, the prediction level stayed relatively stable despite the negative scenarios.

The Value (and Cost) of Accuracy

Although accurate predictions are desirable in many situations, the current research suggests that these benefits may come at the cost of decreasing individuals' motivation and performance in actual goal pursuit. That is, whenever the incentives for being accurate are put forward, people try to avoid inaccuracy by adjusting their predictions downward to account for the negative impact of potential obstacles. The resultant conservative predictions are less motivating performance standards, which subsequently reduce effort put into goal pursuit. Incentivizing accuracy in predictions, ironically, may decrease people's motivation and performance in the actual pursuit.

Our findings are relevant to previous research examining the costs and benefits of accuracy versus optimism (Taylor & Brown, 1988). On the one hand, those with traditional views from clinical psychology and psychiatry argue that mental health should be characterized by accurate perception about one's circumstances and future. On the other hand, ample evidence in both social and cognitive psychology argues for the positive value of being optimistic. Our findings can potentially help resolve this dilemma by identifying situations in which either of these motives can be beneficial and by highlighting the costs of overemphasizing accuracy.

Moreover, this apparent interplay between accuracy and effort has important implications for social agents such as educators, managers, and health professionals. Parents may encourage their children to state precise predictions and consider these binding promises. Managers often ask employees to provide an accurate prediction of their productivity. Health professionals encourage realistic goal setting for behavioral change. Based on our findings, one should be aware of both the benefits and costs of an accurate prediction, and the question of whether to emphasize accuracy when soliciting predictions should depend on the relative priority of encouraging a high level of task performance versus avoiding the cost of being inaccurate. In particular, social agents can promote counteractive optimistic predictions by deemphasizing the importance of accuracy. Health professionals, for example, could emphasize the obstacles and at the same time downplay the importance of accuracy when eliciting predictions of health behaviors, and they should allow their clients to commit to more optimistic (though possibly less attainable) predictions. For example, when soliciting predictions for a new exercise regime, health providers might achieve greater behavioral change if they downplay the importance of being accurate and instead encourage more ambitious expectations. On the basis of our findings, even if these expectations may not be completely fulfilled, they would nevertheless provide more motivation and elicit more effort, compared with expectations that are more accurate and less ambitious.

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