Title
(Too) Optimistic About Optimism: The Belief That Optimism Improves Performance

Journal
Journal of Personality and Social Psychology, 108(3)

ISSN
0022-3514

Authors
Tenney, Elizabeth R
Logg, Jennifer M
Moore, Don A

Publication Date
2015-03-01

DOI
10.1037/pspa0000018

Peer reviewed

(Too) Optimistic About Optimism:

The Belief That Optimism Improves Performance

Elizabeth R. Tenney
University of Utah

Jennifer M. Logg
University of California, Berkeley

Don A. Moore
University of California, Berkeley

Tenney, E. R., Logg, J. M., & Moore, D. A. (2015). (Too) optimistic about optimism: The belief that optimism improves performance. Journal of Personality and Social Psychology, 108(3), 377-399.

Abstract

A series of experiments investigated why people value optimism and whether they are right to do so. In Experiments 1A-B, participants prescribed more optimism for someone implementing decisions than for someone deliberating, indicating that people prescribe optimism selectively, when it can affect performance. Furthermore, participants believed optimism improved outcomes when a person's actions had considerable, rather than little, influence over the outcome (Experiment 2). Experiments 3-4 tested the accuracy of this belief; optimism improved persistence, but it did not improve performance as much as participants expected. Experiments 5A-B found that participants overestimated the relationship between optimism and performance even when their focus was not on optimism exclusively. In sum, people prescribe optimism when they believe it has the opportunity to improve the chance of success—unfortunately, people may be overly optimistic about just how much optimism can do.

Word count: 138

Keywords: optimism, bias, accuracy, deliberation, implementation, performance

Optimistic About Optimism:

The Belief That Optimism Improves Performance

"Optimism is faith that leads to achievement." --Helen Keller (1903, p. 67)

"Wisdom is clearly to believe what one desires, for the belief is one of the indispensable preliminary conditions of the realization of its object." --William James (1882, p. 75)

William James, writing in 1882, and Helen Keller, in 1903, believed that optimism leads to achievement. Empirical research has begun to explore directly whether, like them, people generally believe in the benefits of optimism. One study to tackle this question suggests that they do (Armor, Massey, & Sackett, 2008). Their participants recommended optimism over pessimism or realism in a variety of situations. People believed, in the authors' words, that "it is right to be wrong about the future." Optimism, in this view, has so much to recommend it that it is worth sacrificing accuracy for (Schneider, 2001).

It would be nice if it was possible to be optimistic and accurate at the same time. But if optimism is the inclination to expect the best possible outcome, that would require the best outcome to be the most likely outcome. If people always prescribe optimism over accuracy, as Armor, Massey, and Sackett (2008) suggest, that would be remarkable because there are many advantages to being realistic. Accurate forecasts can help people decide where best to invest their limited time and money in education, recreation, social relationships, and professional opportunities (Baumeister, Campbell, Krueger, & Vohs, 2003; Forsyth, Lawrence, Burnette, & Baumeister, 2007). There is an undeniable benefit to anticipating potential risks, losses, embarrassments, and disasters. Overly optimistic entrepreneurs lose a great deal of money on businesses that fail (Balasuriya, Muradoglu, & Ayton, 2010; Camerer & Lovallo, 1999). Excessive optimism can undermine the motivation to take protective action against risks

(Weinstein & Lyon, 1999). In social situations, people who overestimate their popularity run the risk of social ostracism (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006). There are also potential intrapsychic costs to optimism: the more optimistic people are, the more likely they are to be disappointed when reality falls short of their expectations (Krizan, Miller, & Johar, 2010; Krizan & Sweeny, 2013; McGraw, Mellers, & Ritov, 2004; Thomaes et al., 2010), and giving up on an unreachable goal is good for well-being (Wrosch, Scheier, Carver, & Schulz, 2003).

Why Would People Prescribe Optimism?

Given that realism offers so many advantages, why might people think that optimism is better? Research in positive psychology has identified a host of benefits of optimistic, positive thinking in social relationships, health, and happiness (Carver, Kus, & Scheier, 1994; Peterson, 2000; Scheier et al., 1989; Seligman & Csikszentmihalyi, 2000; Seligman & Schulman, 1986). In particular, some have posited that optimism, and positive affect more generally, creates an approach orientation such that people feel empowered to work towards their relationship and career goals rather than feel a need to withdraw or avoid harm (Carver, 2003; Fredrickson, 2001; Lyubomirsky, King, & Diener, 2005; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Returning to the question of why people prescribe optimism, we propose that people's lay beliefs are in line with this perspective, and that one common reason people prefer optimism is they believe that optimism will make desirable outcomes more likely. Specifically, they believe that having an optimistic outlook will improve performance when working towards a goal, which then increases the chance of success. We call this explanation for prescribed optimism, in which people believe that optimism improves performance (which then improves the chance of successful outcomes that depend on performance), the *optimism-performance hypothesis*. We test it and test whether optimism affects performance as much as people expect.

Although Armor, Massey, and Sackett (2008) found that participants always prescribed optimism for the protagonists in the scenarios in their study, they did find several moderators that decreased the prescription for optimism. Of most interest to the current research, they found that people prescribed less optimism when commitment to a course of action was low compared to high or when a protagonist lacked control over the outcome. We discuss these variables in relation to the optimism-performance hypothesis below.

The optimism-performance hypothesis leads to several predictions. If people prescribe optimism because they believe it can improve performance, then they would be most likely to prescribe optimism in the presence of goals to act or perform. Performance becomes prominent when implementing a decision. Thus, we distinguish pre- and post-decision phases: deliberation and implementation (Gollwitzer, Heckhausen, & Steller, 1990). *Deliberation* describes considering various options, and *implementation* occurs when a person has decided on a course of action and focuses on carrying it out. It stands to reason that sober assessment of one's chances of success is more likely to benefit the decision maker in the deliberative decision phase. On the other hand, once a person has decided on a course of action, performance becomes the focus, and optimism may be more useful for marshaling efficacious action. Once a person finds herself on the karaoke stage with a microphone in her hand, perhaps a little optimism will help her hit the harder notes and marshal her best stage presence.

Some evidence does indeed suggest that people express more optimism when they are in implemental than deliberative decision phases (Armor & Taylor, 2003; Taylor & Gollwitzer, 1995). People also prescribe more optimism when commitment to a particular course of action is high (Armor, Massey, & Sackett, 2008). We expand on this previous research by testing prescribed optimism in deliberative versus implemental decision phases using a more explicit differentiation of the phases than in previous research, and more importantly, by proposing the optimism-performance link as an answer to the question of mechanism: *Why* do people prescribe optimism, and what are the boundaries of this prescription? We predict that if people believe that optimism improves performance, then when the distinction between phases is clear, people will prescribe accuracy in deliberative decision phases, when the emphasis is on making a decision, and prescribe optimism in implemental decision phases, when the emphasis is on performance. We tested this prediction in Experiments 1A and 1B.

Experiment 2 pits the optimism-performance hypothesis against an alternative explanation for why people might prefer optimism: the so-called “Law of Attraction.” The best-seller *The Secret* (Byrne, 2007) popularized the notion that “like attracts like”: we attract into our lives those things we imagine most ardently, and so people would prescribe positive thoughts in order to attract positive outcomes. Researchers have also found that people do sometimes believe that people can create success simply by thinking good thoughts (Pronin, Wegner, McCarthy, & Rodriguez, 2006). If people believe that optimism can have this magical power, then people will believe that optimism can benefit others regardless of whether others can directly control outcomes through their actions. By contrast, the optimism-performance hypothesis predicts that people’s beliefs in optimism’s power to affect outcomes is grounded in their more rational understanding of motivation and action, and that they believe the power of optimism waxes and wanes depending on the degree of actual control. People should expect optimism to improve performance more for someone who can directly influence an outcome than for someone who cannot (Bandura, 2006; Klein & Helweg-Larsen, 2002). We test these competing predictions in Experiment 2 and find support for the optimism-performance hypothesis.

Testing the Accuracy of the Belief in the Benefits of Optimism

Does optimism actually improve outcomes? To answer this question, we consider the literature on self-efficacy, a construct related to optimism. Self-efficacy is peoples' beliefs in their capabilities (Bandura, 1977). Self-efficacy affects factors related to performance such as task initiation, effort, and persistence (Bandura, 1977; Bandura, Adams, & Beyer, 1977; Schunk 1995). This effect is well-documented in the domains of health (Garcia, Schmitz, & Doerfler, 1990; Jerusalem & Mittag, 1995; O'Leary, 1985), work (Barling & Beattie, 1983; Stajkovic, Luthans, 1998), academics (Bouffard-Bouchard, 1990; Cervone & Peake, 1986; Pajares, 1996; Walker, Greene & Mansell, 2006), and athletics (Barling & Abel, 1983; Feltz & Lirgg, 1998; McAuley & Gill, 1983; Moritz, Feltz, Fahrbach, & Mack, 2000; Weiss, Wiese, & Klint, 1989). But it is not clear that self-efficacy affects performance directly, apart from its effect on effort and persistence.[1] One study that manipulated self-efficacy experimentally found no effect of it on performance in an easy, time-limited task, when the effect of persistence would be inconsequential (Locke, Frederick, Lee & Bobko, 1984). Another study investigated performance and persistence separately. It manipulated the self-efficacy of 64 undergraduates by altering feedback about their competence relative to their peers on a verbal task (Bouffard-Bouchard, 1990). Participants then completed additional problems on the same task, in which their goal was to replace nonsense words with real words in sentences. Self-efficacy affected their persistence (i.e., the number of problems participants completed) but not performance (i.e., the number of problems they completed *correctly*).

[1] Some studies claim that self-efficacy affects performance, but they do not necessarily make a distinction between performance and related factors (e.g., semester grades are a mix of persistence, effort, performance, etc.) and/or the data are correlational (e.g., Pajares & Miller, 1994) and/or performance is judged by outside observers, who could have been considering effort in their evaluations (e.g., McAuley & Gill, 1983).

What none of the research on self-efficacy has done is to examine whether lay beliefs about the effects of optimism match the reality of what optimism can deliver. The studies presented in this paper attempt to provide this test. In Experiments 3A-D and Experiment 4, we tested the accuracy of the belief in the benefits of optimism. Crucially, we employed exogenous manipulations of optimism. Experimental manipulation is essential to assessing any causal claim about the influence of optimism. We compared the actual effect of these manipulations with people's beliefs about their effects. Although we expected that optimism will contribute to performance, or at least to persistence (e.g., Bandura, 1982; Lyubomirsky et al., 2005), we suspect that people might believe its effect to be even larger. This belief would be supported by the positive relationship between optimism and performance in many domains (Taylor, 1989). Optimistic athletes, students, or workers often do perform better than pessimistic ones. But it is not easy to apportion the variance in performance between the unique causal role of optimism and other factors that affect both performance and optimism. Deciphering how much optimism affects performance per se compared to how much features of the situation (e.g., test difficulty) or a person's natural ability affect performance is arguably a difficult task. In Experiments 5A and B, we examine how people apportion the variance in performance among optimism and other factors. To foreshadow the results, we show that the belief in optimism's ability to meaningfully affect performance in specific situations is (at least sometimes) misplaced, and that optimism is not always as effective as people believe it to be.

In sum, across studies, we ask whether people believe it is better to anticipate the best of all possible futures or to anticipate the most likely futures. Given the mixed benefits of optimism, we expect that people will not prefer optimistic bias in all situations. Instead, in accordance with the optimism-performance hypothesis, we expect they will prescribe optimism primarily when it has the potential to benefit performance. However, like other sins of social cognition—in which people make an honest attempt to make sense of the world but are prone to systematic errors—people might expect more from optimism than it can deliver.

Overview of Studies

Experiment 1A directly tests the optimism-performance hypothesis by testing the moderating effect of decision phase on the preference for optimism. Participants indicated how optimistic they thought protagonists should be in different phases compared to an accuracy benchmark that we provided. Experiment 1B replicates this experiment with one change: we used an accuracy benchmark that participants provided.

Experiment 2 explores how much people think adopting an optimistic mindset can improve outcomes. This experiment allows us to disentangle whether people's prescriptions for optimism stem from "magical thinking" or from their belief that optimism affects performance directly.

Experiments 3A-D investigate whether people accurately predict the benefits of optimism for performance. In Experiment 3A, experiencers did a practice age-guessing test, received feedback to manipulate their optimism about a similar, upcoming test, and then took the test. Predictors estimated how much the manipulation affected experiencers' optimism and test performance. In Experiment 3B, new predictors learned exactly how optimistic the experiencers in 3A had been and predicted their test performance. Experiment 3C replicates 3A using a math test. Experiment 3D builds on 3C by ruling out some artifactual explanations such as the potential role of anchoring in predictors' judgments.

Experiment 4 measures beliefs about the effect of optimism on persistence, in addition to performance, and compares these beliefs to experiencers' actual behavior. This experiment also measures individual differences in trait optimism and regulatory focus.

Experiment 5A asks predictors to estimate experiencers' test performance based on several cues in addition to optimism to help rule out a focusing effect as the explanation for why predictors think optimism affects performance. Experiment 5B uses a Brunswik (1956) lens model to assess the relative importance that predictors placed on optimism and on other cues to estimate performance.

Experiments 1A and 1B: Prescribed Optimism by Decision Phase

We sought to test the optimism-performance hypothesis as an explanation for why people prescribe optimism. In Experiments 1A and 1B, we aimed to test the moderating effect of decision phase on the preference for optimism. Armor, Massey, and Sackett (2008) found a stronger preference for optimism when commitment to a course of action was high rather than low (as the optimism-performance hypothesis would also predict), but they found that overall, people still prescribed optimism rather than accuracy in both high and low commitment conditions. In contrast, the optimism-performance hypothesis predicts that people would prescribe accuracy rather than optimism while deliberating about a course of action (pre-commitment). On closer examination, the manipulation of commitment (in Armor, Massey, & Sackett, 2008) did not always clearly differentiate between protagonists in deliberative versus implemental decision phases. For example, in the *low commitment* condition, a protagonist had not decided whether to have surgery or another treatment, and in the *high commitment* condition, he had decided on surgery; however, this protagonist would have a long road to recovery either way, and it is unclear whether participants prescribed optimism for this protagonist with the protagonist's decision in mind or the road to recovery in mind. Thus, we employed scenarios from Armor, Massey, and Sackett (2008) and, like them, included a manipulation of decision phase within-subjects in order to test whether the same individual would endorse optimism to differing degrees depending on the circumstances. We modified the materials with the intention of making the decision phases and objective of the prescriptions clear. Unlike previous research, we included an accuracy criterion that allowed participants to specify a preference for deviations from accuracy in percentage terms. This approach allows us to ask participants precisely how much optimism they prescribe and allows us to compare participants' prescriptions with an accuracy standard that we provide (Experiment 1A) or that they provide (Experiment 1B). We predicted that people would prescribe accuracy for someone making a decision and optimism for someone who needs motivation to succeed.

Experiment 1A

Method

Participants

Eighty participants (42 women, 38 men; *Mdn age* = 30) completed this experiment via Amazon Mechanical Turk for $.25. Participants were in the United States and had at least 95% approval rating on the website. We determined the sample size by conducting a power analysis using data from a separate pilot test and aiming for 80% power to detect the difference between the baseline decision phase and the benchmark.

Design

The independent variable was decision phase (baseline, deliberation, or implementation). We manipulated decision phase within-subjects, meaning that each participant endorsed a particular degree of optimistic belief three times. First, we assessed baseline beliefs (in which the protagonist needed motivation to succeed, but this need was implied rather than stated explicitly). Then participants were invited to revise their recommendation twice; once when the protagonist in the scenario was deliberating and once when the protagonist was implementing.

Scenarios. The four scenarios came from Armor, Massey, and Sackett (2008) and are reproduced in Appendix A. They were about someone applying for an academic award, investing in a new business, undergoing open-heart surgery, or hosting a party.

Prescribed beliefs measure. Participants rated what the protagonist should believe his or her chances of success were on a scale from 0% to 100% given that the true chance was X (X was different in each scenario: 65%, 68%, 70%, or 75%). Ratings below X prescribe pessimism, ratings at X prescribe accuracy, and ratings above X prescribe optimism. Participants completed this prescribed beliefs measure three times: once at baseline, once in a deliberative decision phase, and once in an implemental decision phase (described below).

Decision Phase (Baseline, Deliberative, and Implemental): Participants learned that the protagonist had a certain chance of success (baseline phase) and needed to make important decisions based on his or her chance of success (deliberative phase) or that the protagonist needed motivation to work hard (implemental phase). We considered the manipulation to be somewhat conservative because the decision phases were still not entirely discrete; instead, the protagonists were all in the process of implementing recent decisions (e.g., Jane had just decided to invest in a business). Thus, the baseline phase can be thought of as a “light” implemental manipulation with an implied, but not explicit, mention of a need for motivation. To manipulate a deliberative vs. implemental phase, we emphasized one phase more than the other in the context of the protagonists’ current situation and made this distinction clear.

An example of the baseline phase:

> Jane's true chance of success is 65%. What should she <u>think</u> is her true chance of success? (Move the slider below to indicate what she should think her chance is given that her true chance is 65%).

An example of the deliberative phase (with bold text indicating differences from the baseline phase):

> Jane's true chance of success is 65%. **If she is going to have to make a lot of important decisions based on her chance of success (e.g., how to plan her other finances),** what should she <u>think</u> is her true chance of success? (Move the slider below to indicate what she should think her chance is given that her true chance is 65%).

An example of the implemental phase (with bold text indicating differences from the baseline phase):

> Jane's true chance of success **if she works hard** is 65%. **If she is going to need motivation to work hard,** what should she <u>think</u> is her true chance of success **if she works hard?** (Move the slider below to indicate what she should think her chance **if she works hard** is given that her true chance is 65%).

Additional Measures

Armor, Massey, and Sackett (2008) optimism measure. To replicate Armor, Massey, and Sackett (2008), participants rated what kind of prediction would be best for the protagonist to make about his or her chance of success on a scale from -4 (*extremely pessimistic)* through 0 (*accurate)* to +4 (*extremely optimistic)* immediately after reading a scenario. Ratings below zero prescribe pessimism, ratings at zero prescribe accuracy, and ratings above zero prescribe optimism.

Procedure

In order to limit participant fatigue, participants were randomly assigned to read only two of the four scenarios. After reading a scenario, participants responded using the Armor, Massey, and Sackett (2008) optimism measure. Next, they answered the prescribed beliefs question in baseline, deliberative, and implemental phases. In order to increase engagement with the task, along with each of these questions we asked participants, “Briefly describe why you made the selection you did in the previous question.” Participants answered additional exploratory questions that can be found in our supplementary online material. Finally, they reported age and gender.

Results and Discussion

The results support the optimism performance hypothesis; participants prescribed optimism for someone implementing a decision and accuracy for someone deliberating. At baseline (the “implemental light” condition), participants told us that the person in the scenario should believe that the chance of success was 7.31 percentage points (SD = 13.8) above the benchmark provided, $t(79) = 4.73$, $p < .001$, $d = .53$. This basic finding replicates the results of Armor, Massey, and Sackett (2008). Similarly, in the implemental phase, participants also prescribed optimism (M = 8.24, SD = 14.1), $t(79) = 5.22$, $p < .001$, $d = .58$. However, as predicted, in the deliberative phase, participants prescribed accuracy; they prescribed a value that was not significantly different from the benchmark (M = 1.85, SD = 15.1), $t(79) = 1.10$, $p = .276$, $d = .12$.

Planned comparisons confirmed that the baseline and implemental phases were not significantly different from each other, $t(79) = .67$, $p = .504$, $dz = .07$, but were each different from the deliberative phase (baseline vs. deliberative: $t(79) = 3.81$, $p < .001$, $dz = .43$; implemental vs. deliberative: $t(79) = 3.75$, $p < .001$, $dz = .42$). See Figure 1. These results show that participants prescribed optimism for those who needed motivation for implementation but not for those who needed to make decisions based on the chance of success.

Experiment 1B

One feature of Experiment 1A is that we provided participants with accuracy criteria (in the form of benchmark probabilities about the chance of success), but perhaps participants were also relying on their own ideas about what the likelihood of success could be in a given scenario. For example, we claimed that there was a 68% chance of Jane's business being successful, but participants might have believed that a lower number was more appropriate given their own experiences or beliefs about the chance of success in business. If so, then if participants reported that the protagonist should think the chance of success was 68%, we could have mistakenly concluded that participants prescribed accuracy when in fact they had prescribed optimism relative to their own beliefs. Experiment 1B replicated 1A but used an accuracy standard that the participants provided.

Method

Participants

Eighty-three participants (27 women, 56 men; *Mdn age* = 24) completed this experiment via Amazon Mechanical Turk for $.35. Participants were in the United States and had at least 95% approval rating on the website. We determined the sample size by aiming to run the same number of participants as in Experiment 1A.

Design, Materials, and Procedure

The basic design and materials were the same as Experiment 1A with one exception. First, after reading a scenario, participants rated what they thought was the protagonists' true chance of success on a scale from 0% to 100%. We then plugged in the number that each participant provided as the benchmark chance of success for that participant to consider.

Results and Discussion

The results were consistent with Experiment 1A using the participant-provided benchmarks. On average, participants rated the chance of success in the academic award, business, surgery, and party hosting scenarios as: 50%, 54%, 68%, and 71%, respectively (in Experiment 1A, we had used 65%, 68%, 70%, and 75%, respectively).

At baseline, they told us that the person in the scenario should believe that the chance of success was 9.10 percentage points (SD = 17.8) above the benchmark they provided, $t(82) = 4.66$, $p < .001$, $d = .51$. Similarly, in the implemental phase, participants also prescribed optimism relative to their own benchmark (M = 12.75, SD = 20.3), $t(82) = 5.72$, $p < .001$, $d = .63$. However, in the deliberative phase, participants prescribed accuracy; they prescribed a value that was not significantly different from their own benchmark (M = 2.61, SD = 17.4), $t(82) = 1.37$, $p = .175$, $d = .15$.

Comparisons among the phases confirmed that the prescribed percentage above the benchmark in the baseline and implemental phases were not significantly different from each other (although they were marginally different), $t(82) = 1.90$, $p = .061$, $dz = .21$, but were each different from the deliberative phase (baseline vs. deliberative: $t(82) = 2.88$, $p = .005$, $dz = .32$; implemental vs. deliberative: $t(82) = 4.46$, $p < .001$, $dz = .49$). These results corroborate Experiment 1A and are consistent with the optimism-performance hypothesis. Using a benchmark that they themselves provided, participants still prescribed optimism for those who needed motivation to perform but not for those who needed to make decisions based on the chance of success.

One interpretation of these responses is that people think that positive beliefs increase the likelihood of positive outcomes, and so optimistic beliefs can make themselves come true. We test this possibility explicitly in the remaining experiments. Experiment 2 varies control over the outcome, because the potential for an individual to turn his or her optimistic beliefs into reality is clearly greatest when that person actually has some control over the outcome in question.

Experiment 2: High vs. Low Control

Experiment 1 showed that people want others to be optimistic when implementing a decision (and to be accurate when deliberating). In Experiment 2, we explore how much people think adopting an optimistic mindset can improve outcomes during implementation. We also consider the moderating role of subjective sense of control (Harris, 1996) to test the optimism-performance hypothesis. We manipulated the protagonists' degree of control by using two sets of scenarios in which the action either did or did not depend on the protagonist. If people prescribe optimism in part because they believe that optimism improves performance, then they would believe that optimism matters more to the outcome of a person who has high control (e.g., the outcome depended on the person's actions) than low control (e.g., the outcome depended on someone else's actions). If, on the other hand, people prescribe optimism because they believe in "magical thinking" or the idea that optimism improves the chance of success through karma, then people would believe optimism to be beneficial regardless of whether the protagonists' actions themselves determined the outcome.

Armor, Massey, and Sackett (2008) also manipulated control and measured prescribed optimism. They found that people prescribed more optimism in high control rather than low control scenarios. The current study tests different questions to investigate *why* people prescribe optimism; specifically, we ask whether people believe that an optimistic (versus accurate or pessimistic) mindset affects the chance of success in high versus low control scenarios, and if so, how much do they think optimism helps? The focus is on what people believe happens given that someone is optimistic or not. We predict that, consistent with the optimism-performance hypothesis, people prescribe optimism because they believe that it will improve performance, but not when control is absent. After all, as control approaches zero, the ability of higher motivation to affect performance is eliminated.

Method

Participants

Three hundred and five people (89 women, 216 men; *Mdn* age = 26) completed this experiment via Amazon Mechanical Turk for $.35. Participants were in the United States and had at least 95% approval rating on the website. We chose the sample size ahead of time based on a guess, aiming for 50 participants per cell for each of 6 cells and posting 300 spots available for payment (Simmons, Nelson, & Simonsohn, 2013).

Design and Materials

The experiment had a 2 (control: high vs. low) x 3 (protagonists' outlook: optimistic, accurate, pessimistic) mixed design. Control varied between subjects and protagonists' outlook varied within subjects. The dependent variable was perceived chance of success.

Scenarios: This experiment employed the same four high-control scenarios as Experiments 1A and 1B. In the other four scenarios, the protagonist had low control (i.e., the protagonist had little influence over the outcome). For example, one scenario described the protagonist's role in a business as, "passive – she will remain a silent investor without influence over the business." These low-control scenarios were also from Armor, Massey, and Sackett (2008) and are reproduced in Appendix A.

Protagonists' Outlook (Optimistic, Accurate, or Pessimistic): Participants learned that the protagonist believed his or her chance of success was 15 percentage points above (optimistic), at (accurate), or 15 percentage points below (pessimistic) the benchmark of 70%. An example of the wording, with the differences between conditions in italics, is the following:

> Remember that, according to the best information available, the chance of Jane's business being successful is 70%. Jane is NOT aware of this information.
>
> What if Jane thinks the true chance of the business's success is *85/70/55*%. In that case, what do YOU think is the true chance of success? (Move the slider below to indicate what you think the true chance is—given that information suggests the chance is 70%, *but/and* she thinks the chance is *85/70/55*%)

Manipulation Check: Participants answered the question, "How much control does the person in the scenario have over the success of the outcome?" on a scale from 1 (*no control at all)* to 6 (*complete control).*

Procedure

Participants completed the study online. They were randomly assigned to read a scenario from the high or low control condition. After reading the scenario, participants answered questions about the chance of success given three different levels of optimism by the protagonist (optimistic, accurate, and pessimistic, in that order) and completed the manipulation check question about the protagonist's degree of control over the outcome. Finally, they reported their age and gender.

Results and Discussion

Manipulation Check

Participants in the high control condition (M = 3.70, SD = 1.3) rated the protagonist as having more control over the outcome than did participants in the low control condition (M = 2.19, SD = 1.3), $t(303) = 10.08$, $p < .001$, d = 1.16, indicating that the control manipulation was effective.

Perceived Changes in Chance of Success

We analyzed participants' perceived change in chance of success as deviations from the benchmark of 70% using a 2 X 3 ANOVA that featured the following independent variables: protagonists' level of control (low, high) and protagonists' outlook (optimistic, accurate, pessimistic). See Figure 2. Protagonists' outlook affected perceived change in chance of success, $F(2, 302) = 59.79$, $p < .001$, $\eta_p^2 = .28$. When protagonists were optimistic, participants thought the chance of success increased; when protagonists were accurate, they thought the chance of success decreased slightly; when protagonists were pessimistic, participants thought the chance of success decreased. This main effect of protagonists' outlook was moderated by the interaction with control, $F(2, 302) = 5.43$, $p = .005$, $\eta_p^2 = .03$, indicating that the degree to which the protagonists' outlook affected the perceived chance of success depended on whether the protagonists had high or low control over the outcome. When protagonists were optimistic, participants thought their chance of success increased more when protagonists had high control ($M = 3.39\%$, $SD = 9.60\%$), compared to low control ($M = .53\%$, $SD = 11.58\%$), $t(303) = -2.35$, $p = .02$, $d = -.27$. When protagonists were pessimistic, participants thought their chance of success decreased more when protagonists had high control ($M = -9.66\%$, $SD = 13.99\%$) compared to low ($M = -6.51\%$, $SD = 10.51\%$), $t(303) = 2.21$, $p = .028$, $d = .25$. Thus, as expected, the protagonists' outlook affected the perceived chance of success more when the protagonist had high control rather than low.

Experiment 2 shows that people believe that a person's optimistic outlook affects the chance of success, particularly when that person has control over the outcome. This result is consistent with the optimism-performance hypothesis insofar as it suggests that people believe optimism is most useful when performance matters (e.g., when people have control). In

Experiments 3A-D and Experiment 4, we put that belief to the test: does optimism affect outcomes as much as people expect?

Experiments 3A, 3B, 3C, and 3D:

Predicted vs. Experienced Effects of Optimism on Performance

In the previous experiments, we provide support for the optimism-performance hypothesis to explain why people prescribe optimism. But does optimism actually improve performance in the way people expect it to? On the one hand, there is a robust positive correlation between optimism and many desirable life outcomes (Seligman & Csikszentmihalyi, 2000), including academic achievement (see Hansford & Hattie, 1982; and Valentine, DuBois, & Cooper, 2004, for meta-analytic reviews of the relationship between positive self-beliefs and achievement), and people are likely aware of it. However, the degree to which optimism causes desirable outcomes is probably more difficult to assess. For instance, a confident student might very well perform better than a less confident one, but it could be largely because the students differ in their abilities (Baumeister et al., 2003; Klein & Cooper, 2009; but see Valentine et al., 2004). Having observed such a strong relationship between positive attitudes and positive outcomes in everyday life, people could easily misconstrue the importance of the various reasons for this relationship. They might overestimate the effect that sheer optimism can have on performance.

Experiment 3 (A, B, C, D) was designed to test this question using two different tasks. The basic design includes both experiencers and predictors. The experiencers undergo a manipulation of optimistic beliefs and experience its effect on their performance. The predictors have the task of predicting the size of this effect. In 3A, 3B, and 3C, predictors learn about the manipulation of optimistic beliefs in high and low optimism groups. In 3D, we varied optimism between-subjects for predictors—each predictor only made predictions for one of the optimism conditions. Are their beliefs accurate, or are they overly optimistic about optimism's power to influence performance?

Experiment 3A

In Experiment 3A, some participants first took a pretest in which they looked at five photographs and guessed the ages of the individuals in the photographs. Then they received feedback, ostensibly based on their performance on the pretest, designed to manipulate their optimism about the real test. Then we compared whether optimistic beliefs about the upcoming test affected performance on the test.

Other participants did not take the age-guessing test themselves; instead, they learned about the participants who took the test and estimated how well those participants would do on the test. To motivate these participants, we rewarded them for accurate predictions. We expected that participants would believe optimism influenced performance, and we compared their beliefs about performance to what actually occurred.

Method

Participants

One hundred and fifty participants (60 women, 90 men; *Mdn* age = 29) completed this experiment via Amazon Mechanical Turk for $.50 and a chance to win lottery tickets for a $50 bonus based on performance. Participants were in the United States and had at least 95% approval rating on the website. We chose the sample size ahead of time following the guideline of 50 participants per cell (Simmons et al., 2013).

Design

The experiment employed a 2 (role: predictor vs. experiencer) x 2 (optimism: high vs. low) mixed design. Role varied between-subjects. Optimism varied between-subjects for experiencers but within-subjects for predictors (so that predictors could decide how much they thought optimism—as we had manipulated it—would matter to performance). We compared how well participants performed on an age-guessing test to how well predictors thought they would do.

Materials and Procedure

All participants completed the experiment online. The Qualtrics survey program randomly assigned them to be experiencers (*n* = 102), who experienced one of the optimism conditions, or predictors (*n* = 48) who predicted how experiencers did in each of the two conditions.

Experiencers. Experiencers first took a pretest in which they looked at five photographs and guessed, in years, the age of the person in each photograph. After the pretest, participants were randomly assigned to receive feedback designed to make them high or low in optimism about the upcoming real test. Participants read, "Based on the practice test, we think you will get *70/30*% of the answers right on the real test." Participants who learned they were expected to get 70% right were in the high optimism condition, and participants who learned they were expected to get 30% right were in the low optimism condition. In fact, they had gotten 52% right on average (*SD* = 25%). After receiving this feedback, participants completed two manipulation check questions: what percent of the 10 questions on the real test they expected to get right, from 0% to 100%, and how optimistic they felt about the test from 1 *(not optimistic at all)* to 6 *(very optimistic).*

Then participants took the 10-photograph real test. As incentive to perform well, they were entered into a lottery to win a $50 bonus for each answer that was correct. An answer was counted as correct if it was within 3 years of the actual age. Finally, participants reported their ages and genders.

Predictors. Predictors learned that other participants took a multi-phase survey called "Guess My Age" that started with a pretest, manipulated expectations for future performance, and then ended with the real test with incentives for performance. They learned that the other participants were entered into a lottery to win a $50 bonus for each age they guessed correctly within 3 years. Then predictors learned how we assigned those participants to the two groups, A and B. The predictors read:

> There was one thing that made this survey especially interesting for us: We divided the participants who took the survey into two groups of people, Group A and Group B, using a computer program to randomly assign them to groups regardless of how well they had done on the practice test. If the participant was assigned to be in Group A, we told them that we thought they would get 70% right on the real test. If the participant was assigned to be in Group B, we told them that we thought they would get 30% right on the real test.

To reinforce understanding, we asked predictors to briefly describe what was different about Group A and Group B. Then we asked them two true/false questions that they had to answer correctly before the survey let them proceed: "People were assigned to groups based on how well they did on the practice test," *(correct answer: false);* and "We told Group A that we thought they would get 70% right, and we told Group B that we thought they would get 30% right," *(correct answer: true).*

Next, predictors read the exact wording of the feedback that experiencers received and answered questions about each group that were similar to the ones experiencers answered: what percent of the 10 questions did predictors think Group A and Group B expected to get right, and how optimistic was Group A and Group B about the test from 1 (*not optimistic at all)* to 6 *(very* *optimistic).* Then predictors estimated how well they thought Group A and Group B actually did on the test. They read:

> Suppose both groups had the same inherent ability before taking the real test and that both groups took the exact same test. The only difference between the groups is that they had different expectations. We told Group A that we thought they would get 70% right, and we told Group B that we thought they would get 30% right. Answer the questions below to tell us what you think actually happened on the test.

Predictors were rewarded for accuracy—they earned one lottery ticket for each group's (A and B) performance that they estimated correctly within 5%. These lottery tickets earned them chances to win a $50 prize.

Results and Discussion

Predictors overestimated the effect of optimism on performance. They believed that Group A would perform much better than Group B on the age-guessing task. In reality, the difference between the two groups' performance was small and non-significant.

Manipulation Checks

The optimism manipulation was effective. Group A expected to get 65.8% (SD = 15.5%) right, and Group B expected to get 43.9% (SD = 20.0%) right, $t(100) = 6.18$, $p < .001$, $d = 1.22$. Group A (M = 4.43, SD = 1.08) also rated themselves as higher in optimism than Group B (M = 3.61, SD = 1.33), $t(100) = 3.43$, $p = .001$, $d = .68$.

Predictors thought Group A would expect to get 66.88% (SD = 12.86) right and thought Group B would expect to get 35.81% (SD = 14.19) right, $t(47) = 11.61$, $p < .001$, $dz = 1.67$. They also rated Group A (M = 5.00, SD = .68) as higher in optimism than Group B (M = 2.29, SD = .90), $t(47) = 14.57$, $p < .001$, $dz = 2.11$.

Test Performance

Group A answered an average of 42.7% (*SD* = 13.72) of the test questions correctly, which was not significantly different from Group B, who scored 39.4% (*SD* = 14.20), $t(100) = 1.21$, $p = .231$, $d = .24$.

Although there was a small, non-significant difference in actual performance between the groups, predictors expected there to be a large one. They expected Group A to get 60.7% (*SD* = 10.90) right, and they expected Group B to get 46.5% (*SD* = 17.72) right, $t(47) = 4.78$, $p < .001$, $dz = .69$. Thus, predictors overestimated how much optimism would enhance performance. See Figure 3.

Pretest Performance

To control for pretest performance, we conducted an ANCOVA with optimism predicting performance on the test, controlling for performance on the pretest as a covariate. The effect of optimism on performance on the test remained non-significant, $F(1, 99) = 1.22$, $p = .273$, $\eta_p^2 = .012$. We also ran a similar ANCOVA to explore interactive effects between optimism and pretest performance, in case the manipulation affected people differently depending on their ability, but we did not find evidence for this interaction ($\beta = -.19$, $p = .592$).

Experiment 3B

Experiment 3A shows that predictors overestimated the difference in performance between experiencers who had relatively high or low optimism about an age-guessing task. However, predictors also expected the experimental manipulation of optimism to have a stronger effect on experiencers' optimism than it actually did. Does overestimating the difference in optimism account for predictors' erroneous expectations of performance? In Experiment 3B, we recruited new predictors and informed them of exactly how optimistic the experiencers had been.

If predictors still expected optimism to affect performance while knowing the true (somewhat smaller) difference in optimism between the groups, it would underscore predictors' excessive faith in the power of even a little optimism to improve performance.

Method

Participants

Sixty participants (28 women, 32 men; *Mdn* age = 27.5) completed this experiment via Amazon Mechanical Turk for $.50 and a chance to win lottery tickets for a $50 bonus based on performance. Participants were in the United States and had at least 95% approval rating on the website. We chose the sample size ahead of time by conducting a power analysis using Experiment 3A and aiming for 99% power on the within-subjects difference in predicted test scores among predictors.

Design

The design was the same as in Experiment 3A but with only predictors. Thus, it was a 2 (optimism: high vs. low) within-subjects design.

Materials and Procedure

Participants used the same materials and followed the same procedure as predictors in Experiment 3A with one key difference: instead of estimating how much of an impact the optimism manipulation had on experiencers, participants saw truthful information about how much the optimism manipulation had affected the experiencers in Experiment 3A. Predictors read the exact feedback that each group had received, and then predictors learned, "Given this feedback, on average, Group A believed they would get 66% right on the test." They saw similar information for Group B, who believed they would get 44% right. We also showed predictors a screen shot of the optimism scale from Experiment 3A, labeled with how optimistic each group had been on average. Thus, predictors knew precisely how optimistic each group was.

As comprehension checks, we asked predictors to report what percent each group expected to get right on scales from 0% to 100% and to select which group was more optimistic, A or B.

Results and Discussion

The results corroborated those of Experiment 3A. Even with accurate information about experiencers' exact level of optimism, participants expected optimism to affect performance more than it did.

Comprehension Checks

All but nine participants passed all three comprehension checks. Three of the nine were only slightly inaccurate at sliding the scale. Excluding all of these participants from analyses did not affect direction or significance of results, and their data are included in analyses reported below.

Test Performance

As in Experiment 3A, predictors overestimated the effect of optimism on performance. Predictors expected Group A to get 64.3% (SD = 12.15) right, and they expected Group B to get 50.2% (SD = 12.32) right, $t(59) = 8.33$, $p < .001$, $dz = 1.08$. Thus, predictors expected a large difference between the groups. Given that there was a small, non-significant difference in the groups' actual scores (shown in Experiment 3A), these predictors vastly overestimated how much optimism would enhance performance—even when they did not overestimate the level of optimism itself.

Experiment 3C

Experiment 3A and B found that people overestimated the effect of optimism on performance on an age-guessing test. Although the lack of an effect of optimism on performance was clearly a surprise to our participants, perhaps it makes sense if optimism's effect operates through effort. When guessing someone's age, maybe trying harder does not improve performance that much. Experiment 3C is similar in design to 3A but uses a math test. We expected that motivation would be more likely to contribute to math performance (Bryan & Bryan, 1991; Dweck, 1986). Moreover, if math is more familiar to participants than guessing strangers' ages, predictors should have more useful information for making their predictions. Nevertheless, the problem of parsing the causal role of optimism persists, leading us to expect that participants will again overestimate the influence of optimism on performance.

Method

Participants

Two hundred and fifty-four participants (126 women, 128 men; *Mdn* age = 29) completed this experiment via Amazon Mechanical Turk for $.85 and a chance to win lottery tickets for a $50 bonus based on performance. Access was limited to people in the United States with at least 95% approval rating on the website. The survey was advertised as being a survey about math. We determined the sample size ahead of time by conducting a power analysis using data from a pilot test.

Design

We used the same design as Experiment 3A, which crossed role (predictor vs. experiencer) with optimism (high vs. low).

Materials and Procedure

All participants completed the experiment online. The Qualtrics survey program randomly assigned participants to the experiencer (n = 203) or predictor (n = 51) condition. The materials and procedure were similar to Experiment 3A except that the pretest and actual test included math questions instead of age-guessing questions, and predictors could view all of the materials that the experiencers saw. In addition, there was slightly different wording on the optimism manipulation check question that clarified what it would mean to do well on the test. We asked, "How optimistic are you about doing well on the test? (Doing well would be getting about 70% of the questions right)." Participants also reported how enjoyable and how difficult the test was on Likert-type scales from 1 to 6. We describe the math pretest and test below.

Pretest. The pretest consisted of 9 easy math problems (e.g., What is 100 x 1000?) that grew more difficult towards the end (e.g., Solve for x: 2.5x - 2 = -7). Experiencers had 30 seconds to solve as many of the problems as they could while a timer counted down the seconds. After 30 seconds, the survey advanced automatically. They were told that they would be scored on both accuracy and speed, and they were asked not to use a calculator on the pretest. Experiencers answered 3.3 questions correctly on average. No one answered all of the questions correctly in the allotted time. Predictors had 30 seconds to view the entire set of pretest questions.

Math Test. The 10 questions on the math test were adapted from the Graduate Record Examination (GRE) and from the University of Waterloo's Mathematics and Computing Contests. Questions from these sources (e.g., Good, Aronson, & Harder, 2008; Schmader & Johns, 2003) and others (e.g., Brooks, 2014) have been used in prior research examining the effects of expectations or mindsets on math performance under time pressure. We selected questions that a calculator would not necessarily help solve and that were difficult to look up on the Internet. As an example, participants saw a picture of a clock and read, “The minute hand on a clock points at the 12. The minute hand then rotates 120 degrees clockwise. Which number will it be pointing at?” All participants saw a timer count down from 90 seconds for each problem, but participants could advance to the next problem sooner if they wished. They were permitted to use calculators. On average, experiencers answered 4.5 questions right and spent 46.7 seconds (SD = 23.3 seconds) per question.

Results and Discussion

The results were consistent with Experiment 3A using a math test. Again, participants overestimated optimism’s effect on performance.

Manipulation Checks

The optimism manipulation was effective. Group A expected to get 68.4% (SD = 23.1%) right, and Group B expected to get 46.5% (SD = 22.9%) right, $t(201) = 6.80$, $p < .001$, $d = .95$. Group A (M = 4.41, SD = 1.5) also rated themselves as higher in optimism than Group B (M = 3.50, SD = 1.5), $t(201) = 4.33$, $p < .001$, $d = .61$.

Predictors believed that the optimism manipulation would be effective. They thought that Group A would expect to get 72.8% (SD = 7.5%) right, and Group B would expect to get 39.3% (SD = 16.9%) right, $t(50) = 12.88$, $p < .001$, $dz = 1.8$. They also rated Group A (M = 5.18, SD = .70) as higher in optimism than Group B (M = 2.55, SD = 1.3), $t(50) = 10.98$, $p < .001$, dz = 1.6.

Test Performance

Group A answered an average of 45.3% (SD = 23.9%) of the test questions correctly, which was not significantly different from Group B, who scored 44.0% (SD = 20.5%), $t(201)$ = .40, $p = .691$, $d = .06$.

Although there was a small, non-significant difference in actual performance between the groups, predictors expected there to be a large one. They expected Group A to get 67.3% (*SD* = 13.9%) right, and they expected Group B to get 54.9% (*SD* = 15.1%) right, $t(50) = 5.49$, $p < .001$, $dz = .77$. Even with a math test, participants overestimated the effects of optimism. See Figure 4.

Pretest Performance

To control for pretest performance, we ran an ANCOVA with optimism predicting performance on the test, controlling for performance on the pretest as a covariate. The effect of optimism on performance on the test remained non-significant, $F(1, 200) = .264$, $p = .608$, $\eta_p^2 = .001$. We also ran a similar ANCOVA to explore interactive effects between optimism and pretest performance, but we did not find evidence for this interaction ($\beta = -.12$, $p = .555$).

Difficulty and Enjoyableness

Predictors had a good sense of what the test was like. Across all conditions, we found no significant differences in how difficult participants found the test in Group A (*M* = 4.39, *SD* = 1.19), Group B (*M* = 4.36, *SD* = 1.13), and predictors (*M* = 4.06, *SD* = 1.01), $F(2, 254) = 1.66$, $p = .193$, $\eta_p^2 = .013$. There were also no significant differences in how enjoyable participants found the test in Group A (*M* = 3.55, *SD* = 1.53), Group B (*M* = 3.51, *SD* = 1.57) and predictors (*M* = 3.69, *SD* = 1.45), $F(2, 254) = .240$, $p = .787$, $\eta_p^2 = .002$.

Understanding Random Assignment

One artifactual explanation for why predictors expected the high optimism condition to do better on the test than the low optimism condition is that predictors did not understand that experiencers had been randomly assigned to groups. If they mistakenly believed that we created the groups based on participants’ ability, then they could have thought the two groups performed differently on the test because they had different abilities. We implemented several techniques to decrease the likelihood that predictors misunderstood how we created the groups. We stated explicitly that both groups had the same inherent math ability and that the only difference between the groups was where we had set their expectations. We also included a manipulation check question about how we made the groups that they could only pass by answering correctly. We also asked participants in an open-ended question to describe what was different about the groups in the hopes that they would then go back and read the text carefully. Despite these safeguards, we decided to isolate a group of participants who we were confident understood the process of how we created the groups and analyze data from these participants separately.

Two coders independently coded each participant's response to the open-ended question of what was different about the groups to create a sample of participants who spontaneously demonstrated that they understood that the groups had been assigned randomly. To be included in this sample, the participants' description had to completely dispel the possibility that they thought we told the groups different things based on the groups' abilities. For example, if participants explicitly stated that there was nothing different between the groups except what we had told them, or if they said something like one participant's response, "People were assigned to their groups randomly via a computer program," coders included them in the sample. Thus, we used strict inclusion criteria for counting someone as having spontaneously demonstrated that he or she understood random assignment. Initial agreement between the coders was 94%. Disputes on the three mismatched items were resolved by discussion. Coders were blind to information about a given participant aside from the participants' answer. The results showed that this select group of participants (29% of predictors), still expected a large difference in performance for Group A (M = 67.3%, SD = 12.2%) and Group B (M = 54.2%, SD = 16.4%), $t(14) = 3.51$, p =

.003, *d* = .89. Thus, predictors expected optimism to affect performance, and this effect was not driven by a misunderstanding of how the groups were created.

Replication

We conducted a replication of Experiment 3C, using slightly different math questions and disallowing the use of calculators, with participants from the University of California, Berkeley participant pool who participated in person ($N = 140$). This sample had the benefit of being comprised of people who did not self-select to take a survey about math. The results corroborated our previous experiments. As manipulation checks: Group A ($M = 70.4\%$, $SD = 20.7\%$) expected to get more answers right than Group B ($M = 56.9\%$, $SD = 24.3\%$), $t(107) = 3.13$, $p = .002$, $d = .60$, and Group A ($M = 4.19$, $SD = 1.2$) was more optimistic than Group B ($M = 3.75$, $SD = 1.4$), marginally significantly, $t(107) = 1.73$, $p = .087$, $d = .34$. Most notably, there was virtually no difference in mean test performance between Group A ($M = 54.4\%$, $SD = 20.3\%$) and Group B ($M = 54.0\%$, $SD = 22.4\%$), $t(107) = .11$, $p = .914$, $d = .02$, even though predictors expected there to be a large one. They expected Group A ($M = 75.6\%$, $SD = 11.3\%$) to answer more questions correctly than Group B ($M = 46.7\%$, $SD = 19.1\%$), $t(30) = 8.08$, $p < .001$, $dz = 1.51$. Controlling for pretest performance did not meaningfully affect experiencers' results.

In sum, across different populations and two different types of tasks, participants believed that optimism played a larger role in affecting performance than it actually did.

Experiment 3D: Testing the Role of Anchoring

Experiments 3A, B, and C demonstrate that people overestimate the effect of optimism on performance. One potential alternative explanation for these results is that the feedback that Group A and Group B received about how well they would do on the upcoming test (i.e., 70%

and 30%, respectively) served as anchors that influenced predictors' estimates. Predictors might have expected Group A to get a high percentage right and Group B to get a low percentage right simply because they saw different numbers. Numeric reference points, or anchors, can influence judgments without a substantively meaningful reason (Chapman & Johnson, 1999; Tversky & Kahneman, 1974). If this sort of anchoring process were the cause of our results, it could work by a numeric priming or by making anchor-consistent information selectively available in the minds of predictors (Strack & Mussweiler, 1997). This information is then likely to affect their predictions in the absence of some other prime or more specifically meaningful information.

To test this alternative explanation, Experiment 3D attempted to measure the effect of anchoring on estimates of performance. Instead of making predictions about both Group A and Group B's performance in a within-subjects design, in Experiment 3D, predictors estimated the performance of Group A and Group B separately, in between-subjects conditions, so the effects of each condition's anchor, if any, would be separated. Within each of those conditions, predictors also estimated the performance of a control group, Group C, who did not receive any feedback that would affect their optimism. Thus, when predictors estimated the performance of Group C, they did so while still anchored to either Group A's or Group B's reference point. We use the notation Group C_A and Group C_B to keep track of which anchor the control group was associated with. See Table 1. If anchoring is driving the results, then the difference between predictors' estimates of Group A and Group B's test performance will be equal to the difference between predictors' estimates of Group C_A and Group C_B (i.e., there will be no interaction) because the two sets of groups share respective anchors. If the belief that optimism affects performance is driving the results, and not anchoring, then predictors will estimate a larger difference in test performance between Groups A and B than between Groups C_A and C_B.

Method

Participants

Four hundred and four participants (201 women, 202 men; *Mdn* age = 30) completed this experiment via Amazon Mechanical Turk for $.85 and a chance to win lottery tickets for a $50 bonus based on performance. Access was limited to people in the United States with at least a 95% approval rating on the website. The survey was advertised as being a survey about math. We determined the sample size ahead of time by conducting a power analysis and aiming for 80% power.

Design

The design was similar to Experiment 3C but with additional control conditions, and the comparison between Group A and Group B was now between-subjects for both experiencers and predictors. In the new experiencer control condition (Group C), experiencers received no feedback that would affect their optimism. Thus, experiencers were divided into Group A (feedback: high optimism), Group B (feedback: low optimism) and Group C (no feedback), between-subjects. In the predictor conditions, predictors estimated the performance of experiencers in the high optimism or low optimism conditions and, in both cases, they also estimated the performance of experiencers in the control condition as a comparison. Thus, predictors estimated performance for 1) Group A and Group C; or for 2) Group B and Group C. We use the notation Group C_A and Group C_B to differentiate between ratings of the control group in these different conditions. See Table 1. We compared how well experiencers performed on the math test to how well predictors thought they would do.

Materials and Procedure

All participants completed the experiment online. The Qualtrics survey program assigned participants to the experiencer (n = 301) or predictor (n = 103) conditions. The materials and procedure were similar to Experiment 3C but with the addition of Group C.

Results and Discussion

The results were consistent with Experiment 3C. Participants overestimated optimism's effect on performance, and this effect was not likely due to anchoring.

Manipulation Checks

The optimism manipulation was effective. Experiencers expected to get different scores on the math test, $F(2, 297) = 11.84$, $p < .001$, $\eta^2 = .07$, and reported different levels of optimism, $F(2, 297) = 6.61$, $p = .002$, $\eta^2 = .04$. Group A expected to get the most right (M = 64.07%, SD = 22.8%), followed by Group C (M = 50.50%, SD = 26.8%), and Group B (M = 48.43%, SD = 24.2%). As expected, the difference between Group A and Group B was significant, $t(194) = 4.67$, $p < .001$, $d = .67$. Groups C and B did not differ significantly.

Group A (M = 4.25, SD = 1.5) also rated themselves as highest in optimism, followed by Group C (M = 3.63, SD = 1.6), and Group B (M = 3.51, SD = 1.5). As expected, the difference in optimism between Group A and Group B was significant, $t(194) = 3.42$, $p = .001$, $d = .49$. Groups C and B did not differ significantly.

Predictors expected the optimism manipulation to be effective. As expected, the difference between predictors' ratings of Group A (M = 69.66%, SD = 10.3%) and Group B (39.58%, SD = 13.8%) was significant, $t(101) = 12.88$, $p < .001$, $d = 2.47$. Predictors also thought that Group A expected to perform better than Group C_A, $t(47) = 3.99$, $p < .001$, $dz = .58$ and that Group B expected to perform worse than Group C_B, $t(54) = -13.60$, $p < .001$, $dz = 1.83$.

Predictors rated experiencers' optimism in line with their ratings of experiencers' expected performance. The difference between predictors' ratings for Group A (M = 4.73, SD = .82) and Group B (M = 2.64, SD = 1.0) was significant, $t(101) = 11.47$, $p < .001$, $d = 2.31$. Predictors also thought that Group A would be more optimistic than Group C_A, $t(47) = 5.05$, $p < .001$, $dz = .72$, and that Group B would be less optimistic than Group C_B, $t(54) = -13.06$, $p < .001$, $dz = 1.8$.

Test Performance and Pretest Performance

There was a difference in test performance between the groups, but not in the expected direction, $F(2, 298) = 3.15$, $p = .044$, $\eta_p^2 = .02$. Group B (45.00%, SD = 21.2%) performed the best, followed by Group C (M = 38.88%, SD = 21.6%) and Group A (M = 38.42%, SD = 19.2%). According to LSD post-hoc tests, Group B's performance was significantly better than Group A's ($p = .026$, $d = .33$) and Group C's ($p = .034$, $d = .29$). However, when controlling for performance on the pretest as a covariate, significance disappeared $F(2, 297) = 1.46$, $p = .233$, $\eta_p^2 = .01$. The difference in performance was likely due to Group B being slightly better at math from the outset, due to chance.

Consistent with Experiment 3C, predictors expected optimism to affect test performance. This expectation was not simply an artifact of being exposed to different anchors because there was an interaction between anchors with feedback and anchors without feedback, $F(1, 101) = 31.24$, $p < .001$, $\eta_p^2 = .24$. Predictors expected Group A (M = 64.70%, SD = 12.4%) to perform better than Group B (M = 50.10%, SD = 17.3%), $t(101) = 4.86$, $p < .001$, $d = .97$. In contrast, their expectations for Group C_A (M = 60.73%, SD = 16.8%) versus C_B (M = 63.33%, SD = 12.3%) were not significantly different, $t(101) = -.90$, $p = .369$, $d = -.17$. It appears that, if our manipulations acted as anchors that produced assimilation to that anchor, the process by which they did so was more focused than anchoring effects usually are. Since we are reluctant to hypothesize that a unique form of anchoring is operating in this one context, we find anchoring a less parsimonious explanation for the results than is predictors' lay theories about the effects of optimistic beliefs.

Experiment 4: Persistence

Experiments 3A-D found that people participating online and in person overestimated the effect of optimism on performance on cognitive tasks. Experiment 4 is similar in design to Experiment 3 but uses a visual search task and, in addition to measuring performance at the task, also measures persistence. Specifically, participants completed search puzzles from the book *Where's Waldo?* (Handford, 1987) where, in each puzzle, participants had to visually search for a character, Waldo, who was hidden in a busy scene. They could stop searching at any time. We predicted that participants' optimism about their ability to succeed at this task would affect how long they persisted. However, we also expected predictors to overestimate the benefits of optimism for visual search success.

Method

Participants

Four hundred and eleven participants (159 women, 252 men; *Mdn* age = 29) completed this experiment via Amazon Mechanical Turk for $.75. Access was limited to people in the United States with at least 95% approval rating on the website. They were given up to 45 minutes to complete the survey and took 19 minutes on average. We determined the sample size ahead of time by conducting a power analysis for 80% power to detect a difference in persistence among experiencers using data from an unsolvable, one-puzzle pilot test and hoping the effect would be larger with several solvable puzzles.

Design

The design was the same as Experiment 3A, which crossed role (predictor vs. experiencer) with optimism (high vs. low).

Materials and Procedure

Overview. All participants completed the experiment online. The Qualtrics survey program randomly assigned participants to the experiencer (*n* = 310) or predictor (*n* = 101) condition. First, experiencers took two questionnaires: the Regulatory Focus Questionnaire (RFQ) and the Life Orientation Test Revised (LOT-R). Next, they did the Waldo pretest, inspired by the children's book series *Where's Waldo?* After the Waldo pretest, experiencers received feedback to manipulate their level of optimism about the upcoming Waldo test. The feedback was allegedly based on their answers to the two questionnaires and the Waldo pretest (the purpose of including the questionnaires was to make it harder for participants to judge their own ability separate from the feedback). Then they took the test. The dependent measures were test persistence (minutes spent on the test) and test performance (number of Waldos found out of 12).

Predictors viewed all of the materials that the experiencers viewed, and predictors estimated how each optimism group would perform. We describe the preliminary measures, feedback, and test in more detail below.

Preliminary Measures

RFQ. The RFQ (Higgins et al., 2001) measures individual differences in chronic regulatory focus; that is, how often people focus on hopes and advancement (promotion) and on security and responsibility (prevention). The RFQ asks people to rate how frequently specific events occurred in their lives on 5-point scales. Six items measure promotion focus (e.g., "How often have you accomplished things that got you ‘psyched’ to work even harder”) and five measure prevention focus (e.g., “How often did you obey rules and regulations that were established by your parents”). The average score on the prevention items gets subtracted from the average score on the promotion items to create a regulatory focus index (Cesario, Grant, & Higgins, 2004; Hazlett, Molden, & Sackett, 2011).

LOT-R. The LOT-R (Scheier, Carver, & Bridges, 1994) measures individual differences in trait optimism; that is, how optimistic or pessimistic people’s outlook is in general, rather than for a specific task. To assess trait optimism, the LOT-R asks how much people agree, on 5-point scales, with six items such as “In uncertain times, I usually expect the best.” It also includes four filler items that are not scored (e.g., “It’s easy for me to relax”).

Waldo Pretest. The pretest instructions explained that Waldo would be hiding in each picture, and the participant’s job was to click on him to get credit for finding him. They were told that if they “gave up” and did not find him in a particular picture, they could continue to the next one. Before beginning the pretest, participants saw one example picture with Waldo already circled. The pretest itself consisted of three *Where’s Waldo?* pictures. Each picture was overlaid with a heat map, invisible to participants, that recorded whether they clicked on Waldo or not. Each picture was on its own page that displayed a timer to keep track of how long they spent on the page.

Feedback. To manipulate level of optimism about the Waldo test (high: Group A vs. low: Group B), experiencers received the following feedback, with text in italics indicating differences between conditions: “Based on the answers you gave about yourself on the questionnaires, how many Waldo puzzles you completed, and the amount of time it took for you to complete each puzzle, your score is 45.8. This score suggests *high/low* Waldo-finding skill, and we expect you will score *better than 75%/in the bottom 25%* of all our test-takers on the real test." The score of 45.8 was fictional and the same for every participant. As manipulation checks, we asked what percent of test-takers they expected to score better than on the test and how optimistic they were about doing well compared to others.

Waldo Test. The test consisted of 12 *Where's Waldo?* puzzles. Like the pretest, if participants found Waldo, they clicked on him, and if they gave up, they could continue to the next one.

Performance. Performance on the test was measured as the number of Waldos participants found out of 12. Experiencers found Waldo 5.4 times on average (SD = 2.5) and spent 68 seconds per puzzle.

Persistence. Persistence was measured as the number of minutes participants spent on the test. Time devoted to achieving an outcome is a common measure of persistence (Bowles & Flynn, 2010; and see e.g., Dweck & Gilliard, 1975; Grant et al., 2007; Sandelands, Brockner, & Glynn, 1988). We did include a question asking whether participants were interrupted and for how long; however, the amount of time they said they were interrupted was randomly distributed across conditions and did not affect the results.

Additional Question

Persistence Effectiveness. To assess the extent to which participants believed that persistence was useful for finding Waldo, after seeing the test, participants responded to the question, "How much do you think sheer persistence affects people's ability to find Waldo on the test?" on a scale from 1 to 6.

Results and Discussion

The results showed that optimism affected persistence. Experiencers in the high optimism condition spent longer looking for Waldo on the *Where's Waldo?* test than experiencers in the low optimism condition. However, their persistence did not lead to a drastic increase in performance on the test. As in our previous studies, predictors overestimated the degree to which optimism affected performance.

Manipulation Checks

The optimism manipulation was effective. Group A expected their percentile rank to be 59.0% (SD = 22%), and Group B expected it to be 43.5% (SD = 23%), $t(308) = 6.08$, $p < .001$, d = .69. Group A (M = 4.40, SD = 1.20) also rated themselves as higher in optimism than Group B (M = 3.40, SD = 1.48), $t(308) = 6.52$, $p < .001$, d = .74.

Predictors thought Group A would expect their percentile rank to be 73.9% (SD = 15.6%) and Group B would expect it to be 35.5% (SD = 18.5%), $t(100) = 14.10$, $p < .001$, dz = 1.40. They also rated Group A (M = 5.12, SD = .88) as higher in optimism than Group B (M = 2.47, SD = 1.12), $t(100) = 17.78$, $p < .001$, dz = 1.77.

Test Persistence

Group A (M = 15.00 mins, SD = 9.55 mins) spent significantly longer on the test than Group B (M = 12.44 mins, SD = 6.68 mins), $t(299) = 2.71$, $p = .007$, d = .31, indicating that Group A persisted longer than Group B. A log transformation of time spent on the test did not eliminate this result; Group A persisted significantly longer than Group B, $t(299) = 2.77$, p = .006, d = .32.

Predictors expected Group A (M = 18.65 mins, SD = 19.0 mins) to spend non-significantly longer on the test than Group B (M = 17.07 mins, SD = 21.4 mins), $t(100) = 1.42$, p = .158, dz = .14. We suspect that some participants expected Group A to be able to find more Waldos in less time.

Test Performance

Group A (*M* = 5.57, *SD* = 2.50) found Waldo slightly, but non-significantly, more often than Group B (*M* = 5.29, *SD* = 2.56), $t(308) = .962$, $p = .337$, $d = .11$.

Although there was a small, non-significant difference in actual performance between the groups, predictors expected there to be a large one. They expected Group A (*M* = 8.14, *SD* = 2.3) to find Waldo much more often than Group B (*M* = 6.08, *SD* = 2.3), $t(100) = 7.85$, $p < .001$, $dz = .78$.

Additional Analyses

Pretest Persistence and Performance. To control for pretest persistence, we ran an ANCOVA with optimism predicting time on the test, controlling for time on the pretest as a covariate. We ran a similar ANCOVA predicting number of Waldos found on the test controlling for number of Waldos found on the pretest as a covariate. These analyses allowed us to control for inherent ability that may not have been randomly distributed. The effect of optimism on time spent on the test remained significant, $F(1, 298) = 4.85$, $p = .028$, $\eta_p^2 = .016$, and the effect of optimism on number of Waldos found remained non-significant, $F(1, 307)$, = 2.47, $p = .117$, $\eta_p^2 = .008$, providing further evidence that optimism affected persistence but not necessarily performance. There was no evidence that the optimism manipulation interacted with persistence or performance on the pretest (*t*s < .33, *p*s > .70).

Persistence Effectiveness. We were interested in the relationship between persistence effectiveness (i.e., how much participants thought persistence affected performance on the Waldo test) and the tendency to overestimate the benefits of optimism for performance. First, we created a difference score in predicted performance by subtracting how well predictors expected Group B to perform from how well predictors expected Group A to perform. Next, we examined the relationship between this difference score in predicted performance and persistence effectiveness. There was a small, positive correlation between the difference score and persistence effectiveness ($r = .20$, $p = .045$), which means that predictors who believed that persistence affected performance also tended to believe that Group A would perform better than Group B. In other words, predictors who believed that persistence was important for success at this task were more likely to overestimate the benefits of optimism.

Individual Differences (Preliminary Measures)

Test Persistence. The LOT-R ($r = .18$, $p = .002$) but not the RFQ ($r = .07$, $p = .205$) significantly predicted time spent on the Waldo test. Controlling for these variables as covariates in a regression with optimism (Group A = 1, Group B = 2) did not affect the relationship between optimism and time on the test, which remained statistically significant ($\beta = -.14$, $p = .012$). There was a significant interaction between the LOT-R and optimism on time spent on the test ($\beta = -.62$, $p = .016$) and between the RFQ and optimism on time spent on the test ($\beta = -.61$, $p = .001$). Examining the interactions revealed that participants who were higher in the LOT-R were especially likely to spend longer on the test when they were in Group A versus B. Similarly, participants who were higher in promotion focus were especially likely to spend longer on the test when they were in Group A versus B. These interactions were exploratory, but confirm patterns in some previous research (i.e., Hazlett, Molden, & Sackett, 2011).

Test Performance. Neither the LOT-R ($r = .05$, $p = .374$) nor the RFQ ($r = .06$, $p = .259$) significantly predicted number of Waldos found. Controlling for these variables as covariates in a regression with optimism (Group A = 1, Group B = 2) did not affect the relationship between optimism and number of Waldos found, which remained small and non-significant ($\beta = -.06$, $p = .339$). The interactions between the LOT-R or RFQ and optimism on number of Waldos found were also non-significant (*t*s < 1.24, *p*s > .217). Thus, optimism did not affect test performance, and this lack of a main effect was not moderated by individual differences in the test-takers' LOT-R or RFQ scores.

Experiments 5A and 5B: The Role of Focusing

In Experiments 3A-D and 4, our manipulation of optimism occurred in the context of an online survey or laboratory setting, which allowed us to exercise experimental control. However, by directing our participants' attention to the manipulation of optimism, we potentially produced a focusing effect that led participants in the predictor conditions to neglect the innumerable other influences on performance and thereby overestimate the relative contribution of optimistic beliefs. We did take precautions to equate predictors' and experiencers' situations so that predictors had the opportunity to realistically assess experiencers' performance in context (e.g., they saw the same materials). Nevertheless, another way to address this potential concern is to examine the optimism-performance hypothesis in a way in which beliefs about the effects of optimism could be more easily compared with natural variation in other factors that could also affect performance. Thus, in Experiments 5A and 5B, we examine beliefs about optimism in conjunction with beliefs about other factors that could affect performance. These experiments help to provide a better understanding of the importance that predictors placed on optimism relative to other factors.

Experiment 5A

In Experiment 5A, we asked predictors to guess the math test scores of experiencers who had taken Experiment 3C; but we did not give predictors information about our optimism manipulation to avoid focusing their attention on optimism exclusively. Instead, we gave predictors several facts about the experiencers that could have influenced experiencers' performance on the math test in addition to optimism (e.g., their age, pretest score, and enjoyment of the test). We measured whether predictors thought that optimism affected experiencers' performance even while being reminded of these other, potentially important factors. This approach has been used to reduce focusing effects previously (e.g., Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). For example, participants exaggerated the effect that a given event would have on their future happiness when they focused on that one event, but not when they considered several other aspects of their daily lives that could also influence their happiness. Consistent with this approach, if predictors believed that optimism would improve performance in our previous experiments simply because they had been focusing on it, then their belief would dissipate when they were confronted with several other cues. However, if the belief in the optimism-performance link is not an artifact of focusing exclusively on optimism as one cue to performance, then we expect predictors to estimate higher performance for experiencers from the high optimism condition than the low optimism condition.

Method

Participants

One hundred-and-thirty-five undergraduates (84 women, 51 men; *Mdn* age = 19) completed this experiment following unrelated experiments at the University of California, Berkeley for course credit or $15. Participants also had a chance to win lottery tickets for a $50 bonus based on their performance. We aimed for 74 participants but had better show-up rates than expected.

Materials and Procedure

Overview. Participants completed the experiment at computers. They first clicked through the pretest and math test that experiencers had taken in Experiment 3C. Then they saw descriptive statistics (the mean and range) for seven items, or cues, based on the full sample of 203 experiencers in Experiment 3C. Finally, participants saw the exact values of the seven cues from a subset of the experiencers and guessed those experiencers' math test scores.

Cues. The seven cues collected from each experiencer in Experiment 3C and shown to predictors in the current study were: expected score on the test (aka expectation), optimism about the test, perceived test difficulty, perceived test enjoyableness, age, pretest score, and time on the test. The first five cues had been collected via self-report, and the latter two had been collected as behavioral measures. See Appendix B for details about the cues.

Profiles. A profile consisted of the seven cues for one experiencer. The profiles were presented in a table alongside a table of the descriptive statistics of the full sample for comparison (see Appendix B for an example profile).

The profiles were from 15 experiencers who had been in Group A (high optimism) and 15 who had been in Group B (low optimism) in Experiment 3C (participants were not informed of these groups). As in the full sample, the profiles selected from Group A had higher ratings than Group B on expectation and optimism (ts > 5.19; ps < .001) but not on other cues (ts < 1.36, ps > .14). The order that expectation and optimism cues appeared in the profile were counterbalanced across participants such that they both appeared next to each other at the beginning, middle, or end of the list of cues. Profiles from Group A and Group B were presented in a randomized order.

Predictors' Estimated Score. Participants estimated how each experiencer performed on the math test by guessing the number of test questions an experiencer answered correctly from 0 to 10.

Results and Discussion

The order that expectation and optimism cues appeared in the profile did not affect the results and will not be considered further. The results were consistent with our previous experiments. Participants estimated higher math test scores (out of 10) for Group A (M = 6.34, SD = 1.19) than Group B (M = 5.43, SD = .96), $t(134)$ = 11.18, p < .001, d = .84. Thus, participants believed that optimism improved performance even when they were provided with additional cues besides optimism.

This experiment provides initial evidence that belief in the optimism-performance link is not an artifact of asking participants to focus on optimism as a cue to performance. However, there were some limitations to this experiment. First, both optimism and expectations were included in the list of seven cues. If participants recognized that both items were tapping a similar construct, they might have inferred from the redundancy that those cues were especially important. Second, although this experiment demonstrated that participants used optimism as a cue to predict performance, we could not compare the relative importance that participants placed on optimism to an accuracy criterion (i.e., the importance they *should* have placed on optimism given its actual predictive value). We also could not compare the importance that participants placed on optimism relative to other cues. We address these limitations in Experiment 5B.

Experiment 5B

In Experiment 5B, we used a Brunswik lens model (Brunswik, 1956; Gifford, 1994) to assess the relative importance that predictors placed on optimism and on other potential factors. We showed predictors the same seven cues about experiencers as in Experiment 5A drawn from a larger, randomly selected sample of experiencers. We compared the relationship between cues and predictors' estimates of performance to the relationship between cues and actual performance. If predictors overestimated the benefits of optimism for performance, then the relationship between optimism and predictors' estimates of performance would be stronger than the relationship between optimism and actual performance. We can also assess whether predictors overestimate the predictive value of cues other than optimism.

The Brunswik (1956) lens model is used to understand which cues people rely on when they make inferences about others (e.g., Anderson, Brion, Moore & Kennedy, 2012; Gosling, Ko, Mannarelli, & Morris, 2002; Reynolds & Gifford, 2001; Vazire, Naumann, Rentfrow, Gosling, 2008). The cues provide a "lens" through which observers make these inferences. See Figure 5. For example, an experiencer's optimism about performing well on the test could serve as a lens through which a predictor infers the experiencer's high level of performance on the test. In Brunswik's model, on the right side of the lens, the term *cue utilization* refers to the link between the cue (e.g., optimism) and a predictor's judgment (e.g., of performance). A correlation between a cue and a predictor's judgment indicates that the predictor believes that that cue is associated with the judgment (e.g., that higher levels of optimism are associated with higher performance). On the left side of the lens, the term *cue validity* refers to the relationship between the cue and the experiencer's actual performance. A correlation between a cue (e.g., optimism) and performance indicates that the cue is actually associated with performance (e.g., that higher levels of optimism are associated with higher performance).

The lens model (1956) detects predictors' accuracy (i.e., whether predictors utilize valid cues and ignore invalid cues to performance) by comparing the right-hand side of Figure 5 to the left-hand side. We expected that predictors would over-utilize the optimism cues. This hypothesis is supported if the cue-utilization correlations are larger than the cue-validity correlations for the optimism cues. As a secondary hypothesis, we expected predictors would overestimate the contribution of the optimism cues relative to other cues. Although we did not form specific hypotheses about which of the other cues would be valid, we expected predictors to utilize the other cues more appropriately. This hypothesis is supported if cue-utilization and cue-validity correlations differ less for the other cues than they do for optimism.

Method

Participants

Nine[2] undergraduate students (3 women, 6 men; *Mdn* age = 21) served as predictors in this experiment at the University of California, Berkeley for $15. They won lottery tickets for $50 based on performance (i.e., their ability to accurately predict experiencers' test scores).

Materials and Procedure

Overview. The materials and procedure were the same as Experiment 5A with two differences. First, predictors read and estimated scores for 99 profiles, about half of the original sample of experiencers, instead of only 30.[3] We expected that using half of the original sample would be representative of the original sample but would still limit participant fatigue. Previous research used a similar number of profiles (Vazire & Gosling, 2004). Second, predictors were randomly assigned to see one of the optimism cues—expectation or optimism—but not both in a given profile.

Cues. The cues were the same as in Experiment 5A: expected score on the test (aka expectation), optimism about the test, perceived test difficulty, perceived test enjoyableness, age, pretest score, and time on the test. Participants saw one optimism cue (expectation or optimism) but not both. The optimism cue appeared either first, last, or in the middle of the list of cues.

[2] A lens analysis derives the statistical power from the number of target profiles rather than the number of predictors.
[3] We had planned to use 100 profiles, but due to a coding error, one of the profiles was only shown to two of the participants and was therefore excluded prior to data analysis.

Experiencers' Actual Scores. Experiencers' received a score on the test (one point for each correct question) from 0 to 10.

Predictors' Estimated Scores. Predictors estimated how each experiencer performed on the math test by guessing the number of test questions an experiencer answered correctly from 0 to 10.

Results and Discussion

We first examined which cues were actually associated with performance and which cues predictors relied on to make their estimates of performance using Brunswik's lens model. Then, we tested our hypothesis that predictors relied more on the optimism cues than they should have. We also examined whether predictors just overestimated the benefits of optimism or whether they overestimated the benefits of other cues as well.

Cue Validity

The cue-validity correlations in the left-hand side of Table 2 show the relationship between the cues and experiencers' actual scores. The cues are displayed in descending order of the magnitude of cue-validity. Actual scores were most associated with the experiencers' pretest score and perceived difficulty of the test (inversely correlated). This is reflected in the cue-validity correlations above r = .50. We used r = .50 as a reference point based on past work that examined peoples' relative reliance on cues (Anderson, Brion, Moore, Kennedy, 2012). Other work on cue-utilization used significance level of the correlation (Vazire, Naumann, Rentfrow, Gosling, 2008), but the r-values in those studies were all below .5. To determine the relative reliance on cues when participants did rely on the majority of cues (see Table 2), it makes sense to examine the magnitude of the correlation as well as significance. The two optimism cues did not correlate highly with actual scores, as the correlations are below r = .50. See Table 2 for exact r-values.

Cue Utilization

The cue-utilization correlations in the right-hand side of Table 2 show the relationship between the cues and predictors' estimated scores. The cue-utilization correlations for expectations and optimism are above r = .50, suggesting that predictors relied on the optimism cues when they estimated scores. Predictors also may have relied on other cues including pretest score and reported difficulty of the test (inversely correlated), as shown in the correlations above r = .50.

Overestimating the Benefits of Optimism

Consistent with our hypothesis, predictors appeared to overestimate the benefits of optimism for performance. The cue-utilization correlation was significantly greater than the cue-validity correlation for both expectations, $t(96) = 3.03$, $p = .002$, and optimism, $t(96) = 3.04$, $p = .002$, using Hotelling's t-test with Williams' modification (Kenny, 1987). See Table 2.

There were no significant differences between the cue-utilization and cue-validity correlations for the other factors, ts < .51; ps > .30, except for pretest score; predictors overestimated the association between pretest score and performance, $t(96) = 8.70$, $p < .001$.

Robustness Check

In this experiment, four of the nine predictors saw the expectations cue and five saw the optimism cue. To determine whether the results changed depending on which cue participants saw, expectations or optimism, we ran the same lens model analyses for those who saw the expectations cue and those who saw the optimism cue separately. See Table 3. The cue-utilization correlations were significantly greater than the cue-validity correlations for participants who saw the expectations cue, $t(96) = 4.06$, $p < .001$, and for participants who saw the optimism cue, $t(96) = 2.23$, $p = .014$, using Hotelling's *t*-test with Williams' modification (Kenny, 1987). These results indicate that predictors over-relied on each optimism cue to predict performance.

In sum, even when participants considered multiple factors, they overestimated how much optimism mattered to performance. Participants accurately assessed the strength of the associations between performance and most of the other cues and relied on them an appropriate amount. They could have improved their estimates had they relied on the optimism cues less. Experiments 5A and 5B support the optimism-performance hypothesis by demonstrating that the belief that optimism affects performance is not an artifact of being asked exclusively about optimism.

General Discussion

Our results support the optimism-performance hypothesis: people prescribe optimism because they believe it can improve performance. Consistent with this hypothesis, participants endorsed the prescription of optimism selectively, depending on the prominence of goals to perform and the opportunity of performance to affect the outcome. In Experiment 1 (A, B), participants believed that a protagonist should have an accurate assessment of risk if the protagonist was deciding on a course of action. This preference for accuracy during deliberation is more pronounced than what Armor, Massey, and Sackett (2008) found using slightly different materials (implementation goals may have been more prominent in their materials), but is consistent with other research results suggesting that people prefer accuracy to overconfidence when they are deliberating (Sah, Moore, & MacCoun, 2013; Taylor & Gollwitzer, 1995; Tenney, MacCoun, Spellman, & Hastie, 2007; Tenney, Spellman, & MacCoun, 2008). Nevertheless, consistent with the optimism-performance hypothesis, once the protagonist had made up his or her mind and needed motivation to act, participants believed the protagonist should be highly optimistic. Thus, participants prescribed optimism for someone who needed motivation to act, but the solidity of their preference for optimism softened when thinking about someone in a deliberative decision phase, whose decisions could conceivably be aided by accurate estimates of success.

By highlighting these instances in which people do and do not prescribe optimism, these results discredit an alternative explanation; in particular, the idea that people prescribe universal optimism, simply because thinking positive thoughts will put good vibes into the universe and affect outcomes via magic or karma. Instead, participants seemed to prescribe optimism selectively, based on their perceptions of its practical utility, and not based on belief in its karmic benefits. Experiment 2 asked participants directly if they thought the chance of success would be better for people with optimistic rather than accurate or pessimistic predictions of the future. Participants did believe that people who were optimistic had better chances of success than people who were accurate or pessimistic, but this effect was moderated by control. Participants believed that any effects of optimism on success would be more pronounced for those people whose actions directly affected the outcome.

In Experiments 3 (A, B, C, D) and 4, participants again indicated a belief in the power of optimism to improve performance, but when we put those beliefs to the test, reality did not measure up to their expectations. Participants who took the age-guessing test, the math test, or the visual search task did not actually perform better when they were led to be more optimistic, although other participants predicted that they would. So at least in these three instances, optimistic forecasts of future performance did not actually produce that performance.

Experiments 5A and B provide evidence that people's belief that optimism improves performance is not explained by a focusing effect.

Optimism and Performance

It would be reckless to assume that optimism does not ever contribute to performance. Obviously, it can. If optimism gets people to try activities at which they succeed or try healthful foods that they enjoy, that is clearly beneficial. Optimism may also get people to try harder, longer, as they did in the visual search task in Study 4 (and see Heine et al., 2001). Indeed, there are large literatures that document numerous positive effects of optimistic beliefs on life outcomes (Scheier & Carver, 1993). However, the benefits of optimism on test performance may be completely overwhelmed by other, bigger factors such as actual competence or ability (Macnamara, Hambrick, & Oswald, 2014), or even how interesting the test is once people sit down to work on it. The evidence we present offers little to inform any assessment of whether optimism is generally good, bad, or neutral for performance. What it does show, however, is that people believe that it is better to be optimistic when implementing, that this belief is driven in part by the belief that optimism will contribute to performance, and that sometimes this belief is wrong.

We cannot help wondering whether the popularity of optimism is, in part, due to erroneous interpretations of the correlation between optimism and success. There is an undeniably strong association between someone's expectations and his or her actual outcomes in most domains (Taylor, 1989), and so people have the opportunity to observe the positive relationship between optimism and success quite often. But it can be difficult to distinguish cause from consequence. If confident athletes are more likely to win or more optimistic cancer patients are more likely to survive, it is likely that their good outcomes and their optimism often arise from the same underlying cause: better actual chances of success (Baumeister et al., 2003; Klein & Cooper, 2009). Yet when thinking about the future, people may misattribute success to optimism, or at least attribute more of the variance in success to optimism than it deserves.

Future Directions

North American culture is uniquely optimistic regarding the power of positive thinking for success (Ehrenreich, 2009). Perhaps it is no wonder that our North American participants expected optimism to have salutary effects on performance. An interesting avenue for future research would be to explore prescribed optimism and the optimism-performance hypothesis in cultures that imbue optimism with less positive significance. For example, Japanese participants rated self-confidence as less important than did Canadian participants (Heine & Lehman, 1999). And, unlike North American participants, Japanese participants were more motivated by early failure than by early success (Heine et al., 2001). Perhaps expectations about what optimism can do will match more closely with the reality, or might even be reversed, in cultures in which optimism enjoys less cultural sanction.

In the current studies, we attempted to manipulate optimism by manipulating test-takers' expectations of how they would perform on an upcoming test (Experiment 3A-D and 4). This manipulation is compatible with the definition of optimism as the tendency to anticipate a desirable outcome. It is also compatible with the way that other researchers have manipulated optimism in the past (Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000; Norem & Cantor, 1986; Windschitl, Kruger, & Simms, 2003), and we found that it did affect our participants' self-reports of felt optimism and a behavioral measure of their persistence. However, there is no manipulation that can satisfactorily address all of the potential interpretations of what optimism might mean. Future research could explore different ways of manipulating optimism and different types of optimism. Maybe prompting participants to visualize their success or failure (e.g., Taylor, Pham, Rivkin, & Armor, 1998; Vasquez & Buehler, 2007) would be another effective way to manipulate optimism.

Future research could also explore performance on different types of tasks. Perhaps if sheer effort is the solitary key to task success, rather than luck or skill, then optimism could have a larger effect on performance than we found, and predictors' estimates might be correct. Also, although individual differences in trait optimism and regulatory focus did not matter much for performance (see Experiment 4), there might be other interesting individual differences in how people respond to optimism manipulations such as their self-esteem (Baumeister & Tice, 1985) or tendency toward defensive pessimism (Norem & Cantor, 1986). Do people have accurate intuitions about the nuances of the optimism-performance link across individuals, tasks, and cultures? This line of research opens paths to understanding how people make sense of the relationships between optimism, motivation, performance, and outcomes.

Final Word

Before we cynically dismiss optimism because it does not always do what people think it should, we must acknowledge that there are many reasons to be optimistic, over and above the possibility that optimistic beliefs can actually produce better performance. The most definitive benefit may be the pleasure of savoring a bright future (Loewenstein & Prelec, 1993). Many believe that it is hope that sustains people through suffering. In the Greek legend of Pandora's Box, by opening the box, Pandora releases great evil into the world: death, envy, hate, greed, and illness. At the bottom of the box, the very last thing to emerge is hope. Perhaps the optimism of hope sustains us through all the challenges, travails, humiliations, disappointments, and frustrations of life. Readers of the Pandora legend, however, disagree about whether the hope that Pandora drew last from the box was the blessing that allows us to endure all the rest, or whether hope’s temptation to disregard reality makes it, in fact, another curse.

References

Anderson, C., Brion, S., Moore, D. A., & Kennedy, J. A. (2012). A status-enhancement account of overconfidence. *Journal of Personality and Social Psychology*, *103*, 718-735.

Anderson, C., Srivastava, S., Beer, J. S., Spataro, S. E., & Chatman, J. A. (2006). Knowing your place: Self-perceptions of status in face-to-face groups. *Journal of Personality and Social Psychology*, *91*, 1094–1110.

Armor, D. A., Massey, C., & Sackett, A. M. (2008). Prescribed optimism: Is it right to be wrong about the future? *Psychological Science*, *19*, 329-331.

Armor, D. A., & Taylor, S. E. (2003). The effects of mindset on behavior: Self-regulation in deliberative and implemental frames of mind. *Personality and Social Psychology Bulletin*, *29*, 86–95.

Balasuriya, J., Muradoglu, G., & Ayton, P. (2010). *Optimism and portfolio choice*. *Behavioral Decision Research in Management*. Pittsburgh, PA.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*, 122.

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science*, *1*, 164-180.

Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology*, *35,* 125-139.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest*, *4*, 1–44.

Baumeister, R. F., & Tice, D. M. (1985). Self-esteem and responses to success and failure: Subsequent performance and intrinsic motivation. *Journal of Personality*, *53*, 450–467.

Barling, J., & Abel, M. (1983). Self-efficacy beliefs and tennis performance.*Cognitive Therapy and Research*, *7*, 265-272.

Barling, J., & Beattie, R. (1983). Self-efficacy beliefs and sales performance.*Journal of Organizational Behavior Management*, *5*, 41-51.

Bowles, H. R., & Flynn, F. (2010). Gender and persistence in negotiation: A dyadic perspective. *Academy of Management Journal*, *53*, 769-787.

Bouffard-Bouchard, T. (1990). Influence of self-efficacy on performance in a cognitive task. *Journal of Social Psychology*, *130*, 353-363.

Brooks, A.W. (2014). Get excited: Reappraising pre-performance anxiety as excitement. *Journal of Experimental Psychology: General*, *143*, 1144–1158.

Brunswik, E. (1956). *Perception and the representative design of psychological experiments*. Berkeley, CA: University of California Press.

Bryan, T., & Bryan, J. (1991). Positive mood and math performance. *Journal of Learning Disabilities*, *24*, 490–494.

Byrne, R. (2007). *The secret*. Gramedia Pustaka Utama.

Camerer, C. F., & Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *American Economic Review*, *89*, 306–318.

Carver, C. S. (2003). Pleasure as a sign you can attend to something else: Placing positive feelings within a general model of affect. *Cognition and Emotion*, *17*, 241-261.

Carver, C. S., Kus, L. A., & Scheier, M. F. (1994). Effects of good versus bad mood and optimistic versus pessimistic outlook on social acceptance versus rejection. *Journal of Social and Clinical Psychology*, *13*, 138–151.

Cervone, D., & Peake, P. K. (1986). Anchoring, efficacy, and action: The influence of judgmental heuristics on self-efficacy judgments and behavior. *Journal of Personality and Social Psychology*, *50*, 492-501.

Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory fit and persuasion: Transfer from "feeling right." *Journal of Personality and Social Psychology*, *86*, 388-404.

Chapman, G. B., & Johnson, E. J. (1999). Anchoring, activation, and the construction of values. *Organizational Behavior and Human Decision Processes*, *79*, 115-153.

Dweck, C. S. (1986). Motivational processes affecting learning. *American psychologist*, *41*, 1040-1048.

Dweck, C. S., & Gilliard, D. (1975). Expectancy statements as determinants of reactions to failure: Sex differences in persistence and expectancy change. *Journal of Personality and Social Psychology*, *32*, 1077-1084.

Ehrenreich, B. (2009). *Bright-sided: How the relentless promotion of positive thinking has undermined America*. Metropolitan Books.

Eyal, N., Bar-Eli, M., Tenenbaum, G., & Pie, J. S. (1995). Manipulated outcome expectations and competitive performance in motor tasks with gradually increasing difficulty. *Sport Psychologist*, *9*, 188-188.

Feltz, D. L., & Lirgg, C. D. (1998). Perceived team and player efficacy in hockey. *Journal of Applied Psychology*, *83*, 557-564.

Forsyth, D. R., Lawrence, N. K., Burnette, J. L., & Baumeister, R. F. (2007). Attempting to improve the academic performance of struggling college students by bolstering their self-esteem: An intervention that backfired. *Journal of Social and Clinical Psychology*, *26*, 447–459.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American psychologist*, *56*, 218.

Garcia, M. E., Schmitz, J. M., & Doerfler, L. A. (1990). A fine-grained analysis of the role of self-efficacy in self-initiated attempts to quit smoking. *Journal of Consulting and Clinical Psychology*, *58*, 317-322.

Gifford, R. (1994). A lens-mapping framework for understanding the encoding and decoding of interpersonal dispositions in nonverbal behavior. *Journal of Personality and Social Psychology*, *66*, 398-412.

Gollwitzer, P. M., Heckhausen, H., & Steller, B. (1990). Deliberative and implemental mind-sets: Cognitive tuning toward congruous thoughts and information. *Journal of Personality and Social Psychology*, *59*, 1119–1127.

Good, C., Aronson, J., & Harder, J. A. (2008). Problems in the pipeline: Stereotype threat and women's achievement in high-level math courses. *Journal of Applied Developmental Psychology*, *29*, 17-28.

Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Personality judgments based on offices and bedrooms. *Journal of Personality and Social Psychology*, *82*, 379-398.

Grant, A. M., Campbell, E. M., Chen, G., Cottone, K., Lapedis, D., & Lee, K. 2007. Impact and the art of motivation maintenance: The effects of contact with beneficiaries on persistence behavior. *Organizational Behavior and Human Decision Processes*, 103, 53–67.

Handford, M. (1987). *Where's Waldo?* New York, NY: Little, Brown, & Co.

Hansford, B. C., & Hattie, J. A. (1982). The relationship between self and achievement/performance measures. *Review of Educational Research*, *52*, 123-142.

Harris, P. (1996). Sufficient grounds for optimism? The relationship between perceived controllability and optimistic bias. *Journal of Social and Clinical Psychology*, *15*, 9–52.

Hazlett, A., Molden, D. C., & Sackett, A. M. (2011). Hoping for the best or preparing for the worst? Regulatory focus and preferences for optimism and pessimism in predicting personal outcomes. *Social Cognition*, *29*, 74-96.

Heine, S. J., Kitayama, S., Lehman, D. R., Takata, T., Ide, E., Leung, C., & Matsumoto, H. (2001). Divergent consequences of success and failure in Japan and North America: An investigation of self-improving motivations and malleable selves. *Journal of Personality and Social Psychology*, *81*, 599–615.

Heine, S. J., & Lehman, D. R. (1999). Culture, self-discrepancies, and self-satisfaction. *Personality and Social Psychology Bulletin*, *25*, 915–925.

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology*, *31*, 3-23.

James, W. (1882). Rationality, activity, and faith. *The Princeton Review*, *2*, 58-87.

Jerusalem, M., & Mittag, W. (1995). Self-efficacy in stressful life transitions. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 177-201). New York: Cambridge University Press.

Keller, H. (1903). *Optimism: An essay*. New York: T. Y. Crowell.

Kenny, D. A. (1987). S*tatistics for the social and behavioral sciences*. Boston: Little, Brown.

Klein, W. M. P., & Cooper, K. L. (2009). On the physical health costs of self-enhancement. In E. C. Chang (Ed.), *Self-criticism and self-enhancement: Theory, research, and clinical implications*. Washington, DC: American Psychological Association.

Krizan, Z., & Sweeny, K. (2013). Causes and Consequences of Expectation Trajectories “High” on Optimism in a Public Ballot Initiative. *Psychological science*, *24*, 706-714.

Krizan, Z., Miller, J. C., & Johar, O. (2010). Wishful thinking in the 2008 US presidential election. *Psychological Science*, *21*, 140-146.

Locke, E. A., Frederick, E., Lee, C., & Bobko, P. (1984). Effect of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology*, *69*, 241-251.

Loewenstein, G., & Prelec, D. (1993). Preferences for sequences of outcomes. *Psychological Review*, *100*, 91-108.

Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: does happiness lead to success? *Psychological Bulletin*, *131*, 803–855.

Macnamara, B. N., Hambrick, D. A., & Oswald, F. L. (2014). Deliberate practice and performance in music, games, sports, education, and professions: A meta-analysis. *Psychological Science*, *25*, 1608-1618.

McAuley, E. & Gill, D.L. (1983). Reliability and validity of the Physical Self-Efficacy Scale in a competitive sport setting. *Journal of Sport & Exercise Psychology*, *5*, 410-418

McGraw, A. P., Mellers, B. A., & Ritov, I. (2004). The affective costs of overconfidence. *Journal of Behavioral Decision Making*, *17*, 281–295.

Moritz, S. E., Feltz, D. L., Fahrbach, K. R., & Mack, D. E. (2000). The relation of self-efficacy measures to sport performance: A meta-analytic review. *Research Quarterly for Exercise and Sport*, *71*, 280-294.

Newby-Clark, I. R., Ross, M., Buehler, R., Koehler, D. J., & Griffin, D. W. (2000). People focus on optimistic scenarios and disregard pessimistic scenarios while predicting task completion times. *Journal of Experimental Psychology: Applied*, *6*, 171–182.

Norem, J. K., & Cantor, N. (1986). Defensive pessimism: Harnessing anxiety as motivation. *Journal of Personality and Social Psychology*, *51*, 1208–1217.

O'Leary, A. (1985). Self-efficacy and health. *Behaviour Research and Therapy*, *23,* 437-451.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, *66*, 543-578.

Pajares, F., & Miller, M. D. (1994). Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis. *Journal of Educational Psychology*, *86,* 193-203.

Peterson, C. (2000). The future of optimism. *American Psychologist*, *55*, 44–55.

Pronin, E., Wegner, D. M., McCarthy, K., & Rodriguez, S. (2006). Everyday magical powers: the role of apparent mental causation in the overestimation of personal influence. *Journal of Personality and Social Psychology*, *91*, 218–231.

Reynolds, D. J., & Gifford, R. (2001). The sounds and sights of intelligence: A lens model channel analysis. *Personality and Social Psychology Bulletin*, *27*, 187-200.

Sah, S., Moore, D. A., & MacCoun, R. J. (2013). Cheap talk and credibility: The consequences of confidence and accuracy on advisor credibility and persuasiveness. *Organizational Behavior and Human Decision Processes*, *121*, 246–255.

Sandelands, L. E., Brockner, J., & Glynn, M. A. (1988). If at first you don't succeed, try, try again: Effects of persistence-performance contingencies, ego involvement, and self-esteem on task persistence. *Journal of Applied Psychology*, *73*, 208-216.

Scheier, M. F., & Carver, C. S. (1993). On the power of positive thinking: The benefits of being optimistic. *Current Directions in Psychological Science*, *2*, 26–30.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, *67*, 1063-1078.

Scheier, M. F., Matthews, K. A., Owens, J. F., Magovern, G. J., Lefebvre, R. C., Abbott, R. A., & Carver, C. S. (1989). Dispositional optimism and recovery from coronary artery bypass surgery: The beneficial effects on physical and psychological well-being. *Journal of Personality and Social Psychology*, *57*, 1024.

Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology*, *85,* 440 – 452.

Schneider, S. L. (2001). In search of realistic optimism: Meaning, knowledge, and warm fuzziness. *American Psychologist*, *56*, 250–263.

Schunk, D. H. (1995). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 281-303). New York: Plenum Press.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*, 5–14.

Seligman, M. E. P., & Schulman, P. (1986). Explanatory style as a predictor of productivity and quitting among life insurance sales agents. *Journal of Personality and Social Psychology*, *50*, 832.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2013). Life after P-Hacking. *SSRN*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2205186

Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. *Psychological bulletin*, *124*, 240-261.

Strack, F., & Mussweiler, T. (1997). Explaining the enigmatic anchoring effect: Mechanisms of selective accessibility. *Journal of Personality and Social Psychology*, *73*, 437-446.

Taylor, S. E. (1989). *Positive illusions: Creative self-deception and the healthy mind*. New York, NY, US: Basic Books, Inc.

Taylor, S. E., & Gollwitzer, P. M. (1995). Effects of mindset on positive illusions. *Journal of Personality and Social Psychology*, *69*, 213–226.

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*(4), 429–439.

Tenney, E. R., MacCoun, R. J., Spellman, B. A., & Hastie, R. (2007). Calibration trumps confidence as a basis for witness credibility. *Psychological Science*, *18*, 46–50.

Tenney, E. R., Spellman, B. A., & MacCoun, R. J. (2008). The benefits of knowing what you know (and what you don't): How calibration affects credibility. *Journal of Experimental Social Psychology*, *44*, 1368-1375.

Thomaes, S., Reijntjes, A., Orobio de Castro, B., Bushman, B. J., Poorthuis, A., & Telch, M. J. (2010). I Like Me If You Like Me: On the Interpersonal Modulation and Regulation of Preadolescents' State Self-Esteem. *Child Development*, *81*, 811–825.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*, 1124-1131.

Valentine, J. C., DuBois, D. L., & Cooper, H. (2004). The relation between self-beliefs and academic achievement: A meta-analytic review. *Educational Psychologist*, *39*, 111-133.

Vasquez, N. A., & Buehler, R. (2007). Seeing future success: Does imagery perspective influence achievement motivation? *Personality and Social Psychology Bulletin*, *33*, 1392–1405.

Vazire, S., & Gosling, S. D. (2004). e-Perceptions: personality impressions based on personal websites. *Journal of personality and social psychology*, *87*, 123-132.

Vazire, S., Naumann, L. P., Rentfrow, P. J., & Gosling, S. D. (2008). Portrait of a narcissist: Manifestations of narcissism in physical appearance. *Journal of Research in Personality*, *42*, 1439-1447.

Walker, C. O., Greene, B. A., & Mansell, R. A. (2006). Identification with academics, intrinsic/extrinsic motivation, and self-efficacy as predictors of cognitive engagement. *Learning and Individual Differences*, *16*, 1-12.

Wilson, T. D., Wheatley, T., Meyers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: a source of durability bias in affective forecasting. *Journal of Personality and Social Psychology*, *78*, 821-836.

Windschitl, P. D., Kruger, J., & Simms, E. N. (2003). The influence of egocentrism and focalism on people's optimism in competitions: When what affects us equally affects me more. *Journal of Personality and Social Psychology*, *85*, 389-408.

Weger, U. W., & Loughnan, S. (2013). Mobilizing unused resources: Using the placebo concept to enhance cognitive performance. *The Quarterly Journal of Experimental Psychology*, *66*, 23-28.

Weinstein, N. D., & Lyon, J. E. (1999). Mindset, optimistic bias about personal risk and health-protective behaviour. *British Journal of Health Psychology*, *4*, 289–300.

Weiss, M. R., Wiese, D. M., & Klint, K. A. (1989). Head over heels with success: The relationship between self-efficacy and performance in competitive youth gymnastics. *Journal of Sport and Exercise Psychology*, *11*, 444-451.

Wrosch, C., Scheier, M. F., Carver, C. S., & Schulz, R. (2003). The importance of goal disengagement in adaptive self-regulation: When giving up is beneficial. *Self and Identity*, *2*, 1–20.

Wrosch, C., Scheier, M. F., Miller, G. E., Schulz, R., & Carver, C. S. (2003). Adaptive self-regulation of unattainable goals: Goal disengagement, goal reengagement, and subjective well-being. *Personality and Social Psychology Bulletin, 29*, 1494–1508.

Appendix A

Scenarios Used in Experiments 1-2

The following scenarios are from Armor, Massey, and Sackett (2008).

Experiment 1A, 1B, 2 (High Control) – Mr. C Scenario
Mr. C has been diagnosed with a heart condition that impairs proper bloodflow. The condition needs to be treated but the options vary. Mr. C has decided to pursue open-heart surgery rather than to pursue alternative options. Even with surgery the outcome is not certain – sometimes the operation works and sometimes it does not. The success of the surgery depends in large part on rehabilitation, so Mr. C will have substantial control over the outcome.

Experiment 1A, 1B, 2 (High Control) – Jane Scenario
Jane has received an inheritance, and one of the decisions she has made is to invest the inheritance in a new business. (The decision to invest in this business was Jane's to make.) If the business is successful, the profit will be substantial, but if the business fails, Jane will lose the investment entirely. Jane's role in the business will be active – she will have a seat on the board of directors and will have considerable influence over how the business is run.

Experiment 1A, 1B, 2 (High Control) – Lisa Scenario
Lisa's advisor has suggested that she consider applying for a prestigious academic award. Today, Lisa has decided to apply. The application requires a submission fee, which Lisa will have to pay, as well as a scholarly paper. Lisa does have a paper that meets the requirements of the award, and her advisor thinks it has a shot, but the award is very competitive. Lisa will be allowed to revise her paper before submitting her application materials, so she can still work to improve her chances of receiving the award.

Experiment 1A, 1B, 2 (High Control) – Joe Scenario
Joe is a member of a student organization at his university. He was asked if he would host the organization's end-of-the-year party, and Joe has agreed to do so. Joe now has to reserve the courtyard behind his apartment. He is also responsible for making sure the party is a success by deciding whom to invite, ordering food, and selecting the music for the party. Expenses will be covered by the student organization's budget, but Joe will be responsible for how this money is used.

Experiment 2 – Mr. C Scenario (Low Control)
Mr. C has been diagnosed with a heart condition that impairs proper bloodflow. The condition needs to be treated but the options vary. Mr. C has decided to pursue open-heart surgery rather than to pursue alternative options. Even with surgery the outcome is not certain – sometimes the operation works and sometimes it does not. The success of the surgery depends in no part on rehabilitation, so Mr. C will have little control over the outcome.

Experiment 2 – Jane Scenario (Low Control)

Jane has received an inheritance, and one of the decisions she has made is to invest the inheritance in a new business. (The decision to invest in this business was Jane's to make.) If the business is successful, the profit will be substantial, but if the business fails, Jane will lose the investment entirely. Jane's role in the business will be passive – she will remain a silent investor without influence over how the business is run.

Experiment 2 – Lisa Scenario (Low Control)
Lisa's advisor has suggested that she consider applying for a prestigious academic award. Today, Lisa has decided to apply. The application requires a submission fee, which Lisa will have to pay, as well as a scholarly paper. Lisa does have a paper that meets the requirements of the award, and her advisor thinks it has a shot, but the award is very competitive. Lisa will not be allowed to revise her paper before submitting her application materials, so she cannot do anything to improve her chances of receiving the award.

Experiment 2 – Joe Scenario (Low Control)
Joe is a member of a student organization at his university. He was asked if he would host the organization's end-of-the-year party, and Joe has agreed to do so. Joe now has to reserve the courtyard behind his apartment. However, the group's Activity Coordinator is responsible for making sure the party is a success by deciding who to invite, ordering food, and selecting the music for the party. Expenses will be covered by the student organization's budget, and Joe will not be responsible for how this money is used.

Appendix B

Experiment 5A and 5B Materials

Description of Cues (that Predictors Read)

Expectation. Before taking the test, experiencers answered, "What percent of the test do you think *you* will get right?" on a scale from 0 to 100%. On average, people thought they would correctly answer 57.71% of the test questions correct, but this ranged from 1 to 100%.

Optimism. Before taking the test, experiencers answered, "How optimistic are you about doing well on the test? (Doing well would be getting about 70% of the questions right)" on a scale from 1 (*Not optimistic at all*) to 6 (*Very optimistic*). On average, people rated their optimism about their future performance on the test as 3.97, but answers ranged from 1 to 6.

Difficulty. After taking the test, experiencers answered, "In your opinion, how difficult was the Math Test?" on a scale from 1 (*not difficult at all*) to 6 (*extremely difficult*). On average, people rated the difficulty of the test as a 4.38, but answers ranged from 1 to 6.

Enjoyableness. After taking the test, participants answered, "How enjoyable did the Math Test seem?" on a scale from 1 (*not enjoyable at all*) to 6 (*extremely enjoyable*). On average, people rated that the test was 3.53 in terms of being enjoyable, but answers ranged from 1 to 6.

Age. After taking the test, participants answered, "What is your age (in years)?" The average age of people who took the test was 32 years old, but answers ranged from 17 to 61.

Pretest Score. We scored each person's answers on the 30-second pretest before they took the test. On average, people correctly answered 3.25 questions on the quiz, but the correct answers ranged from 0 to 7.

Time on Test. We timed how long people spent on the test. On average, people spent 7.68 minutes on the test, but time ranged from .67 to 13.49 minutes.

Example of a Profile Predictors Saw

Below is a profile. Read it, then guess how many questions that person answered correctly on the 10 question Math Test. If you correctly guess how this person scored on the Math Test, you will have a ticket entered into the lottery for $50.

As a reminder, here are the ranges of responses and averages for each of the factors.

Factor	Range of Answers	Average
Expectations	1 to 100% of total test question expected to get correct	57.71%
Optimism	1 to 6 (1: Not optimistic at all 6: Very optimistic)	3.97
Test Difficulty	1 to 6 (1: Not difficult at all 6: Extremeley difficult)	4.38
Test Enjoyableness	1 to 6 (1: Not enjoyable at all 6: Extremeley enjoyable)	3.53
Age	17 to 61 years old	32
30 Second Quiz Score	0 to 7 correct answers on quiz	3.25 answers
Time	.67 to 13.49 minutes spent on the test	7.68 minutes

Factor	Participant 3
Expectations	20
Optimism	2
Test Difficulty	5
Test Enjoyableness	1
Age	25
30 Second Quiz Score	2
Time	4.59

Table 1

Predictors' Estimates by Condition in Experiment 3D

	70% Condition	30% Condition
Estimate 1	Group A 64.7%[a]	Group B 50.1%[b]
Estimate 2	Group C_A 60.7%[a]	Group C_B 63.3%[a]

Note. The 70% and 30% conditions were between-subjects. Estimates 1 and 2 were within-subjects within their respective columns. Different lowercase, superscript letters indicate significant differences at $p < .001$. Estimates for Group A and Group C_A were marginally significantly different, $p < .07$.

Table 2

Cues Related to Actual and Estimated Performance on the Math Test: A Brunswik (1956) Lens Model Analysis

Cue-validity correlations		Cue-utilization correlations
Actual score	Cue	Predictors' estimated score
.63**[a]	Pretest Score	.94**[b]
-.60**[a]	Difficulty	-.62**[a]
.40**[a]	Expectations	.60**[b]
.34**[a]	Enjoyableness	.34**[a]
.33**[a]	Optimism	.54**[b]
-.25*[a]	Age	-.21*[a]
.17[a]	Time on Test	-.04[b]

Note: Different letters indicate a significant difference within the row, $p \leq .01$. Same letters indicate a non-significant difference within the row, $p > .250$. Asterisks indicate a significant correlation between the cue and either the actual or estimated score, $*p < .05$, $**p < .01$, two-tailed.

Table 3

Cues Related to Actual and Estimated Performance on the Math Test: A Brunswik (1956) Lens Model Analysis, Separated By Participants Who Saw the Expectations (Version 1) or Optimism (Version 2) Cue

Cue-validity correlations		Cue-utilization correlations Predictors' estimated score	
Actual score	Cue	Version 1	Version 2
.63**[a]	Pretest Score	.83**[b]	.95**[b]
-.60**[a]	Difficulty	-.55**[a]	-.62**[a]
.40**[a]	Expectations	.67**[b]	---
.34**[a]	Enjoyableness	.35**[a]	.30**[a]
.33**[a]	Optimism	---	.49**[b]
-.25*[a]	Age	-.16[a]	-.23*[a]
.17[a]	Time on Test	.02[b]	-.09[b]

Note: Different letters indicate a significant difference within the row, $p < .05$. Asterisks indicate a significant correlation between the cue and either the actual or estimated score, $*p < .05$, $**p < .01$, two-tailed.

Figure 1. Prescribed outlook as a function of decision phase, aggregated across four scenarios in Experiment 1A. Scores above zero indicate prescribed optimism; scores at zero indicate prescribed accuracy; scores below zero would indicate prescribed pessimism.

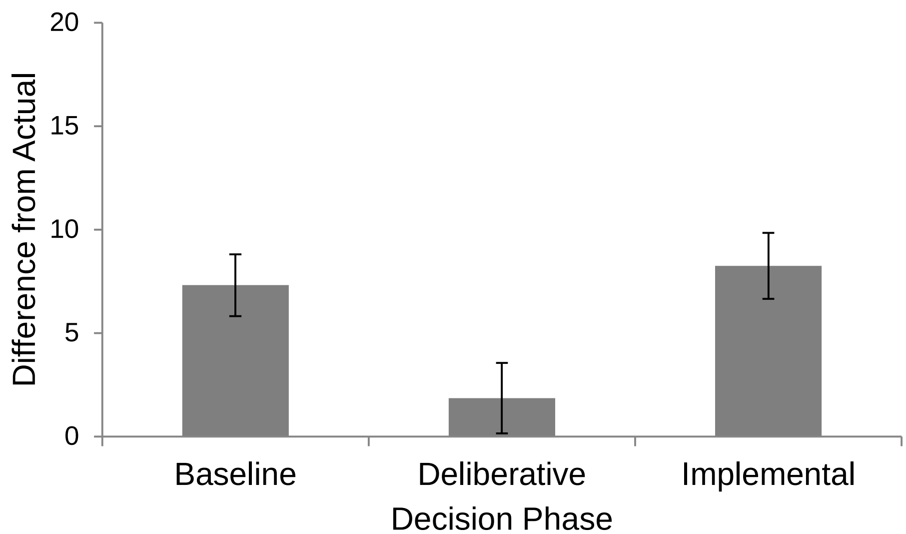

Figure 2. Mean perceived change in chance of success as a function of protagonists' outlook and protagonists' level of control over the outcome across scenarios in Experiment 2. Scores above zero indicate an improved outcome; scores at zero indicate no change in outcome; scores below zero indicate a worse outcome.

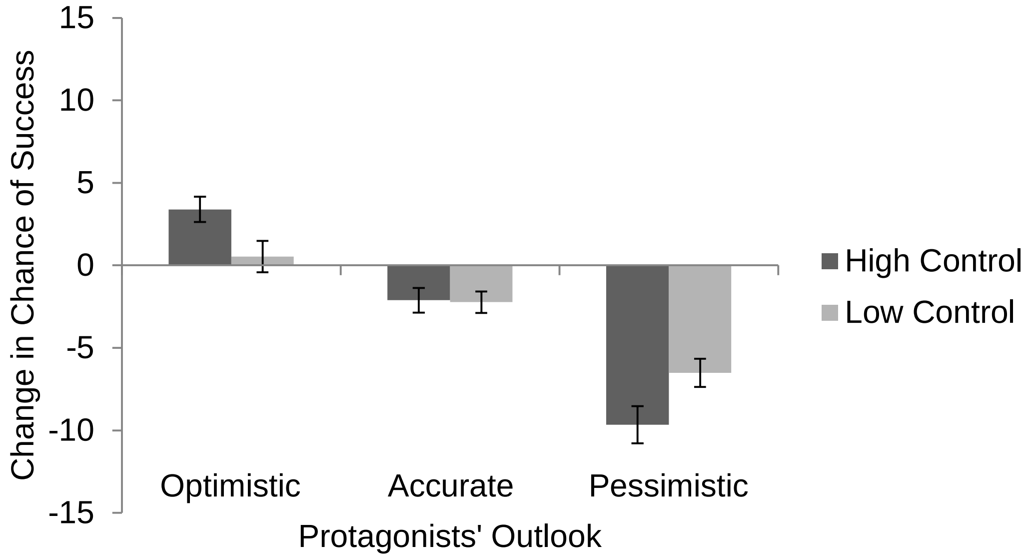

Figure 3. Percent correct on the 10-item age guessing test in Experiment 3A as a function of deceptive feedback about how well participants would do on the test (70% or 30%) and predictors' (predicted) estimates of test performance versus experiencers' actual (experienced) test performance.

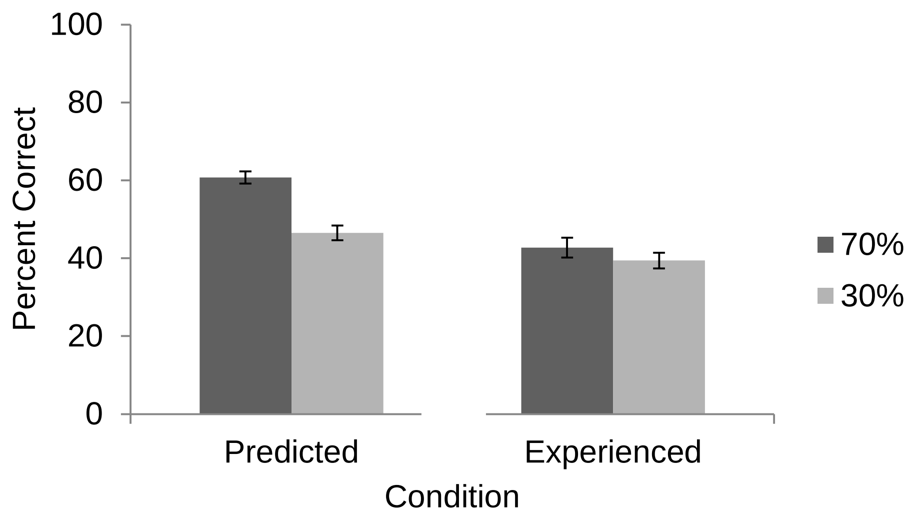

Figure 4. Percent correct on the 10-item math test in Experiment 3C as a function of deceptive feedback about how well participants would do on the test (70% or 30%) and predictors' (predicted) estimate of test performance versus experiencers' actual (experienced) test performance.

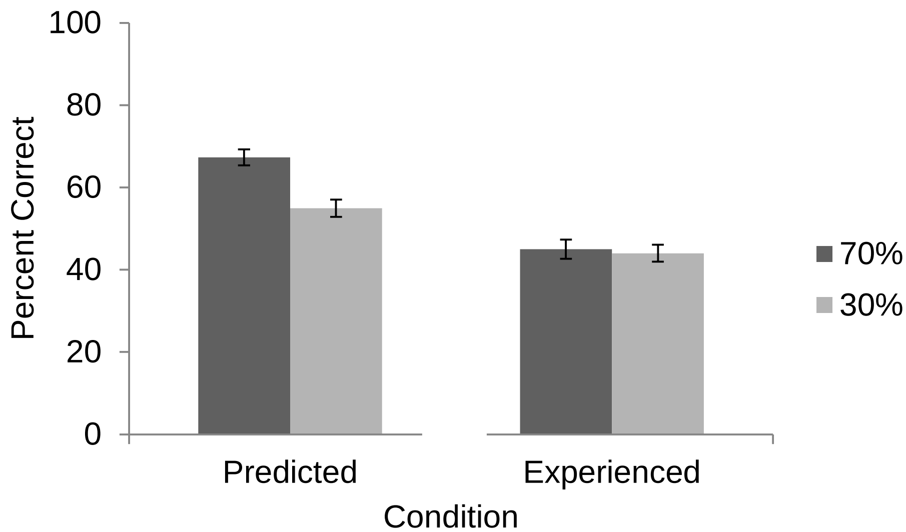

Figure 5. Brunswik's (1956) lens model of a predictor's inference of an experiencer's performance with three cues (adapted from Anderson, Brion, Moore, & Kennedy, 2012).