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The Exaggerated Benefits of Failure

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Commencement speakers, business leaders, and the popular press tell us that failure has at least one benefit: It fuels success. Does it? Across 11 studies, including a field study of medical professionals, predictors overestimated the rate at which people course correct following failure (Studies 1–4). Predictors overestimated the likelihood that professionals who fail a professional exam (e.g., the bar exam, the medical boards) pass a retest (Studies 1a, 1b, and 2a), the likelihood that patients improve their health after a crisis (e.g., heart attack, drug overdose; Studies 2b and 6), and the probability, more generally, of learning from one's mistakes (Studies 3–5). This effect was specific to overestimating success following failure (Study 4) and erasing mention of an initial failure that had actually occurred corrected the problem (Studies 2a and 2b). The success overestimate was due, at least in part, to the belief that people attend to failure more than they do (Studies 5 and 6). Correcting this overestimate had policy implications. Citizens apprised of the sobering true rate of postfailure success increased their support for rehabilitative initiatives aimed at helping struggling populations (e.g., people with addiction, ex-convicts) learn from past mistakes (Studies 7a–7c).

Public Significance Statement

Our culture teaches that failure has, at least, one silver lining: It is a steppingstone to success. Is it? Across 11 studies, people in the lab and professionals in the field overestimated the rate at which health failures, professional failures, educational failures, and failures in a real-time task were followed by success. People thought that tens of thousands of professionals who fail standardized tests would go on to pass (who do not), that tens of thousands of people with addiction would get sober (who do not), and that tens of thousands of heart failure patients would improve their health (in fact, they do not). Overestimating success following failure had key policy implications. Apprising citizens of the true, lower-than-expected rate at which success occurs on the heels of failure increased support for policy initiatives aimed at helping criminals and people in the throes of drug addiction learn and grow from past mistakes.

Keywords: motivation, failure, success, misprediction, policy reform

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Is there anything failure does not ruin? It destroys reputations, careers, and families; economic prospects, political prospects, and social ones. Yet failure, we are told, has one benefit: It fuels success. Michael Jordan famously said, "I have failed over and over again, and that is why I succeed" (Prefontaine, 2016), a sentiment echoed by U.S. Supreme Court Chief Justice John Roberts when he wished a class of college graduates "bad luck"—so they would have something to learn from (Reilly, 2017). Are failures the "fingerposts on the road to achievement" (O'Flaherty & Root, 2018) people believe they are (Maxwell, 2007)? Or is this rosy view too rosy?

We define failure broadly, as any event that does not achieve a desired goal. By this definition, falling short of a health goal, a social

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goal, or an achievement goal constitutes failure.[1] Along these same lines, we define success as corrective action—action that achieves the previously failed goal or makes objective progress toward it. For example, a student who passes an exam they previously failed has succeeded, as has a medical patient who makes a positive lifestyle change (e.g., new diet, more exercise) to achieve the previously failed goal (i.e., health). We test whether people overestimate the rate at which people succeed following a wide and diverse range of failures. We anticipate that predictors overestimate the likelihood of success because they overestimate how much people attend to their failures.

Perceptions of Success After Failure

According to half a century of research on loss aversion (Kahneman & Tversky, 2013) and negativity bias (Baumeister et al., 2001), bad is stronger than good. People react more strongly to loss and failure than gain and success. For example, grant applicants who just miss receiving a grant achieve greater professional renown than applicants who win the grant by the same margin (Wang et al., 2019). Negativity bias affects motivation and behavior as well as perceptions and beliefs (O'Brien, 2020; O'Brien & Klein, 2017; see also Skowronski & Carlston, 1989). Asymmetric reactions to good versus bad, success versus failure, or gain versus loss indicate a pervasive negativity bias.

Complementing this weighty tradition, we test whether negative events create objectively inaccurate perceptions. We ask whether people who learn about a failure overestimate the likelihood of future success. We compare estimates of predicted success to the true rate at which success occurs. Thus, instead of exploring relative differences in the way people react to equivalent positive and negative stimuli, we explore whether negative events bias perceptions and beliefs about what happens next in a way that deviates from reality.

One possibility is that predictors underestimate the likelihood that someone who fails goes on to succeed. Indeed, the perception of negative momentum (i.e., a string of failures) during a game causes observers to expect future failure (Carlson & Shu, 2007; Gilovich et al., 1985). The majority of law school graduates who fail the bar exam the first time go on to fail again (JD Advising, 2019), just as most ex-convicts reoffend (Alper et al., 2018). Past behavior predicts future behavior.

We, however, expect people to overestimate the likelihood that failure is followed by success. In line with this prediction, people tend to be overly optimistic about the likelihood of an underdog making a comeback—even irrationally so. People believe low-ranked entities (e.g., students in a class, NBA teams) are more likely to climb in rank than high-ranked entities are to drop (Davidai & Gilovich, 2015).

One reason people may overestimate postfailure success is because people struggle with perspective-taking (Epley, 2008; Epley et al., 2004). Just as individuals "outside" a boring work task overlook how much fun promotes persistence "inside" the task (Woolley & Fishbach, 2015), and just as people in need of help overlook the social pressure felt upon being asked (Flynn & Lake, 2008), we expect predictors outside a failure experience to overlook what happens inside the experience. People struggle in manifold ways to take on the perspective of others. For example, people are poor at gauging the intentions of others (Kruger et al., 2006), the emotions of others (Van Boven & Loewenstein, 2005), and the knowledge of others (Nickerson, 1999). In the case of failure, we expect people "outside" a failure experience to struggle to gauge how much people "inside" the experience attend to the failures they experience.

Afterall, people struggle to tune in to negative information about the self; avoiding this sort of information is a common psychological defense (Golman et al., 2017; Woolley & Risen, 2018). Novices look away from negative feedback (Finkelstein & Fishbach, 2012), and investors check their stock portfolios less when the market is down—the so-called ostrich effect (Sicherman et al., 2016; Webb et al., 2013). Looking away from failure has a clear downside. It undercuts learning (Eskreis-Winkler & Fishbach, 2019). So why would people do it? To feel good about themselves. Failure is demotivating (Fishbach & Finkelstein, 2012; Hattie & Timperley, 2007; Yeager & Dweck, 2012) and ego-threatening (Fishbach & Finkelstein, 2012; Hattie & Timperley, 2007; Yeager & Dweck, 2012). People who fail tune out when the goal to preserve one's sense of self overrides the goal to learn from the experience (Grundmann et al., 2021). Many failures are so important that they command attention and some degree of learning. Yet even in these instances, people "outside" the failure may overestimate the attention and thought failure receives from those "inside."

Perspective taking may be especially hard in the face of failure if individuals "outside" the failure focus on what those experiencing failure should do (i.e., attend to failure and learn from it), leading them to underestimate how much those on the "inside" are compelled by what they want—namely, to avoid negative information about the self. Thus, while predictors focus on the learning benefits of attending to failure (Hattie & Yates, 2014; Storbeck & Clore, 2008; Wulf & Lewthwaite, 2016), experiencers motivated to maintain their self-esteem may tune in less than predictors think. In sum, we expect predictors to focus on what experiencers ought to do, neglecting what they actually do. Exhibiting an attention to failure gap, predictors "outside" the failure may overestimate the attention and learning of those on the "inside."

Optimism Bias: An Alternative to Our Theory

Whereas we expect predictors to overestimate success following failure due to an attention to failure gap, an established psychological process might also be at play: optimism bias. Optimism bias is the tendency to overestimate the likelihood of positive outcomes (Sharot et al., 2007; Shepperd et al., 2013). For example, students overestimate their future salaries (Shepperd et al., 1996), and patients overestimate the likelihood that they will avoid a deadly diagnosis (Waters et al., 2011). People are more likely to remember better-than-expected outcomes than worse-than-expected outcomes (Lefebvre et al., 2017), a cognitive bias that explains the effect. Optimism bias suggests people overestimate success regardless of whether it is preceded by failure.

Independent of general optimism, we expect predictors to overestimate success following failure. We theorize that the attention to failure gap between experiencers and predictors inflates estimates of success after failure and explains this effect.

[1] We conducted a pilot study to support this broad categorization of failure. We recruited 120 participants on MTurk (48.8% female, 51.2% male, $M_{age} = 42.15$, $SD = 12.53$). We showed participants a selection of failures across traditional achievement domains (e.g., work, school) as well as nonachievement domains (e.g., health, civic society). For each, we asked participants to judge whether the target was experiencing a failure of some kind. Across these varied contexts, participants (87%–100%) thought "failure" was an apt description (for further details, see the online supplemental materials).

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Does Overestimating Success Matter?

On the one hand, overestimating success in the wake of failure could be desirable. People may take more risks and be less fearful if they overestimate the positive growth in failure's aftermath, a point we refer back to in the General Discussion section. Yet, there might also be downsides. People who overestimate the likelihood of follow-up success may see less need for programs and policies that scaffold growth among people who are struggling and need help (e.g., people with addiction, people with criminal convictions).

Policy makers have one of two standard approaches to criminal justice: rehabilitation or punishment (Benson, 2003). The rehabilitative approach is more costly but optimal for growth (Dahl & Mogstad, 2020). Convicts do best when they are scaffolded with programs and resources that help them succeed in the aftermath of conviction (Weisburd et al., 2017), just as people in the throes of addiction who receive treatment significantly increase their odds of recovery (Melemis, 2015). Citizens who overestimate postfailure success may underresource policies and programs designed to help struggling individuals learn and grow from past mistakes. Thus, if we care about the way we treat people who are failing, it is important to understand how beliefs regarding success after failure deviate from reality, how these beliefs undercut motivation to help, and how these beliefs can be corrected.

The Present Research

As noted above, we define failure broadly, as not achieving a desired goal. In the current investigation, we test whether people overestimate success after failure in both traditional achievement contexts (e.g., not passing an exam) and nontraditional achievement contexts (e.g., health failures). We classify these diverse instances as failures because each entails falling short of a desired goal.

Our culture makes broad claims about the positive growth that occurs in failure's aftermath. Failure, we are told, sparks everything from inspiration (Donohue, 2015) to humility (Bradatan, 2017; Morin, 2015) to holistic development (Bell, 2017). We test whether predictors overestimate the actual rate at which success follows failure. We define success as taking corrective action that achieves the previously failed goal or makes progress toward it. For example, a lawyer who fails the bar exam but then passes a retest has achieved the previously failed goal. So too, a heart attack survivor who makes physician-recommended lifestyle changes is taking corrective action to promote the failed goal of health.

We tested our predictions across 11 studies involving judgments of success in the wake of eight categorically different failures (summarized in Tables 1 and 2). We began by testing whether predictors overestimate the likelihood of success following a real-world failure (Studies 1a and 1b). For each real-world failure, we collected national statistics to get a true estimate of the rate at which success follows failure. We then compared this value to predictors' estimates. For example, we compared predictors' estimates of the eventual General Education Diploma (GED) pass rate of students who initially fail the GED with the nationwide rate at which students who fail the GED and retest eventually pass. We used this method to measure the success overestimate, at scale, in two standard achievement contexts: work (Study 1a) and education (Study 1b).

Next, using a labeling experiment, we examined whether erasing mention of a failure that had actually occurred, holding all else constant, would lower predictors' estimates of subsequent success, making predictors more accurate (Studies 2a and 2b). We compared people's estimates of the likelihood that a specific target would succeed after failure (control condition) with estimates of those who did not learn about this initial failure (failure-erased condition). That is, we tested the counterintuitive prediction that giving people less information—deleting information about an earlier failure—would make them more accurate.

Next, we measured overestimates of success in an experimental task (Studies 3–5). We randomized people to personally experience failure (experiencers) or to witness the failures of others (predictors). We ran this task in online samples (Studies 4 and 5) as well as among professionals in the field (Study 3). Using iterations of this task, we tested for specificity—that is, whether the success overestimate was more likely to occur after an initial failure than after other experiences, such as initial success (Study 4).

Turning to the proposed process, Study 5 tested for an attention to failure gap. We examined whether predictors who overestimate success following failure do so because they overestimate how much attention is paid to failure in the first place. In Study 6, we examined whether informing predictors of the true, low rate at which people attend to failure would attenuate overestimates of postfailure success. These mechanism studies tested for evidence of the proposed process using mediation and moderation across traditional (Study 5) and nontraditional (Study 6) achievement contexts.

Finally, we examined policy implications. We tested whether sharing the true, sobering rate at which success follows health and civic failures would increase support for rehabilitation programs that help people in dire circumstances to learn and grow from past mistakes (Study 7).

Transparency and Openness

For all studies, we predetermined the sample size prior to data collection. We expected to find medium-to-large effect sizes (e.g., $d = 0.60$, $\phi = .40$) based on pilot testing the manipulations. To ensure sufficient power to reliably detect effects in our experiments, we predetermined all sample sizes a priori. Based on pilot testing our manipulations, we aimed for 50–100 per cell. We preregistered these sample sizes in all studies except Studies 2a and 7b. We estimated the statistical power across our studies as power $(1 - \beta)$ of 99% to detect our critical effect. This power estimate was computed using a *p*-curve analysis (https://www.p-curve.com/app4/[version 4.06]; Simonsohn et al., 2014). We report how we determined our sample size, all manipulations, and all measures in each study.

All data and materials, including syntax and output for the analyses, are available on the Open Science Framework (OSF): https://osf.io/69ude/?view_only=aff52a381dfe4c84be5ccb81bcfdc21c.

Studies 1a–1b: Overestimating How Much Others Succeed Following Real-World Failures

Study 1 tested whether predictors overestimate the likelihood of success following failure in two traditional achievement domains: work (Study 1a) and education (Study 1b). These two domains are close to home: Participants have personal experience with success and failure in work and school, making such predictions close to their knowledge base.

We identified specific failure scenarios—standardized testing contexts—in which the true rate of postfailure success is documented

Table 1
Summary of Studies

Study	Sample source	Main findings	Operationalization of failure	Operationalization of success	Hypothesis tested
1a*	Online U.S. participants	Predictors overestimated the likelihood that professionals (lawyers, nurses, teachers) pass an exam after failing.	Failing an exam	Passing an exam	Main effect: predictors overestimate the true rate at which people succeed following failure.
1b*	Online U.S. participants	Predictors underestimated the likelihood that students continue to fail the GED after an initial failure.	Failing an exam	Passing an exam	Main effect: predictors underestimate the true rate at which people fail following failure.
2a	Online U.S. participants	Erasing the "failure" label from a licensing exam score lowers predictors' estimates of subsequent success, making their estimates more accurate.	Failing an exam	Passing an exam	Main effect: erasing mention of a failure leads predictors to lower their estimates of subsequent success (making them more accurate at estimating the true value).
2b*	Online U.S. participants	Erasing mention of an acute health failure—a drug overdose—lowers predictors' estimates of subsequent success, making their estimates more accurate.	A drug overdose	Entering drug treatment	Main effect: erasing mention of a failure leads predictors to lower their estimates of subsequent success (making them more accurate at estimating the true value).
3*	Field study of medical professionals	Nurses overestimated how much their colleagues would succeed following profession-related failures.	Answering a profession-related task question wrong	Answering a profession-related task question right	Main effect: predictors overestimate the true rate at which their peers succeed following failure.
4*	Online U.S. participants	Predictors overestimated how much experiencers would succeed following initial failure; in contrast, predictors did not overestimate how much experiencers would succeed following initial success.	Answering a test question wrong	Answering a test question right	Main effect: predictors overestimate the likelihood of success following initial failure but not initial success, thus demonstrating the specificity of the effect.
5*	Online U.S. participants	Predictors overestimated how much experiencers would succeed following failure; this overestimate was driven by the mistaken belief that people attend to failure more than they actually do.	Answering a test question wrong	Answering a test question right	Process: predictors overestimate the likelihood of success following failure because they overestimate how much people attend to failure.
6*	Online U.S. participants	Predictors overestimate the likelihood that heart patients take corrective action (make healthy lifestyle changes) in the wake of a major health failure; this effect attenuates when predictors learn that a minority of heart patients attend to their past health failures.	Experiencing a heart failure	Making a healthy lifestyle change (e.g., exercise, diet, quit smoking)	Process: dampening the false belief that people attend to failure more than they do makes predictors more accurate at gauging the rate at which success follows failure.
7a*	Online U.S. participants	In a between-subjects design, predictors who do (vs. do not) learn the true rate at which success follows failure for people struggling with drug addiction are more likely to think taxpayer dollars should be channeled toward supporting drug recovery (i.e., rehabilitation initiatives).	Substance abuse	Recovery	Implications: correcting the success overestimate increases interest in using taxpayer dollars to create rehabilitation programs that help people with drug addiction achieve recovery.
7b	Online U.S. participants	When predictors learn the true rate at which success follows failure for people struggling with drug addiction, they are more likely to sign a petition advocating for taxpayer dollars to be channeled toward supporting drug recovery (i.e., rehabilitation initiatives).	Substance abuse	Recovery	Implications: correcting the success overestimate motivates people to sign a petition that channels taxpayer dollars toward helping people with addiction achieve recovery.
7c*	Online U.S. participants	When predictors learn the true rate at which success follows failure for ex-convicts, they are more likely to support prison reforms (i.e., rehabilitation initiatives) that help ex-convicts reintegrate into society following release from prison.	Criminal conviction	Reintegrating into society (i.e., not reoffending)	Implications: correcting the success overestimate increases interest in channeling taxpayer dollars toward rehabilitation efforts that help ex-convicts reintegrate into society following release from prison.

Note. Pre-registered studies are noted with asterisk.

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Table 2
Summary of the Success Overestimate Across Studies

Study	*N*	Actual success rate after failure	Predicted success rate after failure	The success overestimate	Effect size	95% CI around the effect size
Study 1a: failing a professional exam	300					
Lawyers	101	35%	57.95%	$t(99) = 9.93$, $p < .001$	$d = 0.99$	[0.55, 1.43]
Nurses		43%	62.65%	$t(99) = 10.37$, $p < .001$	$d = 1.04$	[0.59, 1.47]
Teachers		58%	67.16%	$t(99) = 4.64$, $p < .001$	$d = 0.46$	[0.06, 0.86]
Study 1b: students who failed the GED		60%	73.39%	$t(100) = 6.74$, $p < .001$	$d = 0.67$	[0.26, 1.08]
Study 2a: teachers	100					
Control (failure) condition		58%	70.38%	$t(49) = 4.60$, $p < .001$	$d = 0.65$	[0.06, 1.23]
Failure-erased condition		58%	56.60%	$t(49) = -0.43$, $p = .668$	$d = -0.06$	[−0.49, 0.62]
Study 2b: addiction	100					
Control (failure) condition		16.6%	50.80%	$t(49) = 9.79$, $p < .001$	$d = 1.38$	[0.70, 2.05]
Failure-erased condition		16.6%	32.52%	$t(49) = 5.13$, $p < .001$	$d = 0.72$	[0.13, 1.31]
Study 3: nurses in the field	174	46.34%	86.05%	$\chi^2 = 20.30$, $p < .001$	$\phi = .40$	[0.25, 1.00]
Study 4	201					
Failure condition		2.00	2.45	$F(1, 195) = 7.46$, $p = .007$	$\eta_p^2 = .07$	[0.01, 0.18]
Success condition		2.76	2.52	$F(1, 197) = 2.14$, $p = .145$	$\eta_p^2 = .02$	[0.00, 0.11]
Study 5	201	1.86	2.42	$t(199) = 3.87$, $p < .001$	$d = 0.55$	[0.26, 0.83]
Study 6	200					
Control condition		47%	62.37%	$t(100) = 6.70$, $p < .001$	$d = 0.67$	[0.45, 0.88]
Corrected failure beliefs condition		47%	52.23%	$t(98) = 2.15$, $p = .034$	$d = 0.22$	[0.02, 0.41]

Note. Studies 7a–7c are not included in Table 2 because the focal measures in these studies were not actual versus predicted success. In Studies 1a–1b, we leverage national data sets and large-scale statistics in order to compare predictors' estimates of success after failure to the true, real-world rate at which failure is followed by success in several high-stakes professional and educational contexts. CI = confidence interval; GED = General Education Diploma.

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and publicly available. This allowed us to compare participants' estimates of postfailure success to real-world data.

In Study 1, failure and success outcomes add to 100%. Everyone who retakes an exam either passes or fails; thus, the percent of people who pass and fail sums to 100%. This reality allowed us to vary the framing of the dependent variable while still tapping into people's beliefs about success after failure. Specifically, in Study 1a, participants estimated the percent of professionals who pass a retest after they fail; in contrast, in Study 1b, participants estimated the percent of people who do not pass a retest after an initial fail. We expected participants to underestimate the likelihood of failure after failure just as they overestimate the likelihood of success after failure, thus demonstrating that question framing does not drive the effect.

Method

Participants

In this and all subsequent online experiments, individuals of any nationality were invited to participate so long as their online approval rating was at or above 90%. We recruited two samples from Prolific: Study 1a, 300 respondents (43.5% female, 56.5% male, $M_{age} = 41.27$, $SD = 12.12$); and Study 1b, 101 respondents (49.0% female, 51.0% male, $M_{age} = 30.42$, $SD = 10.36$). We preregistered both studies: Study 1a at https://osf.io/eqm2w/?view_only=a00c6bb725254f109435f98f25948631 and Study 1b at https://osf.io/q6urh/?view_only=d7ac608f224242a98cb6ac80a2a95945.

Procedure

Prior to beginning the study, we asked all participants an open-response question (e.g., "Please tell us who your best friend is and why"). We included this question for all online studies because online participants who are not willing to invest effort tend to drop out when they see an open-response question. Thus, we did not exclude participants based on this question; rather, participants dropped out if they did not want to expend effort. Participants who answered this question were randomly assigned to a failure situation and completed the main task.

In Study 1a, participants predicted success following failure for one of three professionals (lawyers, teachers, nurses; randomly assigned). In each case, participants considered professionals who failed their licensing exam and estimated the likelihood that they would pass upon retest (i.e., in the lawyer domain: "Consider law school graduates who take the bar exam and fail it. What percent of these lawyers will go on to pass the bar upon re-test?"). Participants indicated a percentage ranging from 0% to 100% (open numeric response).

Complementing Study 1a, Study 1b tested for this overestimate in a lower achieving target population: students who did not complete high school. This time, the question was framed in reverse. Participants estimated the likelihood that students who initially failed the GED would continue to fail retests ("… what percent do you think will never pass the test?"). Participants indicated a percentage ranging from 0% to 100% (open numeric response). For all studies, we measured demographics (age [open numeric response] and gender [choice of male or female]) at the end of the survey.

Results

Study 1a

In truth, only 35% of lawyers (JD Advising, 2019), 43% of nurses (NCLEX Pass Rates, 2022), and 58% of teachers (Putman & Walsh, 2021) pass professional exams upon retest. Using one-sample *t* tests[2] to compare predictors' estimates of success (the distribution) to the

[2] In all studies in the article that compared a distribution of values to a single true value, we used a one-sample *t* test to test for significance.

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true value of success (a single value), we found that participants overestimated the true likelihood of success in each profession, lawyers ($M = 57.95\%$ vs. 35%, $SD = 23.11\%$), $t(99) = 9.93$, $p < .001$, $d = 0.99$, 95% confidence interval (CI) = [0.55, 1.43]; nurses ($M = 62.65\%$ vs. 43%, $SD = 18.96\%$), $t(99) = 10.37$, $p < .001$, $d = 1.04$, 95% CI = [0.59, 1.47]; and teachers ($M = 67.16\%$ vs. 58%, $SD = 19.74\%$), $t(99) = 4.64$, $p < .001$, $d = 0.46$, 95% CI = [0.06, 0.86] (see Figure 1).

Study 1b

Participants also underestimated the likelihood that failure would follow initial failure—in other words, they overestimated the likelihood of subsequent success—for low-achieving populations. Predictors expected 26.61% of students to continue to fail the GED after initially failing it ($SD = 19.97\%$), whereas in reality, 40% of students who initially fail continue to fail every retest they take, $t(100) = 6.74$, $p < .001$, $d = 0.67$, 95% CI = [0.26, 1.08]. Reverse-scoring the dependent variable to align with the way we report the rest of our results, predictors expected 73.39% of students to pass the GED after failing it ($SD = 19.97\%$), whereas, in reality, only 60% of students do (see Figure 1[3]).

Discussion

In four distinct failures across two life domains, predictors overestimated the likelihood of success following failure. This overestimate occurred when people made predictions regarding white-collar professionals as well as for students who do not finish high school. The overestimate generalized when the true follow-up success rate was below and above 50%, suggesting that the results are not driven by a statistical artifact (e.g., regression to the mean).

Studies 2a and 2b: Erasing Failure

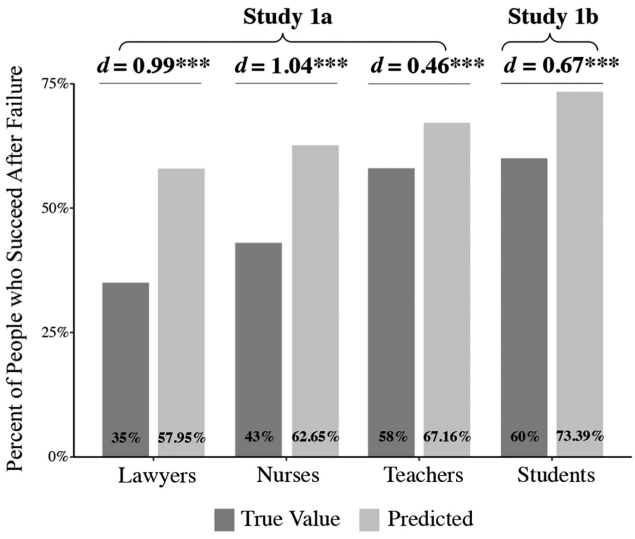
In Studies 1a and 1b, predictors overestimated the likelihood of success following real-world failure. In Studies 2a and 2b, we used a controlled experiment to test whether erasing mention of a failure that actually happened made predictors' estimates of subsequent success more accurate. In other words, we tested whether predictors with less information—those who did not learn about a failure that actually occurred—were more accurate in estimating the likelihood of success.

Recall that we define failure broadly, as not achieving a desired goal. Under this definition, failure occurs in achievement and nonachievement settings. Whereas Study 2a asked predictors to estimate the likelihood of success after an exam failure (traditional achievement context similar to Studies 1a and 1b), Study 2b asked participants to estimate the likelihood that someone who experiences a drug overdose enters treatment (nonachievement context). We categorize a drug overdose as a failure because during this near-death event, the body falls short of the near-universally desired goal of health. We classify entering treatment as success because we define success as taking corrective action that achieves the previously failed goal or makes objective progress toward it (i.e., health).

To see whether people overestimate success following failure in the nonachievement domain of health, just as they did in traditional achievement contexts (Studies 1a and 1b), we conducted a preregistered pilot study (https://osf.io/nfx6t/?view_only=795c46bd58d24b4eb255ed15f29a2c2f). We recruited 152 MTurk participants (41.1% female, 58.9% male, $M_{age} = 42.00$, $SD = 12.22$). We asked participants to predict the likelihood of recovery (i.e., success) following addiction (i.e., failure) across three types of addiction (opioid, smoking, alcohol; randomly assigned). As predicted, participants overestimated the likelihood of recovery among people struggling with addiction ($p < .001$). For details, see Supplemental Study S1 in the online supplemental materials.

Informed by this pilot, across achievement (Study 2a) and nonachievement (Study 2b) settings, we tested whether predictors are more likely to overestimate success when information about a prior failure is mentioned versus erased.

Figure 1
Results of Study 1



*** $p < .001$.

Study 2a

Method

Participants. We recruited 100 MTurk participants. MTurk returned 100 respondents (40.0% female, 60.0% male, $M_{age} = 40.53$, $SD = 13.00$).

Procedure. We randomly assigned participants to a two-condition (control vs. failure erased) between-subjects design. We asked participants to "consider teachers who take the teacher licensing exam and score 219 points (out of 300)." Participants in the control condition learned the true fact that "219 is a failing grade on the teacher licensing exam."[4] For participants in the failure-erased condition, we removed mention of the fact that 219 is a failing score. Following this, all participants predicted the percent of teachers who would raise their score upon retest (0%–100% open numeric response).

[3] For a visualization of all data points in this figure and all figures in the article, see the online supplemental materials.

[4] Indeed, on this licensing exam that ranges from 100 to 300 points, scoring below 220 is a fail (240 Tutoring, 2023). Thus, the dependent variable, which asks participants if they thought the target would improve their score, was essentially asking if the target who failed the initial exam would pass upon retest.

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Results

Using a one-sample *t* test, we found that participants in the control condition—the condition in which failure was mentioned—significantly overestimated ($M = 70.38\%$, $SD = 19.01\%$) the true rate at which teachers pass the licensing exam after failing it (58%), $t(49) = 4.60$, $p < .001$, $d = 0.65$, 95% CI = [0.06, 1.23], replicating Study 1a. In the failure-erased condition, participants did not overestimate ($M = 56.60\%$, $SD = 22.92\%$) the true rate at which teachers pass the licensing exam after failing it (58%). They were accurate, $t(49) = -0.43$, $p = .668$, $d = -0.06$, 95% CI = [−0.49, 0.62]. In support of our main hypothesis, erasing mention of failure led participants to lower their estimates of success, $t(98) = 3.27$, $p = .001$, $d = 0.65$, 95% CI = [0.25, 1.06] (see Figure 2), rendering success estimates indistinguishable from the true value (58%; Putman & Walsh, 2021). In other words, when participants received less information—when failure was not mentioned—their estimates were more accurate.

Study 2b

Building on Study 2a, participants in Study 2b estimated the likelihood that someone with a substance abuse disorder who experienced a drug overdose—an acute health failure—would enroll in treatment. As in Study 2a, we manipulated whether the failure (i.e., the acute overdose) was mentioned (control condition) or not (failure-erased condition). We expected participants to overestimate success in both conditions—since an overdose event and a baseline substance abuse problem can both be considered failures of health. However, we expected that removing mention of the acute failure (i.e., the overdose) would make predictors' estimates of follow-up success more accurate. Of note, people with a chronic drug abuse disorder have a higher lifetime incidence of entering treatment (25%; Grant et al., 2016) than those who have recently experienced a nonfatal overdose (16.6%; Kilaru et al., 2020). Thus, whereas people with an acute failure—a drug overdose—are, in fact, less likely to enter treatment than people with chronic drug addiction, we expected that participants would predict the opposite.

Method

Participants. We recruited 100 Prolific participants. Prolific returned 100 respondents (49.0% female, 51.0% male, $M_{age} = 30.01$, $SD = 9.27$). We preregistered this study on the OSF (https://osf.io/3kmdf/?view_only=10d01fd28ce0426199ae0830ec879479).

Procedure. We randomly assigned participants to a two-condition (control vs. failure erased) between-subjects design. First, all participants were introduced to an individual with a substance abuse disorder: "Consider J.R., an individual with an ongoing substance abuse disorder (opioid addiction). Over the years, J.R. has been strongly advised by many medical professionals, many times, to enter treatment for his addiction." We mentioned this medical advice to ensure that, in both conditions, participants had reason to believe that J.R. was motivated to enter treatment.

Participants in the control condition then learned: "Yesterday, J.R. had a non-fatal drug overdose." This acute health failure was not mentioned in the failure-erased condition. Finally, all participants estimated the likelihood of J.R. entering drug treatment (from 0% to 100%, open numeric response).

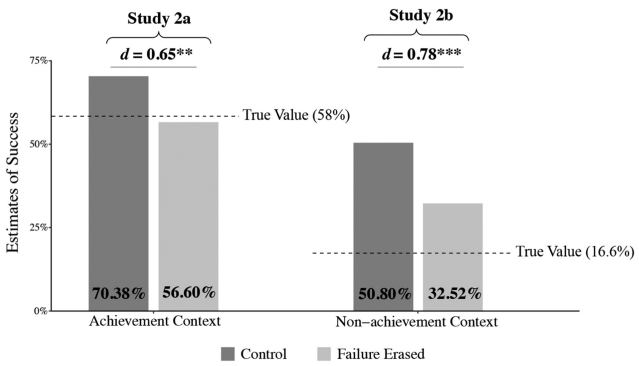
Results

Using a one-sample *t* test, we found that participants in the control condition—the condition in which the acute health failure was mentioned—significantly overestimated the likelihood of the target entering treatment ($M = 50.80\%$, $SD = 24.70\%$) relative to the true rate at which people who have recently experienced a drug overdose enroll (16.6%; Kilaru et al., 2020), $t(49) = 9.79$, $p < .001$, $d = 1.38$, 95% CI = [0.70, 2.05], replicating Study 1a. In the failure-erased condition, participants also overestimated ($M = 32.52\%$, $SD = 21.96\%$) this true value (16.6%), $t(49) = 5.13$, $p < .001$, $d = 0.72$, 95% CI = [0.13, 1.31]. In support of our main hypothesis, erasing mention of failure led participants to lower their estimates of success, $t(98) = 3.91$, $p < .001$, $d = 0.78$, 95% CI = [0.37, 1.19] (see Figure 2), rendering these success estimates closer to the true value (16.6%; Kilaru et al., 2020). In other words, when participants received less information—when failure was not mentioned—their estimates were more accurate.[5]

Discussion

In Studies 2a–2b, erasing mention of failure led participants to more accurately gauge the true likelihood of success. Participants more accurately estimated the likelihood that a test-taker would pass a teacher licensing exam when they were not aware that the test-taker had failed an earlier attempt (Study 2a). So too, participants were more accurate about the likelihood of an individual with an addiction entering treatment when they were not aware that the target had recently experienced an acute health failure—that is, an overdose (Study 2b). In sum, removing mention of a prior failure made participants more accurate at gauging the likelihood of success, lending support to the hypothesis that it is failure, in particular, as opposed to optimism or positivity bias in general, that leads predictors to overestimate success.

Figure 2
Results of Study 2



** $p < .01$. *** $p < .001$.

[5] Participants in the failure erased condition were presented with an individual who was a chronic drug user who had not recently experienced an overdose. The lifetime likelihood of a chronic drug user entering treatment is 25% (Grant et al., 2016). Thus, even though the likelihood of success after failure is factually lower in the control condition (16.6%), mentioning an acute failure led participants to believe it was higher, demonstrating the strength of the misprediction.

Do these success overestimates matter in the real world? Approximately 181,806 people experience nonfatal opioid overdoses each year (Howard, 2022). The true number of survivors who seek treatment is low: approximately 30,206 (NIDA, 2023). Predictors in our study optimistically estimated that around double this number—62,178 people—seek treatment. In other words, our predictors believed that 31,999 overdose survivors who do not actually seek treatment would do so.

Study 3: Nurses Overestimate Peer's Postfailure Success in a Profession-Related Task

Study 3 tested for the main effect in a controlled experimental paradigm modeled after an existing task (Eskreis-Winkler & Fishbach, 2019). This paradigm measured predictors' estimates of how often people who fail go on to succeed—that is, how often they learn from failure feedback. We compared predictors' estimates of subsequent success to the true rate at which experiencers in our study succeeded after failure.

We administered this task to nurses in the field. Nurses estimated the likelihood that their colleagues would learn from failure feedback in a task relevant to their profession. We compared these estimates to the true rate at which nurses completing this task actually succeeded following failure.

Method

Participants

We recruited oncology nurses attending a virtual conference to complete this survey. A priori, we were unaware of how many nurses we would be able to recruit and we opened this study to the first 175 nurses who signed into the online platform. After 175 signed in, additional participants were slotted into a different survey. A total of 174 nurses who began the focal study completed it (88.6% female, 11.4% male, $M_{age} = 49.09$, $SD = 13.65$). This study was preregistered (https://aspredicted.org/JGC_5J7). Participation was voluntary.

Procedure

We randomly assigned nurses to a two-condition (experiencer vs. predictor) between-subjects design. Nurses assigned to the experiencer condition answered one brief multiple-choice question. To make the quiz question as relevant as possible to nurses' interests and profession, the question was based on a recent poll of public attitudes toward nursing (Cavallo, 2020)—a topic relevant to practicing nurses interested in connecting to and building rapport with patients. Specifically, experiencers guessed the answer to one of three questions about lay attitudes toward the nursing profession (Q1: "What percent of Americans believe that racism can impact the care they receive in the U.S. health system?" [approximately eight in 10 or approximately six in 10]; Q2: "What percent of Americans believe that patients in clinical trials are not receiving the best possible care?" [~41% or ~51%]; Q3: "What percent of people believe that if they are going to get cancer they are going to get it, and there is nothing they can do about it?" [~40% or ~25%]). These topics are top of mind for patients who are disadvantaged, related to someone disadvantaged, considering clinical trials, or have a life-threatening illness like cancer. In other words, these are the sort of topics top of mind to many of the patients of the oncology nurses in this sample. Per our preregistration plan, we only retained nurses who answered their assigned question incorrectly (47%, 41/88 nurses) for analysis in the experiencer condition.

Nurses who "failed," that is, those answering the question incorrectly, were told so ("You answered incorrect!"). Because each question had just two answer choices, participants could learn from failure—if they attended to it, they could learn that the answer they did not select was the correct one.

Next, these nurses engaged in a brief pause and reflect activity. We introduced this reflection to equate survey length across the two conditions, as the predictors' survey took less time to complete. Finally, experiencers answered a follow-up question which was a close iteration of the question they had just answered. The purpose of this test question was to see whether experiencers had indeed learned from the failure such that they could now answer this follow-up test question correctly. For example, whereas Q1 read: "What percent of Americans believe that racism can impact the care they receive in the U.S. health system?", the matched follow-up question was asked in the reverse: "Which is NOT the percent of Americans who believe that racism can impact the care they receive in the U.S. health system?". The word "NOT" was in all caps, to ensure that reading errors were not generating the results.

Nurses assigned to the predictor condition ($n = 86$) did not answer a question about the nursing profession. Rather, these nurses were shown the exact materials seen by a fellow nurse in the experiencer condition, and they predicted whether their fellow nurse who answered one of the presented questions and got it wrong would be able to learn from failure and answer the follow-up question correctly. Specifically, predictors were first introduced to the task and asked to consider a colleague participating in the study:

> Today our team is giving a quiz about medical opinions in the U.S. to a group of your peers who are oncology nurses. Your peers guessed the answer to the following multiple-choice question. [One of the actual questions presented to Experiencers was inserted here for the Predictor's viewing]. After answering this question, your peer got feedback on whether they had answered right or wrong.

Next, predictors predicted whether someone who got the question wrong would be able to answer the follow-up question correctly ("Imagine one of your peers guessed an answer to the question above and got it wrong. Do you think they'd be able to learn from that feedback and answer the question below correctly?"). Predictors were shown the exact test question seen by experiencers and indicated whether they thought the experiencer would get it right (Y/N). Crucially, predictors were outside the failure experience—although they had insight into the exact question asked, they did not experience failure themselves. As such, we expected they would overestimate postfailure success.

Results

Per our preregistration plan, only experiencers who got their assigned quiz question wrong received feedback on their answer choice and were retained in our analysis ($n = 41/88$ experiencers). Whereas approximately half of experiencers answered the retest question correctly (success) after initially getting it wrong (failure, 46.34%, 19 of 41 nurses), predictors overestimated the percent of experiencers who would (86.05%, 74 of 86 nurses), $\chi^2(1, N = 127) = 20.30$, $p < .001$, $\phi = .40$, 95% CI = [0.25, 1.00].

Discussion

Complementing the results of Studies 1 and 2, Study 3 compared predicted success after failure to actual success after failure. In the

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field in real time, on a test relevant to their profession, nurses who viewed the exact failure experienced by colleagues predicted that their colleagues would be more likely to learn from the failure than they actually were.

Study 4: Testing for the Specificity of the Misprediction

In Study 4, we ran a similar version of Study 3, this time testing for specificity. In one condition, we examined predictors' estimates of success after an initial failure, anticipating we would replicate the effect from Study 3. In another condition, we examined predictors' estimates of success after an initial success. Our hypothesis was that predictors would overestimate success after initial failure more than success after initial success, thus demonstrating that it is failure, as opposed to optimism bias in general, driving predictors' overestimates of subsequent success.

Method

Participants

We recruited 200 Prolific participants. Prolific returned 201 respondents (50.5% female, 49.5% male, $M_{age} = 29.19$, $SD = 9.01$). We preregistered this study on the OSF (https://osf.io/5zsk2/?view_only=467753a96762450083a09922838551dc).

Procedure

Participants were randomized to condition in a 2 (role: experiencer vs. predictor) × 2 (feedback: success vs. failure) between-subjects design.

In the experiencer condition, all participants answered three consecutive binary-choice questions. Drawing from prior research (Eskreis-Winkler & Fishbach, 2019), we introduced the task to participants as a "researcher-manufactured ancient script." Participants saw a question with symbols from a researcher-invented script that participants had no prior knowledge of (e.g., "Which of the following characters in an ancient script represents an animal?" ᚹ or ᛗ). Thus, unlike Study 3, wherein we were unable to randomize feedback without necessitating deception, in Study 4, we were able to randomize participants to receive question feedback.

Participants received feedback after each question. Participants in the success condition received success feedback after each question ("You answered this question correct!"), whereas participants in the failure condition received failure feedback after each question ("You answered this question incorrect!"). Success was measured by whether participants were able to learn from the feedback they received and, after a brief break, correctly answer three retest questions that were highly similar to the initial questions (e.g., "Which of the following characters represents a non-living, stationary object?" ᚹ or ᛗ).

Experiencers learned at the start of the session that there would be a retest and they would earn a bonus payment for each of the three retest questions they answered correctly. We added this incentive to be sure that learners were highly motivated to learn.

Predictors predicted whether a peer who received success or failure feedback (depending on condition) would be able to, after a brief break, answer the retest questions correctly to earn the bonus. Predictors saw the exact test materials presented to experiencers, including the exact wording of retest questions. Our dependent variable was the number of (predicted vs. actual) test questions answered correctly. This variable ranged from 0 to 3.

Results

We found no significant effect of role, $F(1, 197) = 1.00$, $p = .318$, and a significant effect of feedback, $F(1, 197) = 13.24$, $p < .001$, with lower subsequent success (both predicted and actual) in the failure (vs. success condition). This main effect was qualified by the predicted 2 (role: experiencer vs. predictor) × 2 (feedback: failure vs. success) interaction, $F(1, 197) = 9.23$, $p = .003$, $\eta p^2 = .05$ (see Figure 3). In the failure condition, replicating the effect of prior studies, predictors believed experiencers who initially failed would be more likely to subsequently succeed than experiencers actually were ($M_{predictor} = 2.45$, $SD = 0.61$; $M_{experiencer} = 2.00$, $SD = 1.00$), $F(1, 195) = 7.46$, $p = .007$, $\eta p^2 = .07$, 95% CI = [0.01, 0.18]. This effect attenuated in the success condition ($M_{predictor} = 2.52$, $SD = 0.84$; $M_{experiencer} = 2.76$, $SD = 0.69$), $F(1, 197) = 2.14$, $p = .145$, $\eta_p^2 = .02$, 95% CI = [0.00, 0.11]. This pattern of results demonstrates the specificity of the effect.

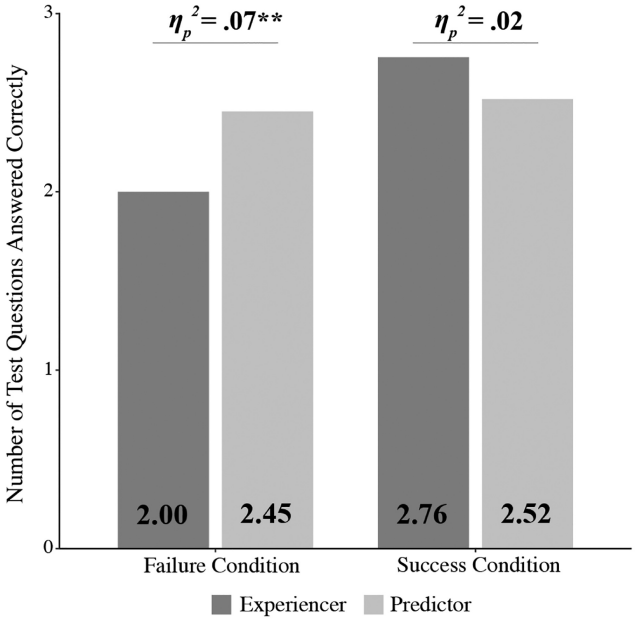
Discussion

Predictors who viewed the exact situation experiencers found themselves in nonetheless believed that experiencers who initially failed would be more likely to subsequently succeed than experiencers actually were. This success overestimate occurred following initial failure, but not initial success. The specificity of this effect rules out the possibility that a general optimism bias fully accounts for the observed effect. If it did, predictors would have overestimated success after initial success just as they overestimated success after initial failure.

Study 5: Overestimating Attention to Failure Leads Predictors to Overestimate Subsequent Success

Why do people overestimate the likelihood that failure is followed by success? We theorize that this occurs because people overestimate

Figure 3
Results of Study 4



** $p < .01$.

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how much failure is attended to in the first place. To test this hypothesis, in Study 5, we compared the estimated likelihood of success following failure (among predictors) to the actual rate of success following failure (among experiencers). In addition, we asked predictors to estimate the likelihood that others would attend to failure and compared this to the actual attentiveness of experiencers. Similar to the failure condition in Study 4, we used a controlled task paradigm to directly gauge experiencers' attention to failure inside the failure experience and to show predictors the exact failure the experiencer experienced without predictors experiencing the failure themselves. We expected that a gap in predicted versus actual attention would explain predictors' overestimates of subsequent success.

Method

Participants

We recruited 200 Prolific participants. Prolific returned 201 respondents (43.7% female, 56.3% male, $M_{age} = 44.43$, $SD = 12.39$). We preregistered this study on the OSF (https://osf.io/y3rpv/?view_only=0dd57c0cbeb245dd9810166d212b1061).

Procedure

Participants were randomly assigned to a two-condition (experiencer vs. predictor) between-subjects design.

In the experiencer condition, participants completed the same materials completed by experiencers in the failure condition in Study 4. That is, experiencers learned at the start of the session that they would answer three questions in Round 1, and then they would earn a bonus payment for each of the three retest questions in Round 2 that they answered correctly. As in Study 4, we included this incentive to ensure that learners were motivated to learn.

The one unique feature we added here was the opportunity to receive feedback. After Round 1 and a brief activity, all experiencers were asked: "Would you like to take time to look at explanatory feedback for the questions you answered in Round 1?". Experiencers chose whether they wanted to see feedback on any or all of the questions from Round 1. This variable ranged from 0 to 3.

Following this, experiencers moved to the next page, on which they saw the retest questions from Round 2. Since all experiencers could learn the correct test answer from the failure feedback (even those who did not opt to see the detailed, explanatory feedback) all experiencers had enough information to answer the retest questions in Round 2 correctly. Everyone had the opportunity to follow failure with success. The dependent variable was how many of these retest questions experiencers answered correctly (range = 0–3).

Participants randomized to the predictor condition predicted whether someone who got the three questions in Round 1 wrong would (a) seek explanatory feedback and (b) answer the questions in Round 2 correctly. Predictors saw the exact materials completed by experiencers. Specifically, predictors first viewed the brief activity that experiencers completed between Round 1 and Round 2. We included this upfront to make the two conditions comparable in content and length. Following this, predictors made their first prediction, which served as the mediator: whether they believed someone who got the initial questions wrong would seek additional explanatory feedback, and if so, for how many questions ("For how many of the Round 1 questions do you think the participant chose to see explanatory feedback before moving on to the bonus round, Round 2?"). This variable ranged from 0 to 3.

Following this, predictors made their second prediction: whether they believed someone who got the Round 1 questions wrong would succeed following failure. For each of the Round 1 questions, predictors saw the initial question alongside the highly similar retest question. For each of the three questions, predictors indicated whether they thought an experiencer who got the Round 1 question wrong would afterward answer the retest question correctly (Y/N). Summing across the three Round 2 questions, this variable ranged from 0 to 3.

Results

In support of our main hypothesis and replicating the effect from Study 4, predictors thought experiencers would be more likely to succeed after failure ($M = 2.42$, $SD = 0.96$) than experiencers actually were ($M = 1.86$, $SD = 1.09$), $t(199) = 3.87$, $p < .001$, $d = 0.55$, 95% CI = [0.26, 0.83]. Predictors also thought experiencers would want more feedback to improve ($M = 2.39$, $SD = 0.92$) than experiencers actually did ($M = 1.16$, $SD = 1.43$), $t(199) = 7.24$, $p < .001$, $d = 1.02$, 95% CI = [0.73, 1.32]. Furthermore, attention to failure feedback predicted subsequent success ($B = 0.33$, $SE = 0.05$), $t(199) = 6.48$, $p < .001$. When included as simultaneous predictors in a regression, condition (experiencer vs. predictor) no longer predicted success after failure ($B = 0.20$, $SE = 0.15$), $t(198) = 1.29$, $p = .198$, but feedback did ($B = 0.29$, $SE = 0.06$), $t(198) = 5.18$, $p < .001$. Next, we tested for mediation. Supporting our hypothesis, attention to failure mediated the effect of condition on subsequent success ($\beta_{indirect} = .36$, $SE = .09$, 95% CI = [0.20, 0.55]) based on 10,000 bootstrap samples (Hayes' PROCESS Model 4).

Discussion

This study provides initial evidence for the underlying process and is consistent with the idea that an attention gap underlies the success overestimate after failure. Predictors overestimated the degree to which experiencers would tune in and learn from failure. We hypothesize this attention gap—this misunderstanding of the actual degree to which the experiencer attends to failure—leads predictors to overestimate subsequent success.

Study 6: Correcting the Overestimate

Study 5 suggests that predictors overestimate the likelihood of success following failure because they overestimate how much attention is paid to failure. That said, statistical mediation cannot establish causality. In Study 6, using moderation, we examined whether the success overestimate attenuates when predictors learn the true lower-than-expected rate at which people attend to failure. This study complements Study 5 by bringing causal evidence for process in a different design.

Another purpose of Study 6 was to bring proof of mechanism in a nonachievement domain. Building on Study 2b, which demonstrated that people overestimate success after failure in the health domain, this study examined whether the attention gap between experiencers and predictors can also be found in a medical context. Predictors in this study considered an individual who had experienced an acute health failure—specifically, a heart attack.

Recall that we define success as taking corrective action toward or fully achieving the previously failed goal. Our metric of success following failure in this study was whether patients who experience

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heart attacks take corrective action to achieve the previously failed goal: health. We operationalize corrective action as making a physician-recommended lifestyle change (e.g., exercise, diet, quitting smoking) to improve health, the previously failed goal.

Method

Participants

We recruited 200 participants via Prolific. Prolific returned 200 respondents (47.7% female, 52.3% male, $M_{age} = 29.76$, $SD = 10.18$). We preregistered this study on the OSF (https://osf.io/f3zcu/?view_only=506fb18d85154f48bdfc9f8b7b227640).

Procedure

We randomly assigned participants to a two-condition (corrected failure beliefs vs. control) between-subjects design. In the control condition, participants were asked to "Consider people who have experienced a failure of health. Specifically, consider people who have experienced a heart attack. Having a heart attack is a scary experience." As the dependent variable, we had participants "Take a guess: What percent of people who have had heart attacks find the motivation to implement a healthy lifestyle change (e.g., changing their diet, quitting smoking, getting more exercise) following the heart attack?" Participants were presented with an open-text box in which they entered a percent between 0 and 100.

In the corrected failure beliefs condition, participants read and completed the same prompt, with one difference. Prior to the dependent variable, participants received information about the actual amount of time heart attack patients spend thinking about their health problem:

> In a survey, we recruited people who had recently survived a heart attack and asked them, in an open-ended response question, to list the topics they actively think about. Only a small minority of people who have survived a heart attack listed their heart attack or their heart health as a topic they actively think about. The rest did not.

This "small minority" claim was based on a separate sample of pilot patients we recruited who had experienced heart failure (for details, see the online supplemental materials). Specifically, we asked heart patients in this pilot to name topics they actively think about, and only 2.7% of participants spontaneously mentioned their health. Presenting participants with the fact that only a "small minority" of heart patients actively think about their heart health tested our theory that lowering predictors' estimates of how much attention is paid to failure would, in turn, attenuate predictors' (over)estimates of the likelihood of corrective action.

Results

On average, participants in the control condition believed 62.37% (SD= 23.04%) of heart attack survivors would make measurable corrective changes to their lifestyles following this health failure. In truth, only 47% of heart attack survivors make a positive change to their lifestyle following a heart attack (Kulash, 2014). Participants in the control condition significantly overestimated this ground truth, $t(100) = 6.70$, $p < .001$, $d = 0.67$, 95% CI = [0.45, 0.88].

In the corrected failure beliefs condition, the overestimate attenuated. Telling participants that only a minority of people who experience heart failure actively think about their heart problems led participants in this condition to estimate that 52.23% ($SD = 24.23\%$) would take corrective action. While this estimate was still inflated compared to the true value of 47%, $t(98) = 2.15$, $p = .034$, $d = 0.22$, 95% CI = [0.02, 0.41], it was significantly lower—that is, more accurate—than the one made in the control condition, $t(198) = 3.03$, $p = .003$, $d = 0.43$, 95% CI = [0.15, 0.71] (see Figure 4).

Discussion

The success overestimate documented here, like many psychological phenomena, is likely multiply determined. Across Studies 5 and 6, using mediation and moderation, we show that an attention gap is one key process that drives the effect.

Sharing the lower-than-expected rate at which people attend to health failures attenuated the success overestimate. Predictors informed of the true rate at which people attend to health failures more accurately estimated the true rate at which people make positive changes to their life. Although the success overestimate we identify is almost certainly multidetermined—most phenomena are—the current results suggest that overestimating how much attention is paid to failure is one key process that inflates estimates of the likelihood of success following failure.

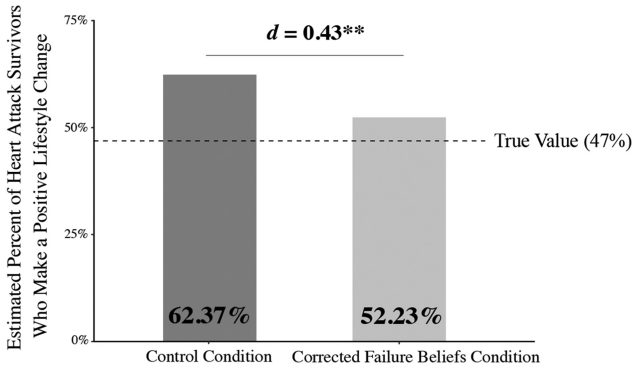
This study also points to the breadth of the main effect. Be it in traditional or nontraditional achievement contexts, people overestimate the likelihood that a wide variety of failures are followed with success—which, in this context, is defined as taking corrective action to achieve the previously failed goal.

How much does the success overestimate matter in the real world? In the United States, 805,000 people experience heart failure each year (Tsao et al., 2022). Predictors in our studies believed that 62% of heart attack survivors would proactively make lifestyle changes to improve their health, while in reality, only 47% do (Kulash, 2014). This overestimate translates into 32,000 heart attack survivors. In other words, predictors in our studies believed that over 30,000 heart attack survivors would make lifestyle changes to improve their health, who, in reality, do not.

Studies 7a–7c: Correcting This Overestimate Leads People to Support Rehabilitation

If people overestimate the true rate at which success follows failure, does this matter? In Studies 7a–7c we examined practical

Figure 4
Results of Study 6



** $p < .01$.

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implications in nonachievement contexts. Specifically, we tested whether success is overestimated in the aftermath of health and civic failures and the implications of this overestimate. Recall that we define success as taking corrective action toward or fully achieving the previously failed goal. In Studies 7a–7c, we explore our theory's implications for people with addiction and criminal convictions: two groups that have fallen short of near-universally desired goals in the health (people suffering from addiction) and civic (ex-convicts) domains.

First, to see whether people overestimate success following failure in the new nonachievement domain of civic society, we conducted a preregistered pilot study (https://osf.io/krab4/?view_only=8dac82ab83ad4369a1e47d3a156b591b). We recruited 145 MTurk participants (33.3% female, 66.7% male, $M_{age} = 38.26$, $SD = 11.51$). We asked participants to predict the likelihood of ex-convicts reintegrating into society (i.e., civic success) following a criminal conviction (i.e., civic failure) for one of three types of crimes (violent offenses, property offenses, drug offenses; randomly assigned). Among ex-convicts, we operationalize civic success as not reoffending. Replicating the results of Study 1, participants overestimated the likelihood that ex-convicts would not reoffend ($p < .001$). For pilot details, see Supplemental Study S2 in the online supplemental materials.

If citizens overestimate the likelihood of success in the wake of health (see Studies 2b and 6) and civic failures, why might this matter? One possibility is that this pollyannish misprediction leads people to undersupport programs and policies that scaffold struggling individuals. Indeed, in the U.S. prison system, some criminologists advocate for rehabilitative resources to help convicts learn from past mistakes, whereas other criminologists advocate punishment. This same divide exists among experts who debate how to treat people in the throes of addiction (Pew Research, 2018).

In Study 7, we told participants the true rate at which people recovering from addiction (Studies 7a and 7b) and ex-convicts (Study 7c) succeed following failure. That is, we corrected citizens' overestimates of success after failure. We hypothesized that learning the sobering, true rate at which success follows failure would lead people to verbally (Studies 7a and 7c) and actively (Study 7b) increase their support for rehabilitation initiatives that help people with addiction and ex-convicts learn from past mistakes.

Method

Participants

We recruited 200 Prolific participants for Study 7a, 100 MTurk participants for Study 7b, and 150 MTurk participants for Study 7c. Prolific returned 205 respondents for Study 7a (49.8% female, 50.2% male, $M_{age} = 31.07$, $SD = 11.02$); MTurk returned 101 participants for Study 7b (48.5% female, 51.5% male, $M_{age} = 44.89$, $SD = 13.67$); and MTurk returned 150 respondents for Study 7c (37.3% female, 62.7% male, $M_{age} = 42.97$, $SD = 14.11$). Study 7a (https://osf.io/e7ha6/?view_only=202580a7b32a4e468179d8c394cb5667) and Study 7c (aspredicted.org/515_X82) were preregistered.

Procedure

In Study 7a, participants were randomized into a two-condition (control vs. corrected success rate) between-subjects design. All participants reported the degree to which they supported channeling resources toward opioid recovery, "Do you think that Congress should channel taxpayer dollars away from other key initiatives in order to create programs that help recovered opioid addicts stay in recovery?" on a scale ranging from 1 = *definitely no* to 100 = *definitely yes*.

Prior to answering this question, the corrected success rate condition (but not control condition) saw the true, lower-than-expected rate at which success follows failure. Participants in this condition learned the actual percent of people recovering from addiction who stay in recovery following an addiction ("Only 9% of people who enter recovery from opioid addiction do NOT relapse in the following year. In other words, 91% of people who relapse from opioid addiction relapse soon after.").[6]

Study 7b replicated Study 7a using a two-condition (control vs. corrected success rate) within-subjects design. Instead of measuring attitudes, Study 7b measured action. Participants indicated if they would "… sign a petition to motivate Congress to channel taxpayer dollars away from other key initiatives in order to support drug rehabilitation and drug treatment programs" from 1 = *definitely no* to 100 = *definitely yes*. Participants rated their action intent both before and after learning the true rate of success after failure—that is, the true percent of people with opioid addiction who maintain recovery ("91% of people who get clean from opioids go on to relapse one year later").

In Study 7c, we examined how participants allocated resources toward ex-convicts, a different group struggling in the aftermath of a public failure. We randomly assigned participants to a condition in a 3 (crime domain: robbery vs. larceny vs. burglary; between subjects) × 2 (resource allocation rating: control vs. corrected success rate; within subject) mixed model design.

Initially, in the control condition, participants rated the focal resource allocation question ("What percent of the money the government spends on prisons do you think should be reallocated to rehabilitation efforts—that is, efforts aimed at helping criminals learn from their past mistakes?") using a dropdown scale ranging from 0% to 100%.

Next, in the corrected success rate condition, participants learned the true recidivism rate for the crime in question (e.g., robbery: "83% of people convicted of robbery go on to commit another robbery after they get out of prison"; Alper et al., 2018). Following this, participants were once again presented with the resource allocation question.

Results

Study 7a

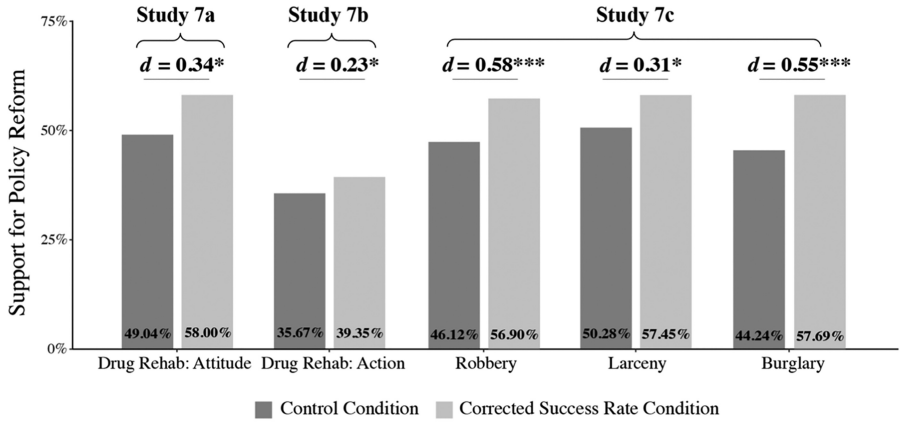
Supporting our hypothesis, relative to the control condition, sharing the lower-than-expected true rate at which success follows failure led participants to increase their policy support for channeling government resources toward the problem ($M_{control} = 49.04\%$, $SD = 26.20\%$; $M_{correctedsuccessrate} = 58.00\%$, $SD = 26.86\%$), $t(203) = 2.42$, $p = .016$, $d = 0.34$, 95% CI = [0.06, 0.61] (see Figure 5). In other words, once participants realized how unlikely failure (i.e., addiction) was to be met with full recovery (i.e., no relapses), they increased their desire to channel government resources toward the cause.

[6] We intentionally presented both the 9% and the 91% statistic to ensure that anchoring was not driving the effect.

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Figure 5

Results of Study 7



* $p < .05$. *** $p < .001$.

Study 7b

Supporting our hypothesis, participants were more likely to sign a petition advocating for opioid rehabilitation reform after learning the true relapse rate ($M_{control} = 35.67\%$, $SD = 33.49\%$; $M_{correctedsuccessrate} = 39.35\%$, $SD = 34.59\%$), $t(100) = 2.27$, $p = .026$, $d = 0.23$, 95% CI = [0.03, 0.42] (see Figure 5).

Study 7c

Supporting our hypothesis, across domains, participants allocated a greater percent of the prison budget toward rehabilitation reform after learning a crime's true recidivism rate ($M_{control} = 45.89\%$, $SD = 28.75\%$; $M_{correctedsuccessrate} = 55.43\%$, $SD = 30.09\%$), $t(149) = 5.77$, $p < .001$, $d = 0.47$, 95% CI = [0.30, 0.64]. This held true in each of the three domains: robbery, $t(50) = 4.18$, $p < .001$, $d = 0.58$, 95% CI = [0.28, 0.88]; larceny, $t(48) = 2.19$, $p = .033$, $d = 0.31$, 95% CI = [0.03, 0.60]; and burglary, $t(49) = 3.87$, $p < .001$, $d = 0.55$, 95% CI = [0.25, 0.84] (see Figure 5).

Discussion

In sum, correcting citizens' success overestimates in health and civic domains increased support for policies that channel resources toward rehabilitation—toward programs aimed at helping people learn from past mistakes. This is a finding with relevance to U.S. drug and prison policy. It is remarkable that in the United States, one of the most punitive societies on the planet (Widra & Herring, 2021), merely sharing the sobering rate at which ex-convicts and people with addiction make positive life changes motivated participants to shift taxpayer dollars toward rehabilitative reform. This study provides further evidence that success overestimates following failure occur—and matter—not only in traditional achievement contexts but also in any context in which people fail to achieve a desired goal.

Study 6 brought evidence that nonachievement failures, such as health failures, occur because predictors overestimate how much attention people who fail pay to their failure experiences. Thus, at the same time that overestimates of success in real-world contexts are multidetermined—almost all phenomena are—taken together, Study 6 and Studies 7a–7c suggest that overestimating how much attention is paid to failure is one key process that inflates estimates of the likelihood of success following failure, and correcting these estimates makes citizens more likely to allocate resources toward people in the real-world struggling with a range of failures.

General Discussion

People think failure is a better teacher than it really is. Across 11 studies, including a field study of medical professionals, people overestimated the likelihood of success in the wake of failure. Lay people overestimated the real-world rate at which professionals (Study 1a), students (Study 1b), people struggling with addiction (Supplemental Study 1 in the online supplemental materials), heart patients (Study 6), and ex-convicts (Supplemental Study S2 in the online supplemental materials) succeed on the heels of failure. In a field study, medical professionals made this same success overestimate following colleagues' failures (Study 3). Bringing evidence for the specificity of the effect, removing mention of a failure that had actually occurred led predictors to more accurately gauge success (Studies 2a and 2b), and the success overestimate was more likely to occur following failure than other nonfailure experiences (Study 4). Predictors overestimated the likelihood of success for targets who experienced failure out in the world (external validity), as well as for failures experienced in a controlled task paradigm (internal validity).

Why do predictors overestimate the rate at which success follows failure? At least in part, predictors do this because they overlook the rate at which people who fail tune out. Overestimating how much experiencers attend to failure leads predictors to overestimate how much experiencers absorb, learn, and grow from a failed experience. Supporting this theorizing, predictors overestimated how much attention people paid to failure, and this explained why predictors overestimated postfailure success (Study 5). Lending further support to this process, apprising predictors of the lower-than-expected rate at which people attend to failure attenuated estimates of subsequent success, rendering them more accurate (Study 6). Thus, while the success overestimate is likely due to many causes, we gather

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evidence for the role of one key process—an attention to failure gap—driving the effect.

Finally, we examined policy implications in consequential domains. Sharing the true, lower-than-expected rate at which success follows failure led citizens to verbally and actively endorse rehabilitative programs aimed at helping ex-convicts and individuals in the throes of addiction to learn and grow from past mistakes (Studies 7a–7c).

Across studies, the size of the success overestimate was statistically significant. Was it practically significant? Translating success overestimates into real-world numbers, predictors believed tens of thousands of lawyers, nurses, and teachers who fail professional exams would actually succeed (5,398 lawyers, 11,419 nurses, and 83,639 teachers; JD Advising, 2019; NCLEX Pass Rates, 2022; NCTQ (National Council on Teacher Quality), 2021). Predictors likewise estimated that approximately 62,178 drug overdose survivors would seek drug treatment after an overdose. Only half this number do (NIDA, 2023). Finally, predictors optimistically believed that annually, over 30,000 heart attack survivors make lifestyle changes to improve their health when, in reality, they do not (Tsao et al., 2022). These numbers suggest cause for concern. Afterall, Studies 7a–7c demonstrate that overlooking problems of this magnitude can undercut motivation to fix them.

Theoretical Implications

These findings contribute to research on negativity bias. Past research in this space has highlighted the unequal reactions people have to equivalent negative versus positive events. Building on this past research, we examined whether negative events bias perceptions of reality. They do. Failure led predictors to infer that subsequent success is more likely than it is; by the same token, removing mention of a failure rendered predictors more accurate.

This success overestimate occurred broadly and widely. It occurred regardless of whether the context was or was not a traditional achievement context, and it occurred across settings that were competitive or not, extending past work (Davidai & Gilovich, 2015).

Failure can be categorized in different ways. Business leaders categorize failures as basic, complex, or intelligent (Edmondson, 2023). Whereas basic failures are simple, unavoidable mistakes and complex failures are avoidable failures with multiple causes, intelligent failures occur as part and parcel of the creative process. Attribution theorists categorize failures on a different basis: the failure's cause. Most commonly, attribution theorists argue that people attribute failures to one of four main causes: lack of effort, lack of ability, task difficulty, or bad luck (Weiner, 1985).

Demonstrating the robustness of the success overestimate, predictors in our studies overestimated the degree to which people attend to failure and make positive change across these different categorizations. Predictors overestimated success regardless of the complexity or intelligence of the failure involved and regardless of the failure's perceived cause. For example, in multiple studies, predictors overestimated the likelihood that a patient experiencing a health failure would course-correct—even though the health failures presented were very different (heart failure vs. addiction) and tended to be attributed to different causes (Erickson & Wilcox, 2001; Kannel & Belanger, 1991). Across studies, we did not specify the degree to which the failure was basic, complex, or intelligent, nor did we specify the failure's cause. Not specifying these details helps demonstrate generalizability: the tendency to overestimate success after failure is robust across these different categorizations of failure.

We further build on past work by identifying a new psychological mechanism that makes judging the aftermath of failure so hard: Predictors believe people attend to failure more than they really do. In actuality, experts attend to failure feedback (Finkelstein & Fishbach, 2012) while most everyone else ignores it. This identified process also points to possible boundaries of the main effect. An attention to failure gap suggests that predictors overestimate the likelihood of success that comes about via attention and effort but that they will not overestimate the likelihood of success when success follows failure via chance (e.g., in a coin toss). The proposed mechanism suggests that the only successes that will be uniquely overestimated after failure are successes that require attention and effort.

Finally, this research contributes to the literature on optimism and positivity bias. These literatures predict that people overestimate the likelihood of positive outcomes (Sharot et al., 2007; Shepperd et al., 2013), including success. We add to this literature by demonstrating that there are specific events that make positivity bias even more likely—namely, a preceding failure. In controlled experimental designs, failure led predictors to overestimate success independent of general optimism.

This is noteworthy given past research might suggest that predictors will do the opposite: underestimate success after failure. Afterall, just as perceiving negative momentum causes observers to expect future failure (Carlson & Shu, 2007; Gilovich et al., 1985), and just as the majority of law school graduates who fail the bar exam the first time go on to fail again (JD Advising, 2019), predictors might be expected to underestimate the likelihood of success following failure. Against this possibility, we find that not only does the tendency to overestimate success remain in the wake of failure, it intensifies.

Avenues for Future Research

We propose three avenues for future research. First, downstream consequences. Second, moderators and boundaries of the effect. Third, additional processes.

Downstream Consequences

As shown in Studies 7a–7c, overestimating the likelihood of success following failure can have undesirable consequences for public policy. One avenue for future research is to look at other downstream consequences of this overestimate. For example, in the world of work, overestimating the likelihood that failure leads to success might lead people to overchallenge others, which would compromise outcomes in workplaces, relationships, and beyond. Initial support for this idea comes from a field test we ran with 251 managers. Managers who overestimated the likelihood that failure would lead to learning and subsequent success overchallenged their direct reports, which means managers unintentionally undermined the very achievement they wanted to promote (for full report, see the online supplemental materials). This preliminary finding points to an important upshot of Study 3, in which medical professionals systematically overestimated how much their colleagues learn from failure. It also complements a robust line of research showing that learning from failure in organizations is difficult (Edmondson, 1996, 2004, 2011; Tucker & Edmondson, 2003).

Relatedly, future research could examine whether the same overestimate that leads to negative consequences in groups and organizations has positive consequences for individuals themselves. Growth mindset researchers teach people the adaptive belief that they can grow in the face of failure and document this belief's positive, life-

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altering effects—effects that range from boosts in productive challenge-seeking to academic persistence to academic achievement (Dweck & Yeager, 2019; Yeager & Dweck, 2012). In sum, both positive and negative consequences of overestimating success are possible. In this article, we document a bias: People believe success follows failure more than it actually does. Insofar as people wish to perceive the world accurately, this bias is problematic. But from a practical standpoint, this bias likely has sometimes negative, sometimes positive consequences, depending on the situation.

Moderators and Boundaries

Future research might also explore moderators and boundaries of the main effect. In the current investigation, predictors believed that the failures they were shown would galvanize attention and corrective action; seemingly, they focused on the motivating power of failure instead of the fact that failure can signal low competence (Elliot & Dweck, 2005). Whenever predictors see failure as an indicator of low ability, this may overshadow beliefs about the motivational power of failure, leading the success overestimate to attenuate or disappear. We expect the success overestimate to attenuate whenever failure suggests incompetence, rather than heightened motivation, due to, for example, the actor's stigmatized identity.

Likewise, we would expect the success overestimate to attenuate for successes that are tied to luck or happenstance rather than corrective action. Our theory specifies that predictors overestimate how much experiencers attend to their failures, and this leads predictors to overestimate the likelihood of corrective action. Thus, it is attention and intentional action that predictors are overestimating in the wake of failure, not success that occurs by happenstance.

The success overestimate may also be moderated by first-hand experience with failure. In the current investigation, we did not recruit predictors who had personally experienced the failure at hand. We did not, for example, recruit lawyers who had failed the bar exam to estimate the likelihood of retest success. That said, arguably all the predictors in our experiments, by virtue of being adult humans, had experience with countless personal failures. In some sense, they were all experiencers at one point, and some of them may have had direct experience with the sort of failure scenarios we presented (e.g., failed exams, health failures). Nevertheless, they reliably overestimated the likelihood that success would follow failure. If personal experience led them to lower their estimates of postfailure success, this effect did not erase the success overestimate. Future research could empirically test whether personal experience with failure moderates the success overestimate.

Finally, future research might explore whether the success overestimate occurs when the experiencer has heightened attention to failure. For example, experiencers who are intrinsically motivated may tune in and learn from failure as much as predictors expect them to. Against this possibility, predictors overestimated the likelihood of postfailure success across samples that varied in intrinsic motivation. The nurses in Study 3 participated voluntarily and were not compensated. These nurses almost certainly had higher intrinsic motivation than the online workers in Study 5. Yet, in both cases, predictors overestimated postfailure success. Fear of failure (e.g., test anxiety) also heightens attention and could lead people to attend to failure more than they would otherwise. Yet the success overestimate emerged across samples in our studies that varied in fear of failure. For example, in Studies 1a and 2a, predictors overestimated subsequent success among high-achieving professionals who almost certainly experienced test anxiety while taking exams (Maloney et al., 2014), something that would not have occurred at all in our field sample of nurses (Study 3). In sum, the range of studies in this investigation suggests that the success overestimate occurs whether or not the experiencer has heightened attention to failure. That said, we did not directly test whether the success overestimate attenuates in the presence of heightened attention to failure—a possibility that would be useful to explore in future work.

Additional Processes

In the current investigation, using mediation and moderation, we gathered evidence that beliefs about attention to failure underlie the main effect. However, many psychological phenomena are multiply determined and the success overestimate we document here is likely no exception. For example, information exposure might also contribute to the effect. People hesitate to share bad news (Berger & Milkman, 2012; Tesser & Rosen, 1975) and are particularly hesitant to share personal failures (Eskreis-Winkler & Fishbach, 2020), which can make the sharer look bad. Yet the one exception to this rule might be sharing an earlier failure after later success. As opposed to making the sharer look bad, sharing stories about early failures suggests a triumphant "heroic arch" (Campbell, 2008) which makes the successful individual look better, not worse. To the extent that people are constantly sharing stories about failures that end well—but not stories of failure that end poorly—predictors may come to believe that failure is more likely to be followed by success than it is. This and other potential mechanisms bear exploration.

Constraints on Generality

We measured success following failure using a variety of procedures and methodologies. Moreover, we tested for predictors' overestimates using a range of paradigms and across very different samples: lay people, individuals with domain expertise, and medical professionals. That said, future research might push the constraints on generality that limit the current investigation. For example, it is still an open question whether our findings generalize to people in other, non-Western, Educated, Industrialized, Rich, and Democratic cultures. Indeed, past research shows that people in different cultures have different attitudes toward, interpretations of, and reactions to failure (Heine et al., 2001). Future research can examine whether the success overestimate we observe in the present studies generalizes to other cultures.

Even within U.S. culture, constraints on generality exist. We demonstrated policy implications of the main effect in online samples recruited on MTurk and Prolific in within- and between-subjects designs. Past research shows that participants from online recruitment sites are more liberal than the general U.S. population (Chandler et al., 2019). Therefore, future studies that examine policy implications in representative field samples would be informative.

It is also an open question whether, following failure, predictors overestimate any success or only a success directly tied to the failure in question. In a preliminary study, we found evidence for the latter, pointing to the specificity of the effect. For an initial pilot study and discussion on this point, see the online supplemental materials.

Conclusion

Across 11 studies, failure was not the stepping stone to success that people believed it to be. Reassuringly, in Studies 7a–7c, we

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find this misbelief is malleable. Sharing the actual lower-than-expected likelihood of postfailure success garnered citizen support for rehabilitative programs that help people learn from their errors. These results have implications for how we treat professional failures, repeat offenders, people with addiction, and anyone else—which is to say, everyone else—who struggles to learn from failure.

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