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When and why narcissists exhibit greater hindsight bias and less perceived learning

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ABSTRACT

The present research sought to examine the impact of narcissism, prediction accuracy, and should counterfactual thinking—which includes thoughts such as "I should have done something different"—on hindsight bias (the tendency to exaggerate in hindsight what one knew in foresight). Specifically, we examined a moderated mediation model, in which should counterfactual thinking mediates the relation between narcissism and prediction accuracy, and the effects in this mediation model are moderated by prediction accuracy such that the relationship is negative when predictions are accurate and positive when predictions are inaccurate after accurate predictions. To test these effects, we conducted four studies (total n = 787). Studies 1 and 2 yielded overall support for our hypothesized model. In addition, in Study 3 we ruled out could counterfactual thinking as an alternative explanation for the relationship between narcissism and hindsight bias. Additionally, in Study 3, we found that non-narcissists felt they learnt more from their decision than narcissists, participants who engaged in more should counterfactual thinking reported more learning, and after an inaccurate prediction, participants who showed less hindsight bias reported less learning. Finally, by manipulating should counterfactual thinking in Study 4, our findings suggest that this type of thinking has a causal effect on hindsight bias. We discuss why exhibiting some hindsight bias can be positive after failure. We also discuss implications for eliciting should counterfactual thinking. Our results help explaining why narcissists perform poorly in positions requiring learning from experience.

Keywords: Decision-making; Personality; Individual Decision-Making

WHEN AND WHY NARCISSISTS EXHIBIT GREATER HINDSIGHT BIAS AND LESS PERCEIVED LEARNING

> *"The greatest tragedy would be to accept the refrain that no one could have seen this coming and thus nothing could have been done. If we accept this notion, it will happen again"* (Financial Crisis Inquiry Commission, 2011: xxviii).

In several testimonies following the financial crisis of 2007–2010, Wall Street bankers expressed the view that virtually no one foresaw the financial crisis (Financial Crisis Inquiry Commission, 2010). Yet, in its final report, the Financial Crisis Inquiry Commission (2011) argued that the financial crisis was in fact foreseeable and avoidable. The bankers' claim is interesting given that these are professionals who are paid handsomely—some would say outrageously—for being able to predict financial market movements. Arguably, they *should have seen it coming*.

Their claim is also inconsistent with the hindsight bias, or the tendency to exaggerate in hindsight what one knew in foresight[1] (Arkes, 2013; Klein, Hegarty, & Fischhoff, 2017). Hindsight bias has been referred to as "one of the most widely studied of decision traps" and has been documented in domains as diverse as managerial, consumer, medical, policy, and legal decision making (Roese & Vohs, 2012, p. 411). A good current example appears to be Donald Trump, who often claims that he "knew it all along", such as when he stated in 2016 that in 2004 he had "predicted the Iraq war better than anybody" (Hannity, 2015).

While hindsight bias is common, a motivational perspective suggests that it can be reduced, eliminated, or even reversed, in the service of self-protection. For example, Louie (1999) found that people who chose to purchase stocks and were then told the stocks had decreased (i.e., an inaccurate prediction) thought post hoc that the outcome was less foreseeable. Consistent with this, and in marked contrast to the above example, President Trump, after

initially predicting that he could easily make a deal on health care, when he later failed to do so stated: “Nobody knew health care could be so complicated” (Lanktree & Lillywhite, 2017).

Interestingly, Trump has been labeled a narcissist (Visser, Book, & Volk, 2017), with narcissism being a personality trait characterized by exaggerated self-enhancement and self-protection (Miller, Lynam, Hyatt, & Campbell, 2017). Thus, one might expect narcissists[2] to generally exhibit stronger hindsight bias (“I knew it all along”) as a way of self-enhancing. However, when their predictions are wrong, they might exhibit reverse hindsight bias, claiming that no one could have seen it coming (not even them!) as a self-protection strategy.

The purpose of our research is twofold. First, we sought to provide a possible explanation for the finding from previous research that narcissism is related to poorer decision quality (Campbell, Goodie, & Foster, 2004; Chatterjee & Hambrick, 2007). We argue that, due to their exaggerated self-enhancement and self-protection tendencies, narcissists show stronger hindsight bias when their predictions are accurate and a reverse hindsight bias when their predictions are inaccurate, both of which harm their learning and future decision making.

Related, a second purpose is to provide an explanation for the relationship between narcissism, prediction accuracy, and hindsight bias. We suggest that a potential reason lies in narcissists’ failure to engage in should counterfactual thinking (SCT). SCT is a form of self-critical thinking about what one should have done or should have known (Cropanzano, Stein, & Nadisic, 2011; Spellman & Gilbert, 2014). We argue that SCT helps disconfirm initial beliefs and reduce hindsight bias for accurate predictions (when one did know), while increasing foreseeability (“I should have known”) for inaccurate predictions by providing a reasonable causal attribution for an unexpected outcome. We posit that narcissists engage in less SCT because doing so would implicate self-blame.

To examine these ideas, we conducted four studies in the context of hiring decisions, one of the most important managerial decisions and thus an important aspect of managerial competence (Guion, 2011). It is also a context in which foreseeability of future job performance is highly limited (Schmidt & Hunter, 1998), often leading to inaccurate predictions, wrong hiring decisions, and counterfactual thinking, making it an ideal setting for our research. Our first study provides an initial test of our complete model (Figure 1). In light of the ongoing replication crisis in the social sciences, Study 2 serves as a replication using a working adult sample with hiring experience and also examines perceived learning as downstream variable. In Study 3, we use a sample of experienced hiring managers to conduct a more stringent test of our assertion that SCT specifically (vs. *could* counterfactual thinking) is related to hindsight bias. In doing so, we can rule out an important alternative explanation. In other words, because SCT and could counterfactual thinking (CCT) are similar constructs (Folger & Cropanzano, 1998), we tested the hypotheses related to SCT while controlling for CCT. Finally, in Study 4 we experimentally manipulate SCT to allow for more confident causal inference as well as demonstrate that SCT can be primed and therefore manipulated if such thinking does not occur naturally.

Our research makes a number of contributions to the literatures on narcissism, hindsight bias, and counterfactual thinking. First, whereas past research has linked narcissism to increased risk taking and overconfidence, and poorer decision quality (Campbell et al., 2004; Chatterjee & Hambrick, 2007), relatively less is known about its mediating mechanisms. Drawing on the theoretical link of narcissism to self-enhancement and protection motives (Horvath & Morf, 2009), we suggest that narcissists fail to engage in self-critical processes of SCT, thus limiting their learning both in situations when they were right – leading to increased hindsight bias – *and* when they were wrong – leading to reverse hindsight bias (i.e., arguing the outcome was more

unforeseeable than it was).

Second, we extend our understanding of the antecedents of hindsight bias in two important ways. First, limited past research has studied individual difference factors as antecedents of the hindsight bias, and these studies have tended to focus more on cognitive factors such as intelligence and conscientiousness (Musch & Wagner, 2007). Drawing on the theoretical link of self-enhancement and protection, we examine narcissism as a novel antecedent of hindsight bias. Second, we establish SCT as an important proximal antecedent of hindsight bias. Importantly, we posit that the relation between SCT and hindsight bias is complex such that it reduces hindsight bias *only* when predictions are accurate, but *increases* hindsight bias when predictions are inaccurate, as it provides reasons for believing that the outcome was actually predictable ("I should have seen it coming (even though I did not)").

Third, by examining the relation between SCT and hindsight bias using both correlational and experimental approaches, we more rigorously test a hypothesis that has only been informally explored previously (Pezzo, 2011). Moreover, we go beyond existing research by positing SCT as a mediator of the relation between narcissism and hindsight bias, as an explanation for hindsight after both accurate and inaccurate predictions, and by differentiating SCT from could counterfactual thinking. In so doing, our results provide empirical support for SCT as a distinct form of counterfactual thinking with its own nomological net.

Theory and Hypotheses

Narcissism, Prediction Accuracy, and Hindsight

During the past 30 years, behavioral scientists have examined narcissism and its consequences in non-clinical settings. Meta-analytic research has established discriminant and incremental validity of narcissism over and above the other dark triad traits (Machiavellianism

and psychopathology) and the Big Five (e.g., Grijalva & Newman, 2015; O'Boyle, Forsyth, Banks, & McDaniel, 2012). Of importance to management scholars, research has found that narcissists tend to perform poorly as leaders, exhibit overconfidence, and engage in risky decision making (Grijalva, Harms, Newman, Gaddis, & Fraley, 2015; O'Boyle et al., 2012). Because narcissists are prone to rise in organizational ranks (Campbell, Hoffman, Campbell, & Marchisio, 2011), this is clearly problematic for the organizations employing these individuals, for the employees reporting to them, and for all stakeholders impacted by their decisions.

While it is known that narcissism is related to poorer decision quality (Campbell et al., 2004; Chatterjee & Hambrick, 2007), it is unclear *why* this is the case. We suggest that the answer may lie in narcissism's trademark characteristic of self-enhancement (Morf, Horvath, & Torchetti, 2011). Narcissism is characterized by a view of the self as superior to others and a motivation for constant self-affirmation (Crowe, Sleep, Carter, Campbell, & Miller, 2018). When given the opportunity for promotion or to demonstrate their grandiose self, individuals with elevated levels of narcissism behave by self-enhancing; if there is a perceived threat to their superiority, they engage in strategies to protect their self-image (Horvath & Morf, 2009).

Self-related motivational processes, such as those mentioned above, are also important in understanding hindsight bias. For example, Mark and Mellor (1991) found that laid off workers thought post hoc that their dismissal was less predictable (i.e., showed less hindsight bias) than did survivors. Laid off workers may have perceived the layoff as less foreseeable in order to protect the self and avoid blame or regret for an event that negatively impacted them. Louie (1999) further investigated this issue experimentally and found that prediction accuracy impacted the hindsight bias. They found that people who chose to purchase stocks and were then told the stocks had increased (i.e., an accurate prediction) showed greater hindsight bias, whereas those

who were told the stocks had decreased (i.e., an inaccurate prediction) thought post hoc that the outcome was less foreseeable. Louie also found that people who made accurate predictions endorsed internal attributions (e.g., "I have knowledge in finance and economics"), whereas those who made inaccurate predictions endorsed external attributions ("There was little information provided on the risk of the opportunity"). This is in line with a self-enhancing and self-protecting interpretation, in which people explain accurate predictions through their own positive abilities but excuse inaccurate predictions (Critcher, Helzer, & Dunning, 2011).

Because narcissists tend to exaggerate self-enhancement after receiving positive feedback and tend to discount failure (Jordan & Audia, 2012), we expect narcissists and non-narcissists will react differently to accurate and inaccurate predictions. Consistent with this, Smalley and Stake (1996) found that narcissists receiving negative feedback tend to discredit the feedback provider and dismiss the feedback as being inaccurate. We argue that, when encountering an outcome that is consistent with their prediction, narcissists will exhibit greater hindsight bias than non-narcissists, as a way of bolstering their self-image. On the contrary, when confronted with an outcome counter to their prediction, narcissists will argue that it was *less* foreseeable than will non-narcissists, as a way of protecting their self-image. Thus, we propose:

> *Hypothesis 1: Prediction accuracy moderates the relationship between narcissism and hindsight bias, such that the relationship is positive when predictions are accurate, and negative when predictions are inaccurate.*

Narcissism and Should Counterfactual Thinking

Counterfactuals are thoughts on what would, could, or should have happened or been done differently (Markman, Karadogan, Lindberg, & Zell, 2009). The functional theory of counterfactual thinking (Roese & Epstude, 2017) states that these thoughts identify causal links

and prescriptions that support learning. Consider a manager hiring a candidate who ends up underperforming. If the manager realizes that a better decision could have been made (e.g., by using different pre-hiring information about the candidate), the manager learns an important lesson for future hiring decisions. SCT focuses on what *should* have been done differently (Li et al., 2011) and is related to violations of deontic standards (Cropanzano, Massaro, & Becker, 2017). In our example, the manager may think, in hindsight, they should have engaged in a more careful decision process, following the deontic standard of diligence.

Violating deontic standards is a key element and is what differentiates should from other types of counterfactuals such as could counterfactuals. Folger and Cropanzano (1998) argue that should counterfactuals have an element of blame that other counterfactuals do not possess, which make them particularly important when judging decisions. In self-relevant decisions (e.g., a manager who hires the wrong candidate), should counterfactuals involve some degree of self-blame. This, in turn, likely motivates people to 'ask why' (Wong & Weiner, 1981). This may be reflected in statements such as 'I should have hired the other applicant; she would have performed better' (Kahneman & Miller, 1986).

We argue that narcissism is negatively related to SCT because such thinking can threaten the self-image of narcissists.[3] Sanna, Chang, and Meier (2001) noted that self-enhancement is associated with fewer thoughts regarding potentially better outcomes. Roese and Olson (1993) found that individuals prone to using self-enhancement strategies avoided should counterfactuals (such as e.g., "I should have studied in order to get a better grade"). Thus, we expected that narcissists would be less likely to engage in SCT than would non-narcissists.

Hypothesis 2: Narcissism is negatively related to should counterfactual thinking.

A Moderated Mediation Model of Hindsight Bias

In a review of the hindsight bias literature, Pezzo (2011) argued that SCT has been largely ignored by existing research despite its apparent relevance. Counterfactual thinking and hindsight bias have common characteristics; for example, both are about the past and involve mental reconstructions (Hawkins & Hastie, 1990). However, the sign of the relationship between counterfactual thinking and hindsight bias likely depends on whether the outcome was accurately predicted (Roese & Vohs, 2012). We propose that when predictions are accurate, individuals who generate should counterfactuals—perhaps facilitated by their low narcissism—will show lower hindsight bias. For example, after a correctly predicted outcome despite a poor decision process, a hiring manager may think: "Even though the new employee's performance meets my expectations, I should have been more careful in my decision process; it was lucky the hire worked out." As Sherman stated, when individuals engage in counterfactual thinking, ''the past seems less inevitable: Other outcomes were clearly possible'' (1991: 182). Counterfactuals help disconfirm initial beliefs, which should reduce hindsight bias. Thus, if SCT arises in the presence of an accurate prediction, individuals would be less likely to fall prey to hindsight bias.

However, we expect the opposite pattern when predictions are inaccurate. In this case, people who engage in SCT may show *greater* hindsight bias. Roese and Olson (1993) argued that if decision makers cannot find a reasonable causal attribution to explain an unexpected outcome, they would perceive the outcome as unforeseeable. In contrast, SCT can provide causal explanations and attributions. For example, individuals engaging in such thinking may generate thoughts such as "I should have focused on the candidates' cognitive skills when making my decision. My inaccurate prediction occurred because I didn't consider the relevant information" (Roese & Olson, 2007). In so doing, they make the incorrect prediction more foreseeable in hindsight (i.e., exhibit greater hindsight bias). We therefore predict:

Hypothesis 3: Prediction accuracy moderates the relationship between should counterfactual thinking and hindsight bias, such that the relationship is negative when predictions are accurate, and positive when predictions are inaccurate.

Logically, integrating our arguments regarding the relations among narcissism, prediction accuracy, SCT, and hindsight bias leads to the following hypothesis.

Hypothesis 4: Overall, there is a second stage moderated mediation, such that narcissism has an indirect effect on hindsight bias through the interaction between should counterfactual thinking and prediction accuracy.

The entire model is shown in Figure 1. Study 1 provides an initial test of Hypotheses 1-4.

---Insert Figure 1 about here---

STUDY 1

METHOD

Participants

The sample size used in each study was determined based on a power analysis conducted in G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). We estimated the sample size needed based on a regression model with two predictors and their interaction, assuming an effect size of $f^2 = .05$ ($R^2 \approx .04$) for a single term, an alpha error of .05, and beta power of .80. This resulted in a sample size of 159 participants in each study to detect effects.

Participants consisted of 170 (134 females) undergraduate students recruited from a psychology participation pool and upper-level psychology courses at a large Midwestern university in the United States. Their ages ranged from 18 to 34 ($M = 19.52$, $SD = 2.14$). Eighty-eight percent were Caucasian. They received course credit or extra credit for their participation.

Design, Procedure, and Materials

This study consisted of an online survey followed by an in-person experimental session. Participants first completed a narcissism measure online along with the Big Five personality traits and demographic questions[5]. After completing the online survey, participants were able to sign up for the in-person study. In order to prevent participants from being primed during the second part of the study (the experimental task) by the questions asked in the first (e.g., the narcissism measure), participants were kept unaware that the online study and the in-person study were related, with consent given separately for each part.

Participants received a description of a realistic personnel selection case within a rug retail chain (taken from Slaughter, Bagger, & Li, 2006). Participants read that the organization recently lost one of its top sales associates and had narrowed a list of applicants down to two candidates. Participants were informed that their task was to use the provided information (including a summary of candidate personality profiles, scores on an intelligence test, results of a handwriting analysis, and results of unstructured interviews) to determine which candidate the organization should hire. After selecting one of the candidates, participants were informed that both candidates were ultimately hired and were provided with information regarding the subsequent performance of each candidate across several job dimensions as the manipulation of prediction accuracy. After the manipulation, participants completed a measure of hindsight bias.

Manipulation of Prediction Accuracy

Participants were randomly assigned to one of two prediction accuracy conditions. They were either told that the applicant they chose was the one who subsequently performed better (accurate prediction condition, $n = 81$) or that the applicant they chose subsequently performed worse (inaccurate prediction condition, $n = 89$). In Pohl's (2007) taxonomy of methods to study the hindsight bias, our design is classified as a hypothetical design with two different feedback

values. This method is particularly suitable for studies involving hindsight bias (Mark, Boburka, Eyssell, Cohen, & Mellor, 2003).

As a manipulation check, following Louie (1999), we asked participants the degree to which their initial expectations matched the actual performance of the applicant. Response options ranged from 1 (*My expectations did not match with what happened*) to 7 (*My expectations matched with what happened*). The point-biserial correlation between the manipulation and its check was .94. Thus, the manipulation was successful.

Furthermore, to ensure participants read and comprehended the case description, they were asked to recall information about the case—five questions in total. For example, participants were asked which candidate had a higher level of education, who was older, and who scored higher on various selection instruments. On average, participants got 97% of the questions correct, indicating they understood and attended to the necessary information.

Measures

***Narcissism*.** We used Raskin and Terry's (1988) NPI-40 measure to assess narcissism. It consists of 40 forced-choice dichotomous items in which participants indicate which of two statements they believe is closer to their own feelings about themselves. Sample pairings include, "I like to be the center of attention" versus "I prefer to blend in with the crowd" and "I am more capable than other people" versus "There is a lot that I can learn from other people." We used an overall measure of narcissism by averaging responses across the 40 items. Thus, the minimum theoretical value is 1 and the maximum is 2.

***Hindsight Bias*.** To assess hindsight bias, we adapted four items (1: *strongly disagree* to 5: *strongly agree*) from Nestler, Blank, and Egloff (2010). Items were "The best performer in this case study was difficult to predict" (reverse-coded); "From the pre-hire information, I had a

clear idea of which candidate would perform better;" "The outcome of this case was foreseeable;" and "I knew it all along which candidate would perform better."

Big Five Personality Traits. In our analyses, we controlled for the Big Five personality traits (Costa & McCrae, 1992). We did so because narcissism is related to some of the Big Five traits (Grijalva & Newman, 2015; O'Boyle et al., 2012); thus, researchers (Kausel & Slaughter, 2011) suggest controlling for the Big Five when testing hypotheses including other personality traits. We used Saucier's (1994) Mini-Markers (1994) inventory, which includes eight items each and a 9-point scale (1 = *strongly disagree*, 9 = *strongly agree*).

Should Counterfactual Thinking. We assessed SCT using four items based on Pierro et al. (2008) and Li et al.'s (2011) measures. The four items (1 = *strongly disagree* to 5 = *strongly agree*) reflected what participants believed they should have done while making their decision. Items were "I should have spent more time examining the pre-hire information," "I should have read the case more carefully," "I should have thought more thoroughly" and "I shouldn't have dismissed some information that I thought was irrelevant."

RESULTS AND DISCUSSION

Scale descriptives, intercorrelations, and reliability estimates (coefficient alpha) are presented in Table 1. We first conducted a multiple regression, which included hindsight bias as the dependent variable, and narcissism, prediction accuracy, and their interaction as independent variables. As Table 2 shows, the interaction between accuracy and narcissism on hindsight bias was significant, even when controlling for the Big Five, as well as their interactions with prediction accuracy. Simple slope analyses, shown at the bottom left of Table 3, revealed that the relationship was positive when predictions were accurate ($b = 1.25$, $SE = .48$, $t = 2.62$, $p < .01$); however, it was non-significantly negative when predictions were inaccurate ($b = -.18$, $SE = .48$,

t = -1.70, p = .09; see also Figure 2, top panel). Thus, narcissists perceived outcomes following accurate predictions as more foreseeable than non-narcissists, but narcissists and non-narcissists did not differ significantly when their predictions were inaccurate. Note that whereas in many studies, simple slope analyses are based on arbitrary +/-1 standard deviation cutoff values of the moderator, in this and subsequent studies the moderator, predictive accuracy, is a dichotomous variable and the simple slopes are calculated at either the low or high value of the moderator, meaning that the simple slopes are substantive and not arbitrary.

We next conducted a multiple regression with SCT as the dependent variable, and narcissism and accuracy as independent variables. Narcissism was negatively related to SCT (β = -.22, $p < .01$), supporting Hypothesis 2. To test Hypothesis 3, we conducted a multiple regression that included hindsight bias as the dependent variable, and SCT, accuracy, and their interaction as independent variables. As Table 3 (Model 2) shows, the SCT x accuracy interaction term predicted hindsight bias. Figure 2 (bottom panel) depicts the interaction by estimating the marginal effects of the interaction component (the simple slopes) while controlling for the other variables in the Model 2 (Cameron & Trivedi, 2010). This was conducted by using the *margins* and *marginsplot* post-estimation commands in Stata (Williams, 2012). Using Hayes and Matthes' (2009) procedure, simple slope analyses revealed that SCT and hindsight bias were negatively related when predictions were accurate (b = -.25, SE = .09, t = -2.83, $p < .01$), and positively related when they were inaccurate (b = .18, SE = .08, t = 2.19, $p < .05$).

---Insert Table 1, Table 2, Table 3 and Figure 2 about here---

Finally, utilizing Hayes' (2018) conditional process model number 15, we estimated the indirect effect of narcissism on hindsight bias through SCT at different values of accuracy. Consistent with Hypothesis 4, as shown in the bottom right of Table 3, the indirect effect was

positive when predictions were accurate and negative when predictions were inaccurate.

This study gave initial support to our proposed model, except that narcissists did not show significantly less hindsight bias when their predictions were inaccurate. Although our overall model was largely supported, the study is limited in that the sample consisted of undergraduate students who likely have little experience in hiring decisions. Thus, in Study 2, we sampled employed individuals with hiring experience to strengthen generalizability and provide a replication of our findings in Study 1.

An examination of the relationship between narcissism and hindsight bias is incomplete, however, without a consideration of the impact of the hindsight bias on subsequent learning, as such learning will undoubtedly impact future decisions. As such, in Study 2 we included a measure of perceived learning to allow for an examination of the relationships between narcissism, SCT, and hindsight bias, and their relations with perceived learning[4].

The hindsight bias is typically considered as having deleterious consequences for learning (Arkes, 2013; Fischhoff, 2001). For example, Arkes (2013) noted the tendency for hindsight bias to occur during clinicopathologic conferences, events in which a physician is provided with a medical case and asked to provide a likely diagnosis, after which the pathologist who performed the autopsy for the case in question provides the correct diagnosis. Arkes argued that the conference, intended to serve as an educational experience for attendees, often results in attendees falling prey to the hindsight bias, believing the correct diagnosis was obvious. Rather than learning from the situation, attendees criticize the physician who inaccurately diagnosed the patient (the typical result given particularly challenging cases are chosen, where misdiagnosis is likely). Thus, it is believed that the hindsight bias serves as a likely impediment to subsequent learning.

The detrimental effect of the hindsight bias on learning, however, is likely moderated by prediction accuracy. When predictions are accurate, the tendency to not perceive learning has occurred is likely exacerbated. With the outcome matching the initial prediction, there is no reason the decision maker will view the outcome as anything other than a confirmation of what was already known. As such, he or she will likely not perceive learning has occurred. When predictions are inaccurate, however, the individual making the decision will face the realization that his or her initial decision was wrong, and be aware of another, correct option. Thus, he or she will perceive learning has occurred.

Hypothesis 5: Prediction accuracy moderates the relationship between hindsight bias and perceived learning, such that the relationship is negative when predictions are accurate, and positive when predictions are inaccurate.

As noted earlier, per the tenets of the functional theory of counterfactual thinking (Roese & Epstude, 2017), engaging in SCT is likely to support learning given it serves to identify causal links and prescriptions. Thus, SCT should counter the effects of the hindsight bias and allow for subsequent learning. Based on the theoretical link of narcissism to self-enhancement and protection motives (Horvath & Morf, 2009), narcissists, however, are unlikely to benefit from the self-critical processes of SCT. Thus, we posit that narcissists fail to engage in SCT, thereby limiting their learning both in situations when they were right – leading to increased hindsight bias – *and* when they were wrong – leading to reverse hindsight bias (i.e., arguing the outcome was more unforeseeable than it was).

Hypothesis 6: Should counterfactual thinking is positively related to perceived learning.

Our final hypothesis is an integration of our previous hypotheses to explain the relationship between narcissism and perceived learning. Namely, we expect that narcissism is indirectly

related to perceived learning through a) should counterfactual thinking (per Hypotheses 2 and 6) and b) the hindsight bias, as moderated by prediction accuracy (per Hypothesis 1) and partially mediated through an interaction between should counterfactual thinking and prediction accuracy (per Hypotheses 3 and 4), with the relationship between hindsight bias and perceived learning once again moderated by prediction accuracy (per Hypothesis 5). The entirety of Figure 1 reflects this amalgamation of hypotheses.

Hypothesis 7: Narcissism is indirectly related to perceived learning through a) should counterfactual thinking and b) the hindsight bias, as moderated by prediction accuracy and partially mediated through an interaction between should counterfactual thinking and prediction accuracy, with the relationship between hindsight bias and perceived learning moderated by prediction accuracy.

STUDY 2

METHOD

Participants

The initial sample were 273 (129 female) working adults (M_{age} = 41.47; *SD* = 11.74). They were recruited as follows. First, we recruited participants (n = 74) from our professional networks using snowball sampling. Individuals in positions that involved making hiring decisions were contacted via email and asked to participate. We also asked those individuals to forward the recruitment email to other individuals with hiring experience. Participants in the snowball subsample were not compensated but offered a copy of the final paper. Second, we recruited participants (n = 199) from Prolific, an online survey research system. We specified the following selection criteria: Participants had to be US citizens, have experience with hiring decisions, be either full-time or part-time employed, and have an approval rate of at least 95% on

Prolific.

Both samples had a diverse range of occupations, from account manager to human resource consultant. Around 32 percent of the participants' descriptions of their occupations included the word 'manager', 'executive', 'chief' or 'director.' There were some differences across these two samples. The first sample was somewhat older ($M_{sample1}$ = 45.37, $SD_{sample1}$ = 11.47; $M_{sample2}$ = 40.40; $SD_{sample2}$ = 11.54; $t(271) = 3.02$, $p < .05$) and included more women (sample 1, 62.12%; sample 2, 41.19%; χ^2 (1) = 8.11, $p < .01$) than the second sample. However, there were a similar number of managers (using the above rule) in the first (35%) and second samples (31%) and no significant differences were detected in this regard, χ^2 (1) = .45, p = .50.

Participants were paid USD 3.34 for an estimated 20 minutes of participation (estimated hourly payment of USD 10; actual payment, USD 11.90). When asked, "How experienced are you with hiring decisions?" the average response (1 = *no experience* to 4 = *extremely experienced*) was 2.94 (*SD* = 0.83). Seventy-nine people (29% of the sample) reported being "extremely experienced." Nine participants (3.3%) reported "no experience." They were removed from the sample. Thus, the final sample included 264 participants (124 female; M_{age} = 41.62; *SD* = 11.70) with an average hiring experience of 3.01 (*SD* = 0.77) in the above scale.

Design, Procedure, and Materials

The design and procedure of this study was similar to Study 1, with two main design differences. First, we added a measure of perceived learning. Second, participants completed the individual differences measures immediately after the hiring task.

Narcissism, SCT, hindsight bias, Big Five, and perceived learning.[4] Hindsight bias, narcissism, the Big Five traits, and SCT were measured as in Study 1. Perceived learning was measured with three items based on Witt and Wheeless' (2001) measure. Items (1: *strongly*

disagree to 5: *strongly agree*) were "I learned how to make better hiring decisions from this task," "I could improve my hiring decision making through this task," and "Learning about the performance of the two candidates helped me improve my decision making."

Manipulation and comprehension check items. We used the same manipulation and manipulation check as in Study 1. The manipulation was successful: The point-biserial correlation between the manipulation and its check was .92. Also, participants got on average 82% of the recall questions correct, indicating they attended to the relevant information.

RESULTS AND DISCUSSION

Test of Hypotheses

Scale descriptives, intercorrelations, and reliability estimates are presented in Table 4. CWe first conducted a multiple regression with hindsight bias as outcome, and narcissism, prediction accuracy, and their interaction as the predictors. As Table 2 (right panel) shows, the interaction between prediction accuracy and narcissism on hindsight bias was significant, even when controlling for the Big Five and their interactions with prediction accuracy. Simple slope analyses revealed that, as predicted, the relationship was positive for accurate predictions (b = .90, SE = .41, t = 2.20, $p < .05$) and negative for inaccurate predictions (b = -1.33, SE = .41, t = -3.25, $p < .01$). Thus, consistent with Study 1, narcissists perceived outcomes following accurate predictions as more foreseeable than did non-narcissists. Unlike Study 1, but consistent with our hypothesis, narcissists perceived outcomes following inaccurate predictions as less foreseeable than did non-narcissists. Thus, Hypothesis 1 was supported.

Supporting Hypothesis 2, we found that narcissism was negatively related to SCT (β = -1.01, $p < .001$). Next, we tested Hypothesis 3 with a multiple regression that included hindsight bias as the outcome, and SCT, prediction accuracy, and their interaction as predictors. The

interaction between SCT and prediction accuracy significantly predicted hindsight (β = -0.70, p < .001; ΔR = .06). Simple slope analyses revealed that while the relationship between should counterfactuals and hindsight bias was positive for inaccurate predictions (b = .25, SE = .07, t = 3.39, p < .001), it was negative for accurate predictions (b = -.36, SE = .09, t = -4.05, p < .001).

---Insert Tables 4 and 5 about here---

Following this, we tested Hypothesis 4, using Hayes' (2018) formulas and macro. Table 5 (left panel) shows a summary of the findings. As shown at the bottom left of Table 5, the indirect effect of narcissism through SCT on hindsight bias was negative when the prediction was inaccurate and positive when the prediction was accurate.

We then examined Hypotheses 6 and 7, which involved perceived learning as an outcome. First, as Table 4 shows, the bivariate correlation between narcissism and perceived learning was negative. Second, consistent with Hypotheses 6, SCT was positively related to learning. Third, we tested the whole model using learning as the dependent variable, SCT and hindsight bias as mediators, narcissism as independent variable, and prediction accuracy as moderator. We were interested in testing whether SCT and hindsight bias serially mediated the indirect effect of narcissism on learning; but this indirect would conditional to (i.e., moderated by) prediction accuracy (Hypothesis 7). As shown at the bottom right of Table 5, the indirect effect of narcissism on learning through SCT and hindsight bias (Narcissism → SCT → HB → Learning) was negative when predictions were inaccurate; however, it was not significant when predictions were accurate. In other words, narcissists were less likely to learn than non-narcissists due to SCT and hindsight bias, but only after inaccurate predictions.

Discussion

Results from Study 2 provided additional support for our proposed model. In addition to

replicating results from Study 1 (with the exception of finding full support for Hypothesis 1 rather than partial support), generalizability is strengthened through the working adult sample with hiring experience. Further, several interesting results emerged from examining perceived learning. First, non-narcissists felt they learned more from their decision than did narcissists. Second, and consistent with the functional theory of counterfactual thinking (Roese & Epstude, 2017), participants who engaged in more SCT reported more learning. Finally, the reason non-narcissists perceived they learned more from their decisions was because, after inaccurate predictions, they engaged in more SCT and more hindsight bias. Stated differently, focusing on narcissists, they tend learn less than non-narcissists because after failures they are less likely to engage in critical thinking, and more likely to argue that 'nobody would have predicted it.' However, this serial mediation was not significant after accurate predictions.

An unresolved issue from both Study 1 and Study 2 is whether SCT specifically is mitigating hindsight bias. In Study 3 we examine this issue by examining *could* counterfactual thinking as an alternative predictor. We expect that should, but not could, counterfactual thinking will predict hindsight bias. The reason is that SCT implicates allocating blame ("I should have known this") more strongly than could counterfactual thinking ("I could have known this") and thus links theoretically to the self-protection motives involved in both hindsight bias and narcissism (Campbell et al., 2011; Pezzo, 2011; Roese & Vohs, 2012).

STUDY 3

METHOD

Participants

Participants consisted of 91 individuals (32 females) responsible for hiring decisions in their organizations. They were enrolled in executive masters' programs related to human

resource management and business administration at a large Latin American university. Participants reported an average age of 33.44 (*SD* = 4.60) years. When asked, "How experienced are you with hiring decisions?" the average response on a four-point scale (1 = *no experience* to 4 = *extremely experienced*) was 3.19 (*SD* = 0.74). Thirty-five people (39% of the sample) reported being "extremely experienced." No participant reported having "no experience." As an incentive for participation, participants were entered in a lottery in which they could win a prize of approximately $100, which was randomly awarded.

Design, Procedure, and Measures

The design of this study was identical to Study 1, except for two differences. First, we measured *could counterfactual thinking* (CCT) in addition to SCT. Second, because the number of participants we could recruit from our pool was limited (due to enrollment estimates in the executive masters' programs), based on the available sample size and a power analysis we decided to only test Hypothesis 3 in this study and did not measure narcissism[5]. Both the case and the measures were translated from English to Spanish and back-translated by two bilinguals as suggested by van de Vijver and Hambleton (1996). Some aspects of the context (e.g., location of the organization, candidates' names) were modified for the Spanish version.

Hindsight bias and SCT were measured with the same measures as in Study 1. Following Li et al. (2011), CCT was measured with four items, which were very similar to the SCT measure. The key difference was that we replaced the word 'should' with the word 'could' in these questions, which were presented in italics in each measure.[6] Because the last item of the SCT measure ("I shouldn't have dismissed some information that I thought was irrelevant") seemed awkward when using 'could', we used a different wording for this item: "I could have used the provided information more thoroughly."

RESULTS AND DISCUSSION

Scale descriptives, intercorrelations, and reliability estimates are presented in Table 6. We conducted three confirmatory factor analyses (CFA) to provide confidence in our counterfactual thinking measures. Three participants were excluded from these analyses because they had missing values. The first CFA used a single-factor model including all items of all three variables (SCT, CCT, and hindsight bias). This model did not fit the data well, χ^2 (54) = 279.69, $p < .001$, CFI = .647, RMSEA = .219, SRMR = .165, AIC = 3,323.69. The second CFA used two factors: One including all counterfactual (SCT and CCT) items and the other including the hindsight items. The fit of the two-factor model was substandard, χ^2 (53) = 109.44, $p < .001$, CFI = .912, RMSEA = .111, SRMR = .065, AIC = 3155.45. The difference in fit between the two-factor and one-factor model using all items was significant, such that the two-factor model fit better, χ^2 (3) =170.25, $p < .001$. The third CFA used a three-factor model with CCT, SCT, and hindsight bias items. This model fit the data well, χ^2 (51) = 53.50, $p = .378$, CFI = .996, RMSEA = .024, SRMR = .043, AIC = 3,103.51. The difference in fit of the two-factor and three-factor models using all items was significant, with the more complex three-factor model fitting the data significantly better, χ^2 (2) =55.94, $p < .001$.

We then conducted a multiple regression analysis. As shown in Table 7, the accuracy x SCT term was significant but the accuracy x CCT term was not. Simple slope analyses showed that the SCT–hindsight bias relationship was negative for accurate decisions (b = -.53, SE = .13, t = -3.71, $p < .001$) and positive for inaccurate decisions (b = .41, SE = .13, t = 3.13, $p < .01$), supporting Hypothesis 3 and consistent with Studies 1 and 2.

---Insert Table 6 and Table 7 around here---

Results from Study 3 replicated the interaction between SCT and prediction accuracy on hindsight bias in a sample of highly experienced practitioners. The results also show that the relation between prediction accuracy and hindsight bias can be attributed to *should*, rather than *could*, counterfactual thinking. A limitation of both studies, however, is that indirect effect analyses with non-manipulated and endogenous mediators are prone to biased causal estimates (Bullock, Green, & Ha, 2010). To better ascertain whether SCT is indeed having an effect on hindsight bias, in Study 4 we manipulated this variable (Imai, Tingley, & Yamamoto, 2013).[7]

STUDY 4

METHOD

Participants

Two hundred and two undergraduate psychology students at a large Midwestern university in the United States participated in exchange for course credit. Over half were female (59%) and most were Caucasian (81%). Their ages ranged from 18 to 49 (M = 20.52; SD = 3.34).

Design, Procedure, Manipulation, and Measures

The design of this study was a 2x2 factorial between-subjects design, with two independent variables: SCT prime (SCT vs. control) and prediction accuracy (accurate vs. inaccurate). The procedure was very similar to the laboratory session in Study 1. We used the same materials and measures as in the previous studies, with the SCT measure serving as manipulation check for the priming task. The key difference in Study 4 was a priming task aimed at manipulating SCT (see below). This task was conducted after participants chose the candidate, but before we told them the outcome.

We used a scrambled sentence priming task to manipulate SCT. Researchers have used this task to manipulate constructs ranging from regret (Reb & Connolly, 2009) to moral

standards (Welsh & Ordóñez, 2014). Bargh, Lee-Chai, Barndollar, Gollwitzer, and Trötschel (2001) argue that priming works by activating (priming) nonconscious goals. These activated nonconscious goals then impact behavior in the same way as consciously activated goals. Furthermore, they argue that nonconsciously primed goals can affect tasks such as forming judgments about other people, a key aspect of making hiring decisions. Indeed, Bargh et al. (2001) demonstrate that simply priming nonconscious goals through a sentence unscrambling task can impact performance, cooperation, and the impressions people form about others. Furthermore, the activation-striving model suggests that self-discrepant (i.e., undesirability of the end state) priming impacts goal activation (Sela & Shiv, 2009). Because SCT inherently focuses thinking on undesirable end states (e.g., "I should have done something differently"), a sentence unscrambling task would be expected to prime SCT in an impression formation task (i.e., regarding the evaluation of others in a selection context). Although some social psychology researchers have questioned the replicability of priming tasks (see Cesario, 2014), recent studies have supported their effects on behavior. For example, based on a meta-analysis of 133 studies, Weingarten et al. (2016) found that, with sufficient power, priming tasks involving incidentally presented words had an effect of $d = .35$ on behavior—a relatively small but robust effect.

Participants had to construct six grammatically correct four-word sentences, using a set of five randomly positioned words. Following Bargh et al. (2001), participants in the SCT condition constructed sentences in which the word *should* was involved (e.g., "try Sue harder flat should" unscrambled into "Sue should try harder" [unused word: flat]). In contrast, in the control condition the words were neutral (e.g., "cream Sue ice flat bought" unscrambled into "Sue bought ice cream" [unused word: flat]). The full measure is available from the first author.

RESULTS AND DISCUSSION

Manipulation and Comprehension Check Items

As in Study 1, we asked participants five questions about the case. On average, participants answered 93% of the questions correctly, indicating they understood and attended to the necessary information. Individuals in the SCT condition reported having significantly more should counterfactual thoughts (M = 3.00, SD = 1.10) than those in the control condition (M = 2.59, SD = 1.02), $t(200) = 2.56$, $p < .05$, $d = .40$. The point-biserial correlation between the accuracy manipulation and the question asking for the match between their initial expectations and actual performance was .90. Thus, both manipulations were successful.

The Effect of SCT on Hindsight Bias

After examining descriptives, intercorrelations, and reliability estimates (Table 8), we conducted a multiple regression analysis. In Table 9, we include two models: Model 2 controls for narcissism; Model 1 does not. We report below the results of Model 2. Table 9 shows that the SCT manipulation interacted with accuracy to affect hindsight bias, supporting Hypothesis 3. Simple slope analyses revealed that, when compared to the control condition, the manipulation of SCT reduced hindsight bias following accurate decisions (b = -.53, SE = .20, t = -2.61, $p <$ .01); following inaccurate decisions, the manipulation increased hindsight bias (b = .51, SE = .20, t = 2.53, p <.05). Figure 3 depicts the results of the analysis.

---Insert Tables 8 and 9 and Figure 3 about here---

Additional Analyses

We conducted further analyses to examine (a) the role of narcissism in explaining hindsight bias in this sample and (b) whether the SCT manipulation had an effect among narcissists. First, we analyzed whether the narcissism x accuracy interaction replicated among only those in the control condition (n = 108). The interaction was indeed significant (b = 2.64, t =

3.00, $p < .01$; $\Delta R^2 = .039$). Simple slope analyses show that the relationship between narcissism and hindsight bias was positive when predictions were accurate ($b = 1.92$, $SE = .57$, $t = 3.39$, $p < .01$), but non-significant for inaccurate predictions ($b = -.71$, $SE = .67$, $t = -1.06$, $p = .29$).

Second, we examined whether the SCT manipulation had an effect among only those with higher levels of narcissism. Essentially, we conducted the same analyses as those reported with the whole sample above, but restricted to those ($n = 98$) who scored above the mean in the NPI-40 (i.e., scored more than 1.39). As in the main analyses, the SCT manipulation interacted with accuracy ($\beta = -.45$, $t = -3.45$, $p < .001$; $\Delta R^2 = .082$). Compared to the control condition, SCT reduced hindsight bias for accurate decisions ($b = -.83$, $SE = .31$, $t = -2.70$, $p < .01$), but increased it for inaccurate decisions ($b = .62$, $SE = .28$, $t = 2.13$, $p < .05$).

Discussion

In Study 4, we established through an experimental manipulation that SCT was indeed having a causal effect, increasing confidence in the internal validity of our findings. Results confirm that SCT interacts with prediction accuracy to affect hindsight bias. This interaction held when we restricted our analyses to participants high on narcissism. Of note, a limitation of this study is that it was likely underpowered given Weingarten et al.'s (2016) conclusion from studies within their meta-analysis that "the typical behavior priming study was severely underpowered to detect effects" and "obtaining a power of .80 requires a minimum sample size of $n = 143$ participants per condition" (p. 489). Thus, while our study allows for more confident causal inference to be drawn, further research is needed to ensure replication of our results.

GENERAL DISCUSSION

In the present research, we examined whether hindsight bias could present a possible explanation for the finding that narcissism is related to poorer decision quality. Secondarily, we

examined SCT as a potential explanation for the relationship between narcissism and hindsight bias. We drew on a motivational perspective as the theoretical link between narcissism and hindsight bias. On this basis, we posited that narcissists, because of their heightened self-enhancement and self-protection motives, are prone to both stronger *and* weaker hindsight bias, depending on whether hindsight flatters them or implicates failure and blame ("I should have known it, but didn't"). More specifically, we expected that prediction accuracy would moderate the relation between narcissism and hindsight bias: Narcissists show stronger hindsight bias when their predictions are accurate; however, when their predictions are inaccurate, narcissists instead show weaker hindsight bias, arguing that the outcome was not foreseeable.

Moreover, we posited that SCT acts as a mediating mechanism linking narcissism to hindsight bias. As SCT involves self-critical thinking, we expected that narcissists would be less likely to engage in it because of their intense self-protection motive. Moreover, because it questions the obviousness of events, we expected that SCT is negatively related to hindsight bias, when predictions are accurate, as this is when the tendency for hindsight bias is strongest.

We conducted four separate studies, the results of which provided overall support for our predictions. In both Study 1 (using undergraduate students) and Study 2 (using employed individuals with hiring experience), we found that narcissists showed greater hindsight bias than non-narcissists when their predictions were accurate. However, only Study 2 found that narcissists showed less hindsight bias than non-narcissists following inaccurate predictions. Both studies showed support for a second-stage moderated mediation model in which narcissists were less likely to engage in should counterfactuals; and the relation between SCT and hindsight bias was moderated by prediction accuracy such that it was negative when predictions were accurate and positive when predictions were inaccurate.

In Study 3, we ruled out could counterfactual thinking as an alternative explanation for the relationship between narcissism and hindsight bias, providing further support for our integrative mode. Finally, in Study 4, we manipulated SCT and provided experimental evidence with high internal validity that SCT indeed interacts with prediction accuracy in the way hypothesized. Below, we discuss theoretical and practical implications of our research.

Narcissists, Self-Critical Processes, and Managerial Decisions

Narcissism has received considerable attention in the media—not the least because of suspicions that current US president Trump is a narcissist—as well as in scholarship. Much progress has been made in advancing our understanding of the costs yet also benefits of narcissism, as research has focused on outcome variables such as aggression, interpersonal difficulties, and use of antisocial tactics (Muris, Merckelbach, Otgaar, & Meijer, 2017); leadership effectiveness (Grijalva et al., 2015); and job performance and counterproductive work behaviors (O'Boyle et al., 2012). Much less is known, however, about the processes through which narcissism influences more distal outcomes such as organizational performance. Addressing this gap, our research highlights the important role the cognitions of narcissists play. Specifically, we found that narcissists were less likely to retrospectively believe they should have done something differently than non-narcissists during their decision process. This was the case both when the predictions of decision outcomes turned out to be accurate as well as inaccurate.

Our findings help explain previous findings and have important practical implications. Given their heightened confidence, narcissists are prone to rise in organizational ranks (Campbell et al., 2011). However, this may be counterproductive for firms (Grijalva et al., 2015; O'Boyle et al., 2012). The question remains why this is the case. Our studies suggest narcissists are especially prone to blindly feel like winners after success. Moreover, they do not engage in

self-critical processes that can have positive consequences for future decisions. This is similar to Gino and Pisano's idea that some managers "attribute the success of their organizations to their own insights and managerial skills and ignore or downplay random events or external factors outside their control" (2011: 69). They labeled this as the failure-to-ask-why syndrome, the tendency not to examine the reasons of high performance systematically. It seems that narcissists are particularly disposed to the failure-to-ask-why syndrome when judging their decision-making processes. Given the importance of learning from both failure and success among executives (Gino & Pisano, 2011), this may also help explain the finding the narcissists in high organizational ranks may tend to perform poorly. A tentative practical implication is that organizations should avoid having narcissists in positions in which learning from outcomes—especially from outcomes based on accurate decisions—is important.

The Role of Should Counterfactual Thinking and How to Elicit It

Previous research had found a positive relationship between prediction accuracy and hindsight bias (Louie, 1999) such that outcomes that were accurately predicted are perceived as more foreseeable and outcomes that were not predicted are perceived as less foreseeable. We found that prediction accuracy also served as a moderator of the relation between SCT and hindsight bias. Decision makers who made accurate predictions and engaged in SCT were less likely to perceive the outcome stemming from their decision as foreseeable. Participants who made inaccurate predictions and engaged in SCT were less likely to perceive the subsequent (unexpected) outcome as unforeseeable. These findings, when combined with Louie's (1999), suggest that managers who generate should counterfactual thoughts are less likely to blame the situation or deny responsibility after making mistakes.

Previous research has identified priming as a way to induce behavior (Weingarten et al.,

2016). For example, Latham and Piccolo (2012) primed achievement of call center employees using a backdrop photograph of a person winning a race. In Study 4, we showed that SCT could be triggered indirectly, not just explicitly. Organizational culture scholars (e.g., Smircich, 1983) argue that symbols can affect how organization's members behave. The use of symbols, images, or stories may help prime SCT. For example, images showing multiple product development paths could enhance this type of thinking. As such, organizations may benefit by enhancing SCT of employees through explicit and implicit elicitation processes.

Inaccurate Predictions, Hindsight Bias, and the Inability to Learn from Experience

Finally, our results also have implications for the hindsight bias literature. The hindsight bias is generally regarded as having harmful consequences to learning from experience (Arkes, 2013; Fischhoff, 2001). Our results suggest this may be true only when assessing outcomes that reflect inaccurate predictions. We suggest that, for inaccurate predictions, people who fail to perceive outcomes as foreseeable are less likely to improve and learn from experience. This is because they tend to blame the situation, not themselves (Louie, 1999), and appear to learn less (per our findings in Study 2). Consider again the financial crisis of 2007–2010. Despite many Wall Street bankers claiming the financial crisis was impossible to predict, the Financial Crisis Inquiry Commission (2011) concluded that the crisis was in fact foreseeable and avoidable. Thus, perceiving an inaccurately predicted outcome as unforeseeable implies an external attribution; as such, lessons are not learned and the decision-making process remains unchanged.

Consistent with this view, we found that non-narcissists who engaged in SCT were also *more* likely to perceive outcomes that were not accurately predicted as foreseeable (i.e., showed *more* hindsight bias). Our results support the view of only a handful of researchers who argue that the hindsight bias does not always result in important lessons missed (e.g., Hoffrage,

Hertwig, & Gigerenzer, 2000). As Hoch and Loewenstein noted "it appears that there are a variety of situations where subjects suffer (…) hindsight while concurrently extracting diagnostic information from outcome feedback" (1989: 618). We suggest that one important situation is following inaccurate predictions.

Strengths, Limitations, and Future Research

Our research has a number of strengths as well as limitations that point to future research directions. A strength is the replication of findings across four studies using different designs and samples in which we also ruled out important alternative explanations by including control variables for both the independent and the mediator variable. Further, our experimental approach allows greater confidence in causal inferences. In Study 4, we manipulated the moderator (prediction accuracy) *and* the mediator (SCT), a practice that is recommended by methodologists but rarely done. However, we did not manipulate narcissism. While narcissism is most frequently operationalized as a personality trait, some studies have demonstrated that state levels of narcissism can be induced (e.g., Kausel, Culbertson, Leiva, Slaughter, & Jackson, 2015). Thus, our causal conclusions may have been further strengthened had we used a 2x2x2 design and manipulated narcissism. We offer this as a potential avenue for future scholars to explore.

In addition, our emphasis on strong causal inference led us to use a hypothetical scenario to have control over the manipulation of prediction accuracy. To help preserve the internal validity of this research, we used the same decision task in all four studies. While we used samples of experienced hiring managers (Studies 2 and 3), doing so can only partly address concerns about external validity and generalizability. Thus, future research should test whether our findings can be replicated in other contexts such investment, product design, and marketing strategy predictions. Also, such research should study actual predictions and their outcomes,

ideally using a longitudinal design. This would allow researchers to learn whether organizations led by narcissists who make accurate predictions may engage in subsequent mistakes over time, failing to learn from success. Finally, and related to this notion of failing to learn, in Study 2 we provided an examination of the impact of hindsight bias, SCT, and narcissism on perceived learning. It could be argued that it is the perception of learning (vs. actual learning) that matters for subsequent behaviors. If individuals perceive they have learned from a situation, they are likely to utilize different strategies and incorporate information they believe they learned. If they do not believe learning occurred, they are likely to utilize the same decision-making strategies as before, possibly falling prey to the same mistakes. Nevertheless, future research should examine how actual learning may differ from perceived learning with regard to these various elements.

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FOOTNOTES

1. According to Blank, Nestler, Collani, and Fischer (2008), hindsight bias can be divided into three different albeit related phenomena: *inevitability* (the belief that an event was determined to occur), the *I said it would happen* effect (recalling an earlier prediction biased by an outcome), and *foreseeability* (the belief that one could have predicted an event). In general, however, when researchers refer to the hindsight bias they are focusing on foreseeability, which is also the focus of our research. As hindsight bias is the much more widely understood term, we will refer to this higher-level construct throughout. This said, at times we use other terms (e.g., foreseeability) when doing so aids in reader ease and/or comprehension.

2. Although narcissism is conceptualized and operationalized as a trait that exists along a continuum, for the sake of brevity and in line with previous work (Campbell, Goodie, & Foster, 2004), we use the terms *narcissists* and *non-narcissists* to refer to people high and low on narcissism.

3. An important distinction in counterfactual thinking is its reference (Roese & Olson, 1993). In the example of the manager and his/her relative, counterfactual thinking is self-referenced, because it references a decision by the same individual who is thinking about this event. However, counterfactual thinking can also be other-referenced—it may reference a decision made by a different individual. Following the above example, the rejected, more competent candidate may think about the manager's decision and how he or she should have done something different. In the current paper, to simplify, we use the term 'should counterfactual thinking' to refer to self-oriented thoughts.

4. We used a measure of perceived learning rather than actual learning because actual learning would be difficult, if not impossible, to ascertain in the working adult sample with hiring experience and design we employ in this study. While this distinction is important, perceived (vs. actual) learning remains important and relevant for the topic at hand, though results should be interpreted accordingly.

5. In Studies 1 and 2 we found a stronger effect of SCT x accuracy on hindsight bias than narcissism x accuracy on hindsight bias. Based on revised parameters, our power analysis for this study changed such that we needed n = 115 (vs. n = 159 previously) to achieve power of .80. Thus, Study 3 remains underpowered, but not by as much as our previous power analysis would suggest. We urge readers to interpret our findings from this study with this in mind.

6. The relevant words in Spanish are *puedo* (could) and *debo* (should).

7. Some authors call the procedure of manipulating the independent variable in one study and the mediation variable in a second study, "double randomization design" (Pirlott & MacKinnon, 2016) or "experimental-causal-chain design" (MacKinnon, Fairchild, & Fritz, 2007).

Figure 1

Overall Conceptual Model

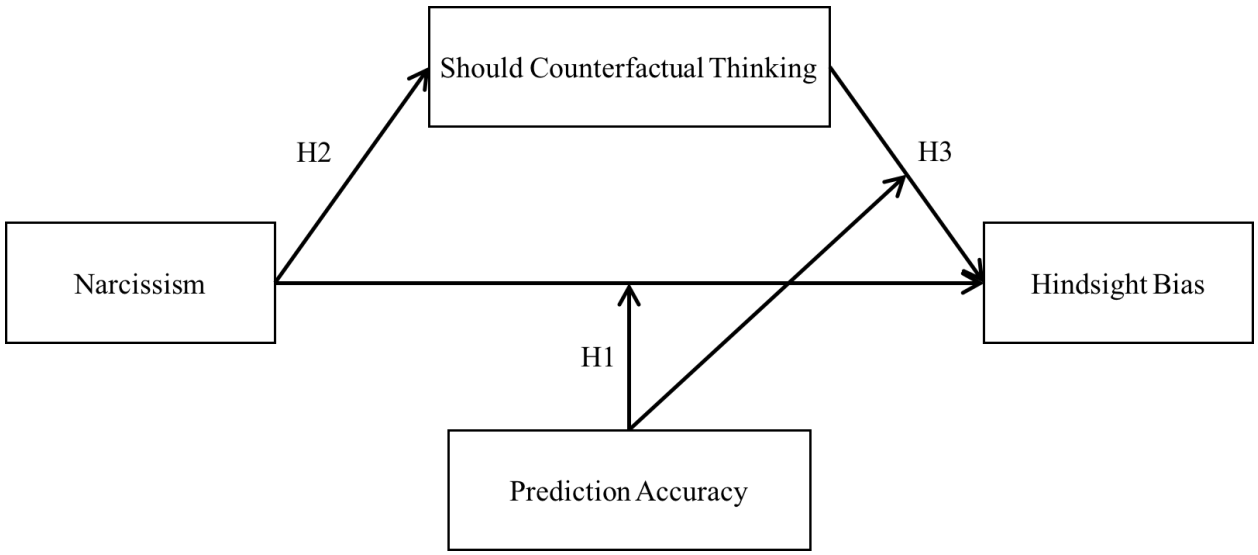
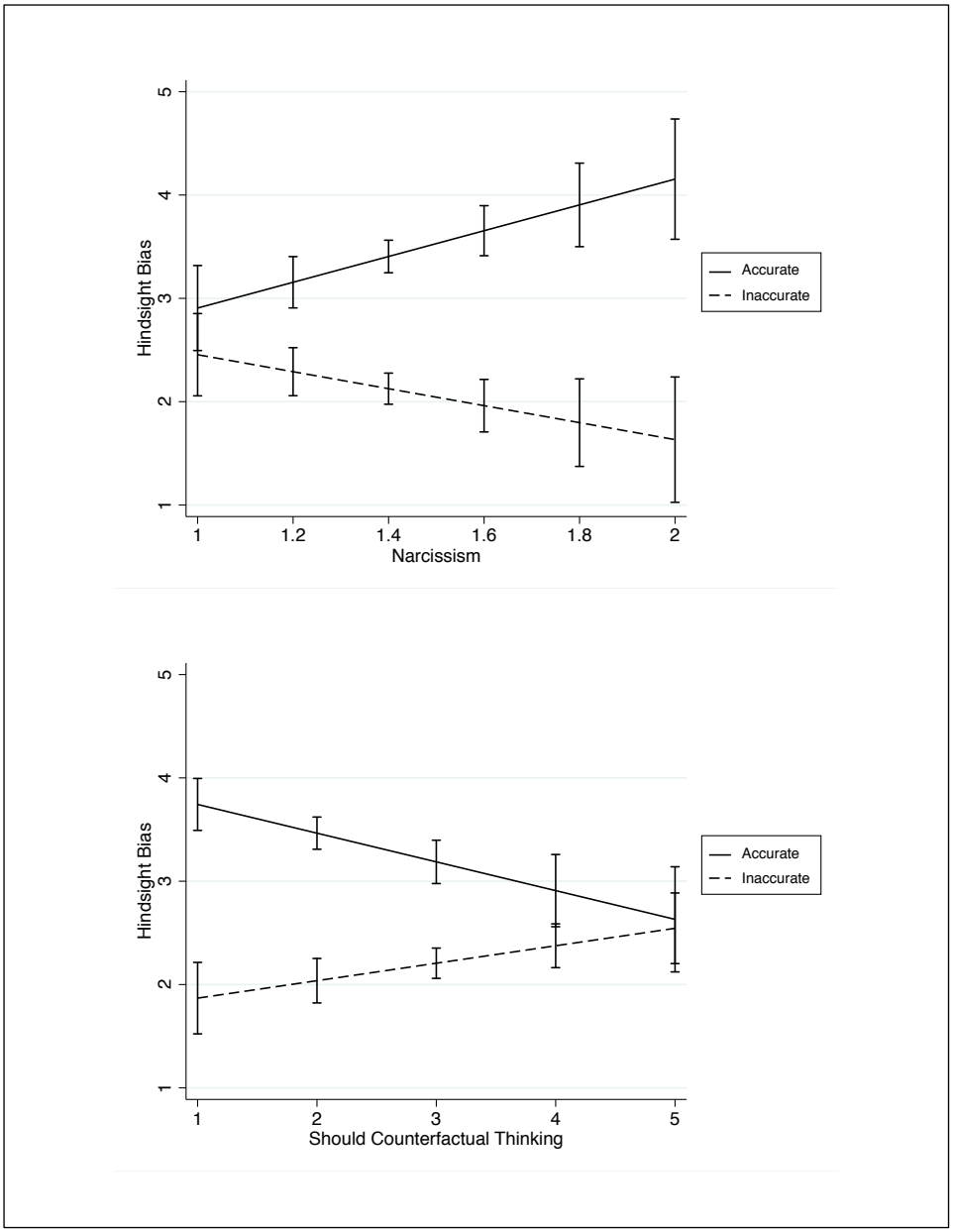


Figure 2

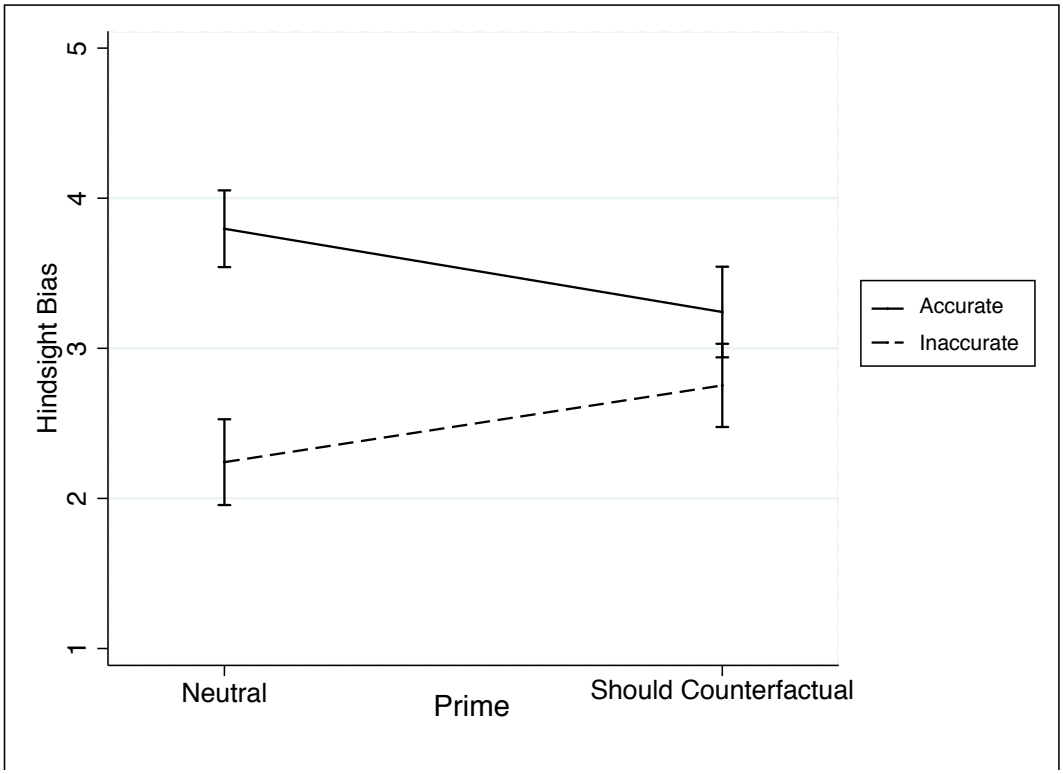
The Moderating Effect of Prediction Accuracy, Study 1



Note. The figure shows the moderating effect of prediction accuracy on the relationship between narcissism and hindsight bias (top panel) and on the relationship between should counterfactual thinking and hindsight bias (bottom panel). The narcissism scale ranges from 1 to 2 and the should counterfactual thinking scale from 1 to 5. Error bars indicate 95% confidence intervals.

Figure 3

The Interactive Effect of Prediction Accuracy and Priming Should Counterfactual Thinking on Hindsight Bias, Study 4



Note. Error bars indicate 95% confidence intervals.

Table 1

Means, Standard Deviations, and Intercorrelations among Study 1 Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Age	19.52	2.14	--										
2. Gender	0.79	0.41	-0.10 (0.178)	--									
3. Prediction Accuracy	0.48	0.50	0.02 (0.826)	0.00 (0.954)	--								
4. Narcissism	1.39	0.16	-0.04 (0.592)	-0.15 (0.055)	0.06 (0.456)	**(0.82)**							
5. Extraversion	5.31	1.12	-0.12 (0.127)	0.05 (0.557)	0.06 (0.456)	0.33 (0.000)	**(0.82)**						
6. Agreeableness	6.68	1.22	-0.11 (0.167)	0.14 (0.072)	0.07 (0.361)	-0.32 (0.000)	0.09 (0.224)	**(0.86)**					
7. Conscientiousness	6.14	1.34	-0.09 (0.24)	0.06 (0.446)	-0.04 (0.570)	-0.12 (0.133)	0.04 (0.638)	0.33 (0.000)	**(0.84)**				
8. Neuroticism	5.63	1.28	-0.07 (0.366)	0.01 (0.856)	0.15 (0.053)	0.05 (0.510)	-0.14 (0.065)	-0.03 (0.700)	0.01 (0.897)	**(0.77)**			
9. Openness	6.23	1.06	-0.14 (0.068)	0.01 (0.946)	0.03 (0.658)	0.15 (0.044)	0.19 (0.016)	0.28 (0.000)	0.18 (0.02)	-0.11 (0.138)	**-0.80**		
10. SCT	2.61	1.02	0.02 (0.836)	0.06 (0.414)	-0.42 (0.000)	-0.24 (0.002)	-0.10 (0.176)	0.06 (0.458)	0.07 (0.392)	-0.08 (0.308)	-0.02 (0.807)	**(0.94)**	
11. Hindsight Bias	2.74	0.97	0.06 (0.416)	-0.03 (0.705)	0.66 (0.000)	0.08 (0.323)	-0.08 (0.305)	-0.03 (0.731)	-0.20 (0.010)	0.15 (0.058)	0.03 (0.728)	-0.29 (0.000)	**(0.91)**

Note. $N = 170$. Gender was coded 0 = male, 1 = female. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. Where appropriate, reliability coefficients (Cronbach's alphas) are presented on the diagonal in parentheses and bold. *p*-values between parentheses.

Table 2

Test of the Interaction Effect between Narcissism and Prediction Accuracy on Hindsight Bias, Study 1 and Study 2

			Study 1						Study 2					
Model	Step	Variable Entered	*β*	*b*	*SE*	*p*-value	ΔR^2 step	*p*-value step	*β*	*b*	*SE*	*p*-value	ΔR^2 step	*p*-value step
1	1	Narcissism (Na)	-0.14	-0.82	0.48	0.092			-0.23	-1.33	0.41	0.001		
		Prediction Accuracy (PA)	-0.84	-1.62	0.95	0.092	0.43	0.000	0.23	0.47	0.21	0.028	0.34	0.000
	2	Na x PA	1.52	2.07	0.68	0.003	0.03	0.003	0.44	2.22	0.58	0.000	0.04	0.000
2	1	Narcissism (Na)	-0.09	-0.52	0.52	0.313			-0.24	-1.39	0.45	0.002		
		Extraversion (Ex)	-0.13	-0.11	0.05	0.039			0.03	0.02	0.04	0.679		
		Agreeableness (Ag)	0.01	0.01	0.05	0.873			0.00	0.00	0.06	0.973		
		Conscientiousness (Co)	-0.15	-0.11	0.04	0.012			-0.01	-0.01	0.05	0.828		
		Neuroticism (Ne)	0.04	0.03	0.04	0.452			-0.03	-0.02	0.04	0.583		
		Openness (Op)	0.05	0.05	0.06	0.376			0.00	0.00	0.05	0.987		
		Prediction Accuracy (PA)	-0.57	-1.11	0.95	0.245	0.48	0.000	0.24	0.49	0.22	0.024	0.34	0.000
	2	Na x PA	1.24	1.69	0.68	0.014	0.02	0.014	0.43	2.20	0.59	0.000	0.03	0.000
3	2	Ex x PA	-0.37	-0.12	0.11	0.232			0.30	0.10	0.09	0.239		
		Ag x PA	0.19	0.05	0.11	0.623			0.26	0.08	0.12	0.524		
		Co x PA	-0.26	-0.08	0.09	0.374			0.16	0.05	0.10	0.655		
		Ne x PA	0.11	0.03	0.09	0.694			-0.42	-0.13	0.09	0.136		
		Op x PA	-0.17	-0.05	0.11	0.658	0.01	0.819	0.72	0.20	0.11	0.055	0.04	0.006
	3	Na x PA	1.53	2.08	1.00	0.010	0.02	0.010	0.33	1.66	0.67	0.013	0.02	0.013

Note. Parameter estimates are for the final step, not entry. In the third model, for space reasons, we omitted the first step with the non-interacted terms (i.e., PA and personality traits; same as Model 2, step 1).

Table 3

Direct and Second Stage Moderation Model with Hindsight Bias as Outcome, Study 1

	Model 1				Model 2				Model 3			
	β	*b*	*SE*	*p*-value	β	*b*	*SE*	*p*-value	β	*b*	*SE*	*p*-value
Intercept		3.28	0.68	0.000		1.61	0.25	0.000		2.53	0.78	0.001
Prediction Accuracy (PA)	-0.84	-1.62	0.95	0.092	1.21	2.34	0.33	0.000	-0.02	-0.04	1.08	0.967
SCT					0.18	0.18	0.08	0.030	0.16	0.15	0.08	0.065
SCT x PA					-0.55	-0.42	0.12	0.001	-0.46	-0.36	0.12	0.004
Narcissism (Na)	-0.14	-0.82	0.48	0.092					-0.10	-0.61	0.49	0.216
Na x PA	1.52	2.07	0.68	0.003					1.17	1.59	0.69	0.022
R^2 *Model*		0.46		0.000		0.47		0.000		0.49		0.000

Conditional Direct Effects of Narcissism on Hindsight Bias (Excluding SCT)

Accuracy	Effect	*SE*	*t*	Lower *CI*	Upper *CI*	*p*-value
Inaccurate	-0.82	0.48	-1.7	-1.78	0.13	0.216
Accurate	1.225	0.48	2.62	0.31	2.19	0.001

Conditional Indirect Effects of Narcissism on Hindsight Bias through SCT

Accuracy	Effect	Boot *SE*	Boot Lower *CI*	Boot Upper CI
Inaccurate	-0.23	0.13	-0.57	-0.03
Accurate	0.31	0.20	0.01	0.83

Note. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. SCT: Should counterfactual thinking. *CI*: Confidence Interval. The conditional indirect effects are estimated using bootstrapping. The bootstrapped method was conducted using 5000 iterations. When a 95% confidence interval does not include zero, it is essentially equivalent to state that it is 'statistically significant' at $p < .05$ (Hayes, 2018); however, it is not technically correct to claim this. As such, we do not include p-values in these analyses.

Table 4

Means, Standard Deviations, and Intercorrelations among Study 2 Variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	41.63	11.70	--											
2. Gender	0.47	0.50	.04	--										
3. Prediction Accuracy	0.50	0.50	.11	.02	--									
4. Narcissism	1.32	0.17	-.14	-.08	-.03	(.86)								
5. Extraversion	5.67	1.43	.15	.00	.02	.41	(.84)							
6. Agreeableness	6.98	1.09	.25	.19	.15	.04	.38	(.81)						
7. Conscientiousness	7.04	1.13	.18	-.04	.05	.01	.22	.35	(.84)					
8. Neuroticism	6.21	1.45	.22	-.10	.19	.07	-.32	.10	.04	(.84)				
9. Openness to Experience	7.07	1.06	.09	.10	-.02	.20	.17	.34	.17	.09	(.80)			
10. SCT	2.61	1.02	.01	.00	-.27	-.20	-.13	-.05	-.03	-.13	-.06	(.86)		
11. Hindsight Bias	2.74	0.97	.07	.08	.58	-.05	-.01	.08	.01	.09	-.04	-.16	(.89)	
12. Perceived Learning	2.90	1.04	-.03	.06	-.05	-.22	-.07	.08	.07	.00	.06	.34	.02	(.86)
13. Hiring Experience	3.01	0.77	.24	-.03	.04	.19	.27	.06	.11	.04	.06	.01	.02	-.14

Note. $N = 264$. Gender was coded 0 = male, 1 = female. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. Where appropriate, reliability coefficients (Cronbach's alphas) are presented on the diagonal in parentheses.
Correlations > |.12| are significant at $p < .05$.

Table 5

Second Stage Moderation with Serial Mediation, using Learning as the Outcome, and Should Counterfactual Thinking and Hindsight Bias as Mediators

	Outcome: Hindsight Bias				Outcome: Learning				Outcome: Learning			
	β	*b*	*SE*	*p*-value	β	*b*	*SE*	*p*-value	β	*b*	*SE*	*p*-value
Intercept		1.95	0.27	0.000		1.98	0.17	0.000		1.47	0.29	0.000
Prediction Accuracy (PA)	0.91	1.87	0.37	0.000						0.81	0.43	0.061
SCT	0.18	0.20	0.07	0.007	0.34	0.41	0.07	0.000		0.37	0.07	0.000
SCT x PA	-0.62	-0.54	0.12	0.000								
Narcissism (Na)	-0.18	-1.07	0.4	0.009								
Na x PA	0.33	1.68	0.57	0.003								
Hindsight Bias (HB)										0.26	0.12	0.027
HB x PA										-0.32	0.16	0.046
R^2 *Model*		0.42		0.000		0.12		0.000		0.14		0.000

Conditional Indirect Effects of Narcissism on Hindsight Bias through SCT

Accuracy	Effect	*SE*	Lower *CI*	Upper *CI*
Inaccurate	-0.21	0.10	-0.45	-0.07
Accurate	0.34	0.15	0.11	0.72

Conditional Indirect Effects of Narcissism on Learning through SCT and Hindsight Bias (Narcissism --> SCT --> HB --> Learning)

Accuracy	Effect	Boot *SE*	Boot Lower *CI*	Boot Upper CI
Inaccurate	-0.05	0.04	-0.15	-0.01
Accurate	-0.02	0.04	-0.09	0.08

Note. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. SCT: Should counterfactual thinking. *CI*: Confidence Interval. The conditional indirect effects are estimated using bootstrapping. The bootstrapped method was conducted using 5000 iterations. When a bootstrapped 95% confidence interval does not include zero, it is essentially equivalent to state that the effect is 'statistically significant' at $p < .05$ (Hayes, 2018); however, it is not technically correct to claim this. As such, we do not include p-values in these analyses.

Table 6

Means, Standard Deviations, and Intercorrelations among Study 3 Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Age	33.44	4.60	--						
2. Gender	0.35	0.48	-.04	--					
3. Hiring Experience	3.19	0.74	.26	.03	--				
4. Prediction Accuracy	0.48	0.50	-.09	.07	-.07	--			
5. SCT	2.96	1.11	.08	-.06	-.01	-.47	(.87)		
6. CCT	3.48	1.18	.06	-.03	-.10	-.33	.66	(.90)	
7. Hindsight Bias	2.97	1.34	.01	.14	.03	.61	-.30	-.21	(.88)

Note. $N = 91$. Gender was coded 0 = male, 1 = female. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. SCT: Should counterfactual thinking; CCT: Could counterfactual thinking. Where appropriate, reliability coefficients (Cronbach's alphas) are presented on the diagonal in parentheses.

Table 7

Test of the Interaction Effect between Should Counterfactual Thinking and Prediction Accuracy on Hindsight Bias, Study 3

Model	Step	Variable Entered	*β*	*b*	*SE*	*p*-value	ΔR^2 step	*p*-value step	*VIF*	*1/VIF*
1	1	Prediction Accuracy (PA)	0.60	1.50	0.24	0.000			1.29	0.78
		SCT	-0.02	-0.02	0.11	0.868	0.37	0.000	1.29	0.78
	2	Prediction Accuracy (PA)	1.69	4.20	0.60	0.000			10.17	0.10
		SCT	0.36	0.41	0.12	0.002			2.36	0.42
		PA x SCT	-1.03	-0.93	0.19	0.000	0.13	0.000	8.04	0.12
2	1	Prediction Accuracy (PA)	0.60	1.50	0.24	0.000			1.29	0.78
		SCT	-0.01	-0.01	0.14	0.927			2.04	0.49
		CCT	-0.01	-0.01	0.12	0.948	0.37	0.000	1.77	0.57
	2	Prediction Accuracy (PA)	1.71	4.27	0.67	0.000			12.73	0.08
		SCT	0.40	0.45	0.18	0.016			4.53	0.22
		CCT	-0.05	-0.05	0.16	0.746			4.03	0.25
		PA x SCT	-1.03	-0.93	0.25	0.000			12.90	0.08
		PA x CCT	-0.03	-0.02	0.22	0.928	0.13	0.000	15.45	0.06

Conditional Effects of SCT on Hindsight Bias

Accuracy	Effect	*t*	*SE*	*p*-value
Inaccurate	0.41	3.13	0.13	0.002
Accurate	-0.53	-3.71	0.14	0.000

Note. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. SCT: Should counterfactual thinking. CCT: Could counterfactual thinking.

Table 8

Means, Standard Deviations, and Intercorrelations among Study 4 Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Age	20.52	3.34	--						
2. Gender	0.59	0.49	-.17	--					
3. Should Counterfactual Prime	0.47	0.50	-.05	-.06	--				
4. Prediction Accuracy	0.51	0.50	.05	.00	-.10	--			
5. Should Counterfactual Thinking	2.77	1.07	-.04	-.04	.18	-.29	(.90)		
6. Hindsight Bias	3.03	1.16	-.01	-.07	-.05	.46	-.26	(.90)	
7. Narcissism	1.39	0.16	-.06	-.13	.01	.03	-.19	.06	(.87)

Note. $N = 202$. For this table, should counterfactual prime was coded 0 = control condition, 1 = SCT condition. Gender was coded 0 = male, 1 = female. Prediction accuracy was coded 0 = inaccurate, 1 = accurate. Where appropriate, reliability coefficients (Cronbach's alphas) are presented on the diagonal in parentheses.
Correlations > |.13| are significant at $p < .05$

Table 9

Test of the Interaction Effect between Should Counterfactual Prime and Prediction Accuracy on Hindsight Bias, Study 4

Model	Step	Variable Entered	*β*	*b*	*SE*	*p*-value	ΔR^2 step	*p*-value step
1	1	Should Counterfactual Prime (SCP)	-0.01	-0.01	0.15	0.955		
		Prediction Accuracy (PA)	0.46	1.06	0.15	0.000	0.21	0.000
	2	SCP	0.22	0.51	0.20	0.012		
		PA	0.67	1.54	0.20	0.000		
		PA x SCP	-0.36	-1.03	0.29	0.000	0.05	0.000
2	1	SCP	-0.01	-0.01	0.15	0.948		
		PA	0.46	1.06	0.15	0.000		
		Narcissism	0.05	0.35	0.45	0.437	0.21	0.000
	2	SCP	0.22	0.51	0.20	0.012		
		PA	0.67	1.54	0.20	0.000		
		Narcissism	0.05	0.40	0.44	0.359		
		PA x SCP	-0.37	-1.04	0.29	0.000	0.05	0.000

Note. Model 2 differs from Model 1 only in that it also controls for narcissism.