Prefactual Potency: The Perceived Likelihood of Alternatives to Anticipated Realities

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Abstract

Prefactual thoughts typically take the form of implied or explicit if–then statements that represent mental simulations of alternatives to what is expected to occur in the future. The authors propose that the multiplicative combination of "if likelihood" (the degree to which the antecedent condition of the prefactual is perceived to be likely) and "then likelihood" (the perceived conditional likelihood of the outcome of the prefactual, given the antecedent condition) determine the influence of prefactuals. This construct, termed *prefactual potency*, is a reliable predictor of the degree of influence of prefactual thinking on judgments of anticipated negative affect. Through three experiments, the authors demonstrate the predictive power of this construct and show that it plays a causal role in determining the strength of the effects of prefactual thought. Implications of prefactual potency as a central factor of prefactual influence are discussed.

Keywords

counterfactual thinking, prefactual thinking, anticipated negative affect

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Fundamental to human reasoning is the ability to think hypothetically (Evans, 2007; Evans, Over, & Handley, 2003). Not only is it important to one's ability to consider multiple means to his or her desired ends, but it is also important to the advancement in science and society (Johnson-Laird & Byrne, 1991). Perhaps, one of the most ubiquitous (and frequently studied) forms of hypothetical thinking is that of counterfactual thinking (i.e., mentally simulating alternatives to *past events* by reconsidering actual occurrences in terms of alternative possible outcomes; for reviews, see Mandel, Hilton, & Catellani, 2005; Roese, 1997; Roese & Olson, 1995). Frequently emerging when people experience undesirable events, people often cannot help but think of how things might have been different (see Hofstadter, 1979). Counterfactuals are often characterized by conditional statements (i.e., "If only X, then Y") and can serve as standards of comparison, or reference points, for judgments (Kahneman & Miller, 1986; Kahneman & Tversky, 1982; Roese, 1997). As such, counterfactuals can have an important influence on affective, cognitive, and behavioral reactions (Petrocelli & Sherman, 2010).[1]

However, people can sometimes "see" undesirable things coming before they actually occur. In such cases, people often cannot help but think of how things could be if contextual attributes were somehow different. Thus, mental simulations of alternatives to reality are not always about the past, as people can mentally simulate alternatives to their expected realities of the future. This activity is commonly referred to as *prefactual thinking* (see Sanna, 1996; for example, "If only Joe would tell Rachel how he really feels, she might go out with him"). Prefactual thinking is a special type of future-directed imagination that requires one to form a general expectation about how an upcoming event is likely to unfold as well as how the outcome of the event may be altered by altering the expected antecedent conditions. In the case of Joe and Rachel, it is implied that Joe is unlikely to tell Rachel how he feels about her. However, if Joe does something unexpected, such as telling Rachel how he really feels, a more desirable outcome may occur.

Prefactual thinking can have important implications for one's expectations and predictions (Hoch, 1985; Sherman, Skov, Hervitz, & Stock, 1981), anticipatory affect (McConnell et al., 2000; Sanna, 1996), and performance (Criado del Valle & Mateos, 2008; Sanna, 1996, 1998). Furthermore, people's tendency to generate prefactuals before making decisions appears to be a spontaneous mental activity (McConnell et al., 2000). Given the number of decisions people make on a daily basis, we estimate the pervasiveness of prefactual thinking to be as great as that of counterfactual thinking.

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The distinction between counterfactual and prefactual thinking is critical to understanding the effects that mental simulations have on decision-making processes. Prefactual thinking may be well-positioned to directly affect decisions and behavior. If one is to receive the potential benefits from counterfactual thinking (see Epstude & Roese, 2008; Markman, Gavanski, Sherman, & McMullen, 1993; Roese & Olson, 1997), future encounters, similar to those that one may learn from, are required. However, the effects of prefactual thoughts do not necessitate such additional encounters because they emerge prior to the key event. For instance, the likelihood of purchasing insurance increases when people focus on things that could happen if they decide not to purchase insurance (Boninger, Gleicher, Hetts, Armor, & Moore, 1994, cited in Gleicher et al., 1995). It is likely that people who bypass insurance generate a host of counterfactuals when unfortunate things actually happen. Although these counterfactuals may affect future insurance purchases, prefactuals (that influence decisions) may even prevent the likelihood of such counterfactual thinking in the first place.

Prefactual thinking also emerges when people anticipate the regret associated with various choice options (see Crawford, McConnell, Lewis, & Sherman, 2002). We also know that regret aversion has important implications for decision making (e.g., Zeelenberg & Beattie, 1997; Zeelenberg, Beattie, van der Pligt, & de Vries, 1996). For instance, Zeelenberg et al. (1996) showed that people make regret-minimizing as opposed to risk-minimizing choices in choosing between gambles. Prefactual thinking is important for understanding decisions more generally, such as when a woman, who after consulting with her doctor, must decide whether to treat a life-threatening condition with medication or surgery. Her prefactual thoughts, and the extent to which she has confidence in such mentally simulated alternatives, is likely to drive her decisions.

For these reasons, we believe that determining when one's prefactuals will and will not affect anticipatory judgments and behavior is important to our understanding of the link between decision making and simulations of alternatives to expected realities. We propose that Petrocelli, Percy, Sherman, and Tormala's (2011) notion of *counterfactual potency* should be foundational to such an inquiry.

Counterfactual Potency

Petrocelli et al. (2011) proposed that counterfactual thoughts are predictive of judgments and affective reactions to the extent that their counterfactuals are potent, the extent to which people perceive mentally simulated alternative antecedents and consequences to be likely to actually occur (i.e., *counterfactual potency*). The most potent counterfactuals are characterized by conviction and certainty in the notion that alternative outcomes could have or should have actually occurred. Thus, not all counterfactual thoughts have the same influence on judgments and emotions.[2]

For example, if one were to play 2-5-8 in a pick-three lottery only to lose when 2-5-9 is drawn, the default counterfactuals (i.e., "If only I had played a nine rather than the eight . . ." or "If only the nine was an eight . . .") can be very potent. This is because one can be certain that a win would have resulted if the alternative antecedent had actually occurred; in such cases, a negative affect directed at the self is expected to emerge. However, if the proposed antecedent (i.e., playing 2-5-9) is implausible or unlikely (e.g., "My favorite number is 258, and I never would have played 2-5-9"), the former counterfactual may be unlikely to affect one's reactions, and negative affect directed at the self is not expected to emerge. Furthermore, it is possible for an alternative antecedent to be perceived as highly likely, but the alternative outcome may not be so clear. For example, forgoing an interested admirer might lead one to generate devastating counterfactuals later in life: "If only I had married Suzy rather than Laura, I would have been happy." In many such cases, one will never know how hypothesized outcomes might have actually turned out, and coming to terms with the subjectivity of hypothetical thinking would seem to make such counterfactuals less potent.

Petrocelli et al. (2011) divided the subjective estimate of the likelihood of counterfactual thoughts (i.e., counterfactual potency) into two metacognitive and interactive components. First, for a counterfactual to be effective, one must believe that the proposed alternative antecedent condition (or the "if" part of the counterfactual) was reasonably likely ("if likelihood" or IL), and the degree of this perceived likelihood should affect the influence of such a thought on judgment. An alternative antecedent may consist of a different decision, a different behavior, or a different circumstance.

Second, despite the importance of the IL in counterfactual thought, this characteristic is influential only to the extent that the change in the antecedent, however plausible or likely, is ultimately associated with an alternative outcome ("then likelihood" or TL). For example, only to the extent that one's deviation from a routine is linked to avoidance of an undesirable outcome (e.g., "If only I had taken a different route, I could have avoided this traffic" vs. "If only I had worn a different shirt, I could have avoided this traffic") will mutations of that antecedent exert effects on judgment, regardless of how plausible the alternative antecedent is perceived to have been. For this reason, the influence of perceived antecedent likelihood is always contextualized by the associated antecedent-alternative outcome contingency (TL).

Furthermore, Petrocelli et al. (2011) theorized that only when counterfactual potency is high will counterfactuals influence reactions (independent of the frequency of counterfactual thoughts). Their studies supported this reasoning. In one study, participants learned about a target named Sam, a game show contestant with a chance to win US$50,000. Sam was to first select one of three doors. If he selected the correct door, he would then need to answer a trivia question. Half of the participants learned that Sam's favorite number

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was 3 and that he had no trouble with the decision (low IL). Other participants were led to believe that Sam struggled with the decision; he strongly considered Door 2 but ultimately choose Door 3 (high IL). In each condition, Door 2 was the correct door. The IL manipulation was then crossed with a TL manipulation. Half of the participants learned that Sam would have been unlikely to answer the deciding trivia question regarding the Ancient Aztecs because he knew nothing about them (low TL). Other participants learned that Sam might have known the answer to the question, as he recently watched a documentary on the Ancient Aztecs (high TL). As hypothesized, the responsibility/blame and negative affect that Sam was likely to feel was rated highly only in the high IL/high TL condition. In another study with a similar structure, participants were asked to select one of two roulette wheels tied to two possible bets. One condition was given the chance to place a bet on 15 versus 9 preselected numbers (low IL), whereas another condition was given the chance to place a bet on 15 versus 13 preselected numbers (high IL). Participants observed the roulette wheel being spun, and all lost the bet. Afterward, participants were shown the roulette wheel spin of which they did not select. One condition was shown a losing wheel (low TL), and one condition was shown a winning wheel (high TL). The magnitude of regret was greatest in the high IL/high TL condition. These tendencies were supported even in studies that controlled for the frequency of counterfactual thoughts.

Prefactual Potency

Given the influence of counterfactual potency on the influence of counterfactuals on reactions to previous events, we find it a natural parallel to investigate the role of prefactual potency on the influence of prefactual thinking on future events. Again, we argue that the importance of such an investigation rests on the fact that prefactuals may be well-positioned to predict reactions and behavior because the key event was yet to occur when prefactuals are generated. Thus, the notion that the potency of one's prefactuals is important to the effects of prefactuals on judgments of anticipatory events is an empirical question warranting examination.

We find it useful to conceptualize prefactual potency as similar to counterfactual potency in terms of its structure and effect on judgments and reactions, but for anticipated rather than previous events. Thus, we theorized that like counterfactual potency, prefactual potency has five important characteristics (see Petrocelli et al., 2011). First, prefactual potency is composed of the interaction between two important components: the perceived likelihood of an alternative antecedent actually occurring (IL) and the perceived likelihood of an alternative outcome emerging given the alternative antecedent (TL).

Second, prefactual IL and TL are independently determined. IL and TL (although they may be correlated under certain circumstances) are theoretically independent. For instance, implausible prefactuals can be generated by a basketball fan about to watch a game. It is possible, within a particular prefactual, for IL to be low while TL is high (e.g., "If only we had Michael Jordan on our team, we could win tonight's game"). On the other hand, TL may be low while IL is high (e.g., "If only I had a seat closer to the floor, then we could win tonight's game"). In short, the perceived a priori likelihood of the antecedent condition in a prefactual is not dependent on the contingency between the antecedent and the alternative outcome, or vice versa.

Third, prefactual IL and TL are subjectively determined. It is the perceived likelihoods that are important for the purposes of prefactual potency, not the objective or true likelihoods.

Fourth, neither prefactual IL nor TL operates independently to affect reactions, but rather each component contextualizes the other's effect. For example, despite the fact that perceptions of antecedent-outcome contingencies are important in causal reasoning about counterfactuals (Hilton, 1988; Mandel, 2003; Spellman, 1997), the cognitive availability of alternative antecedents has been shown to moderate this influence. Specifically, explicit references to changes in particular antecedents can change perceptions of causation, even if contingencies are held constant (see Byrne & McEleney, 2000). Such research (and the evidence for the overall importance of IL described earlier) supports the important relationship between the two components, such that the ultimate influence of a counterfactual thought is determined by their interaction.

Finally, like the spontaneous generation of prefactuals (see McConnell et al., 2000), we contend that prefactual IL and TL are also spontaneously estimated. The research of Goldinger, Kleider, Azuma, and Beike (2003) not only suggests that counterfactuals can be spontaneously and automatically generated in response to an event but also that people adjust their judgments for unwanted effects of counterfactuals when afforded the cognitive resources to do so. One way of adjusting such judgments would be to adjust the perceived likelihood of a counterfactual alternative. We have no reason to believe that this activity would differ for prefactual thinking.

Overview of Studies

We first conducted two scenario studies (Experiments 1 and 2) in which we presented participants with information leading to an event and a potential outcome. In both studies, we presented participants with an upward prefactual (i.e., an alternative better than that which might be expected), manipulated perceived IL and TL and tested whether or not they interacted to predict anticipated negative affect. We further tested whether or not prefactual potency mediated the relationships between our manipulations and the dependent variables (anticipated negative affect). In Experiment 3, we manipulated IL and TL before asking our participants to complete a roulette decision task. Again, we tested whether

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or not prefactual potency mediated the relationships between our manipulations and the dependent variable (i.e., anticipated negative affect). In each experiment, we predicted that prefactuals are likely to have their greatest impact when IL and TL are both high, and that prefactual potency mediates the moderation that emerges between our IL and TL manipulations for anticipated negative affect.

Experiment 1

Method

Participants and Design. Sixty undergraduates (37 females, 23 males; M_{age} = 18.77, SD_{age} = 1.69), enrolled in an introductory psychology course at Wake Forest University, participated in exchange for partial course credit. A 2 (disclosure likelihood: high vs. low) × 2 (reciprocal attraction: high vs. low) × 2 (measurement of anticipated negative affect: before vs. after likelihood judgments) between-groups design was employed.

Procedure

Scenario. All participants read the following scenario root:

> Joe and Rachel are seniors in college. They are both single. Joe has admired Rachel since they were freshmen. Joe finds Rachel to be very interesting, attractive, and would like to date her. Joe and Rachel often flirt with each other on campus. Mark, one of Joe's friends, suggested that Joe tell Rachel how he really feels about her.

To manipulate estimates of the IL for the default prefactual (provided below), we manipulated Joe's implied disclosure likelihood. Specifically, participants were either informed that Joe's response to Mark was positive (i.e., "Maybe. Perhaps I could do that after some practice"; *high disclosure likelihood*—high IL) or that Joe's response was negative (i.e., "No way. I could never do that"; *low disclosure likelihood*—low IL).

To manipulate estimates of the TL for the default prefactual (provided below), we manipulated Rachel's implied reciprocation likelihood. Specifically, after reading that Suzy, one of Rachel's friends, asked Rachel about what the flirting with Joe was about, participants were either informed that Rachel's response was neutral (i.e., "Oh, nothing—he's just a nice guy"; *low reciprocal attraction*—low TL) or that Rachel's response was relatively more positive (i.e., "Oh, he's so cute, and he's such a nice guy"; *high reciprocal attraction*—high TL).

Prefactual potency. Participants then considered the following prefactual: "If only Joe would tell Rachel how he really feels about her, then she might go out with him on a date." This prefactual thought implies that the expected (default) reality is that Joe is unlikely to disclose to Rachel his true feelings and they are unlikely to date because of it. Thus, participants were expected to use the IL- and TL-relevant information to judge the likelihoods of alternative worlds in comparison with the expected reality.

To measure prefactual potency, participants were provided with detailed instructions modified from those employed by Petrocelli et al. (2011; Study 2). Specifically, participants were given detailed instructions to ensure that they were clear about what was being asked. It was further explained that the thought was an example of an if–then statement and that people often make if–then statements when they consider alternatives that are better than expected. Participants then read the following:

> For example, you might say before an upcoming exam "If only I had more study time, I could get a better grade on tomorrow's exam." We could then ask you questions about this "if . . . then" statement: 1) Consider the "IF" part of that statement: How likely were you to find more study time?; and 2) Consider the "THEN" part of that statement: Assuming you had actually found more study time, then how likely is it that you would get a better grade on tomorrow's exam? Make sure you understand the difference between these two kinds of questions before moving on to the next screen frame.

Then, with the prefactual thought displayed at the top of the screen frame, participants were asked to rate their perception of the likelihood of Joe actually telling Rachel how he feels about her (IL), as well as the likelihood that Rachel would agree to go on a date with Joe (given that Joe actually told Rachel how he feels; TL), on 11-point scales anchored at *not at all likely* (0) and *extremely likely* (10).

Anticipated negative affect. Finally, participants rated how much regret they would expect Joe to experience if he doesn't tell Rachel how he really feels using a 9-point scale anchored at *very little* (1) and *very much* (9). The placement of this question was counterbalanced, coming either before or after the measurement of prefactual potency.

Results and Discussion

Prefactual Potency. Prefactual potency was calculated by multiplying the IL and TL estimates (see Petrocelli et al., 2011). Similar to McGuire's (1968) notion of the interactive relationship between reception and yielding in persuasion, Petrocelli et al. (2011) proposed (and found empirical support for the notion) that measures of IL and TL combine multiplicatively within a given counterfactual to produce counterfactual potency and affect reactions to events. Using the same approach here with prefactual thoughts, prefactuals for which IL and TL are both high should exert particularly strong effects on affect and judgment, whereas prefactuals for which either component is low should exert a weak effect. In other words, any situation

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Table 1. Descriptive Statistics and Results of Main Effect Tests of ANOVAs

Prefactual potency condition										
	If likelihood					Then likelihood				
	Low		High			Low		High		
Variable	*M*	*SD*	*M*	*SD*	*F*	*M*	*SD*	*M*	*SD*	*F*
Experiment 1										
Prefactual potency	27.10	10.49	35.06	14.48	7.58**	26.17	10.58	36.00	13.81	11.54**
Anticipated NA	6.70	1.21	7.30	1.09	4.30*	6.87	1.04	7.13	1.31	0.85
Experiment 2										
Prefactual potency	31.43	13.65	45.53	18.56	12.91**	33.50	12.62	43.47	20.56	6.45*
Anticipated NA	7.64	0.79	7.73	0.96	0.68	7.53	0.77	7.84	0.95	2.03
Experiment 3										
Prefactual potency	17.76	14.33	28.53	18.14	10.56**	17.24	16.38	29.40	15.73	12.87**
Anticipated NA	4.13	1.11	4.81	1.18	8.04**	4.14	0.98	4.82	1.30	7.69**

Note: NA = negative affect.
*$p < .05$. **$p < .01$.

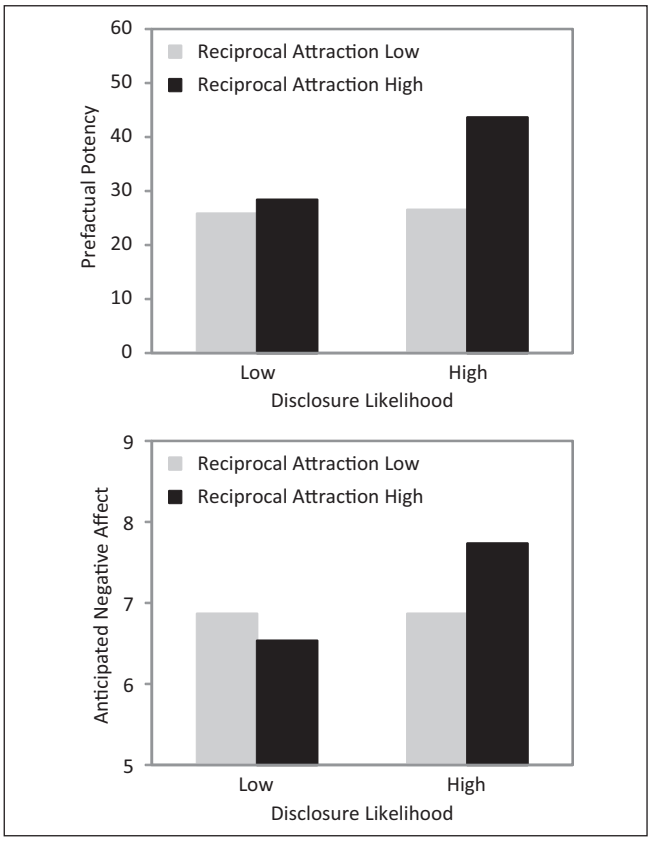

Figure 1. Mean prefactual potency and anticipated negative affect by disclosure likelihood and reciprocal attraction conditions (Experiment 1)

in which one or both components are very low will lead to a relatively impotent prefactual (i.e., multiplying 100 by zero, similar to multiplying zero by zero, produces zero). However, Petrocelli et al. noted that in addition to their interactive effect, it is possible for IL and TL to exert main effects, and these must be partialed out to interpret the interaction.

These data were subjected to a two-way disclosure likelihood × reciprocal attraction analysis of variance (ANOVA). Two significant main effects (see Table 1) were qualified by the expected interaction, $F(1, 56) = 6.25$, $p < .02$ (see top panel of Figure 1). When both likelihoods were high, greater prefactual potency was reported than when the likelihood of disclosure was high but reciprocal attraction was low, $t(56) = 4.17$, $p < .001$, and when the likelihood of disclosure was low but reciprocal attraction was high, $t(56) = 3.71$, $p < .001$; all other ts < 0.65.

Anticipated Negative Affect. Using the same analysis framework, a significant main effect was observed (see Table 1). However, this effect was qualified by the expected interaction, $F(1, 56) = 4.31$, $p < .05$ (see bottom panel of Figure 1). When both likelihoods were high, greater negative affect was anticipated than when the likelihood of disclosure was high but reciprocal attraction was low, $t(56) = 2.12$, $p < .05$, and when the likelihood of disclosure was low but reciprocal attraction was high, $t(56) = 2.93$, $p < .01$; all other ts < 0.85.[3] Thus, Joe's decision to disclose or not disclose his feelings only increased judgments of Joe's anticipated negative affect when it was perceived to make a difference to Rachel.

Mediation analysis. We then tested prefactual potency as a mediator of the IL and TL manipulations on anticipated negative affect using mediated moderation (Muller, Judd, & Yzerbyt, 2005; Wegener & Fabrigar, 2000; see Figure 2). As described earlier, significant interactions were obtained for prefactual potency and anticipated negative affect. Prefactual potency predicted anticipated negative affect above and beyond the distal variables, whereas the distal interaction

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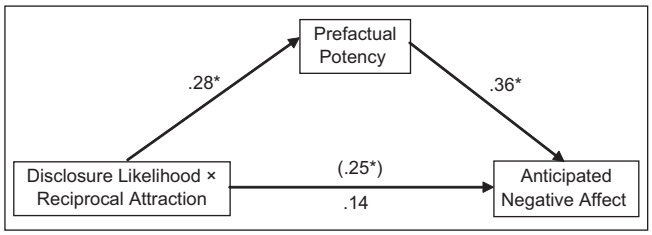

Figure 2. Results of mediated moderation analysis (Experiment 1)
*$p < .05$.

effect was reduced to nonsignificance (Sobel test: $z = 2.15$, $p < .05$). Thus, consistent with expectations, prefactual potency appears to be a mechanism by which manipulations of IL and TL affect judgments of a social target's anticipated negative affect.

Experiment 2

Experiment 2 served as a replication of Experiment 1 using a modified version of Kahneman and Tversky's (1982) Mr. Crane/Mr. Tees scenario. Hypotheses mirrored those of Experiment 1.

Method

Participants and Design. Sixty undergraduates (40 females, 20 males; $M_{age} = 18.85$, $SD_{age} = 1.64$), enrolled in an introductory psychology course at Wake Forest University, participated in exchange for partial course credit. A 2 (consistency of distracting interaction: high vs. low) × 2 (further delay: yes vs. no) × 2 (measurement of anticipated negative affect: before vs. after likelihood judgments) between-groups design was employed.

Procedure. The procedures of Experiment 2 were similar to those of Experiment 1, with the exceptions of the scenario and dependent variables.

Scenario. Mr. Crane was described as running late for a flight and being stopped by his boss to talk about his golf game. To manipulate estimates of the IL for the default prefactual (provided below), we manipulated the consistency of a distracting interaction with Mr. Crane's boss. Specifically, half of the sample was informed that Mr. Crane's boss often grabs him to talk about golf (*high consistency*—low IL), and the other half of the sample was informed that Mr. Crane's boss is usually "all business," but today he grabbed him to talk about golf (*low consistency*—high IL).

To manipulate estimates of the TL for the default prefactual (provided below), we manipulated whether or not Mr. Crane experienced a further delay. Half of the sample was informed that Mr. Crane was delayed further by heavy traffic (*further delay*—low TL), and the other half of the sample was not provided with information about traffic (*no further delay*—high TL). When Mr. Crane made it to the parking lot, his flight was scheduled to leave in 7 min. We expected perceived prefactual potency to be greatest in the low consistency/no further delay condition.

Prefactual potency. Prefactual potency was measured in the same way as it was in Experiment 1 using the following prefactual: "If only Mr. Crane had left for the airport earlier, he might make his flight." This prefactual thought indicates that the expected (default) reality is that Mr. Crane is unlikely to make it to his flight on time. As in Experiment 1, participants were expected to use the IL- and TL-relevant information to judge the likelihoods of alternative worlds in comparison with the expected reality.

Anticipated negative affect. Participants were asked how much regret, annoyance, frustration, anger, disappointment, and irritation they would expect Mr. Crane to experience if he didn't make his flight, using 9-point scales anchored at *very little* (1) and *very much* (9), either before or after the measurement of prefactual potency.

Results and Discussion

Prefactual Potency. A two-way consistency of distraction × further delay ANOVA was employed. Two significant main effects (see Table 1) were qualified by the expected interaction, $F(1, 56) = 4.19$, $p < .05$ (see top panel of Figure 3). When the consistency of the boss's distraction was low, greater prefactual potency was reported when there was no further delay than when there was, $t(56) = 3.21$, $p < .01$. In addition, when there was no further delay, greater potency was reported when the consistency of the boss's distraction was low than high, $t(56) = -3.95$, $p < .001$; all other ts < 1.10.

Anticipated Negative Affect. Neither of the main effects emerged for anticipated negative affect (see Table 1). However, the expected interaction was significant, $F(1, 56) = 4.79$, $p < .05$ (see bottom panel of Figure 3). When the consistency of the boss's distraction was low, greater negative affect was reported when there was no further delay than when there was, $t(56) = 2.56$, $p < .02$. In addition, when there was no further delay, greater negative affect was reported when the consistency of the boss's distraction was low than high, $t(56) = -1.84$, $p = .07$; all other ts < 1.30. Thus, being distracted by the boss only seemed to matter to Mr. Crane's anticipated negative affect when Mr. Crane was perceived to actually have a chance at making it to his flight on time.

Mediation analysis. Similar to Experiment 1, we tested our mediation model for anticipated negative affect (see Figure 4). As described earlier, significant interactions were obtained for prefactual potency and anticipated negative affect. Prefactual potency predicted anticipated negative affect above and beyond the distal variables, whereas the distal interaction effect was reduced to nonsignificance (Sobel test: $z = 2.00$, $p < .05$).

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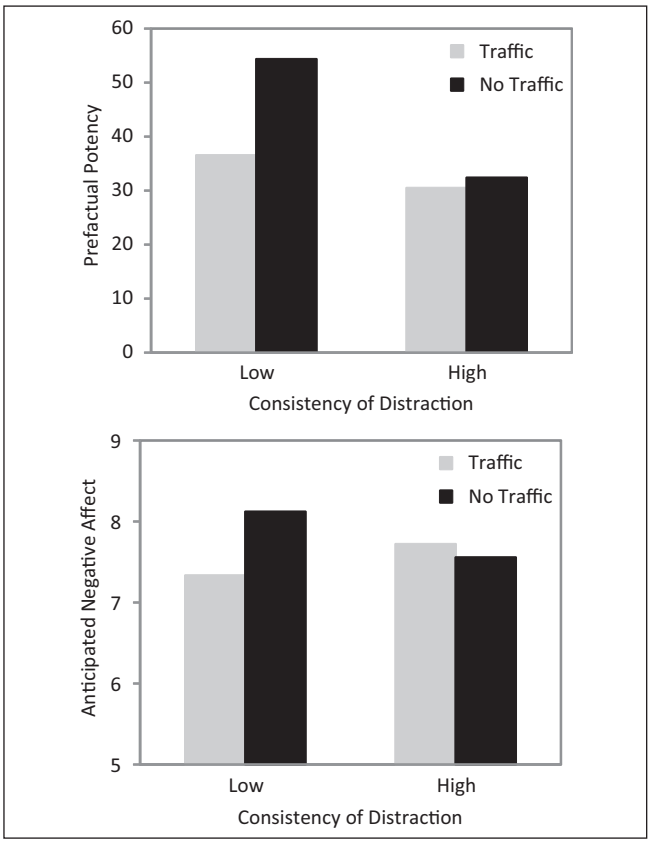

Figure 3. Mean prefactual potency and anticipated negative affect by consistency of distraction and further delay conditions (Experiment 2)

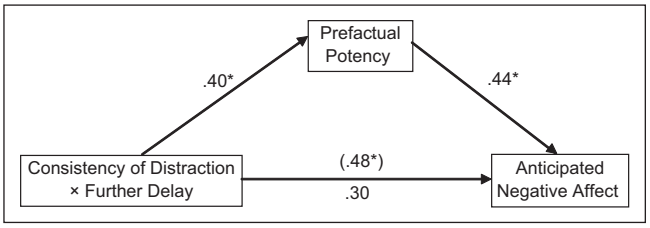

Figure 4. Results of mediated moderation analysis (Experiment 2)
*$p < .05$.

Experiment 3

In our first two studies, we demonstrated that prefactual potency influences the anticipated negative affect of social targets. In Experiment 3, we sought to test the possibility that prefactual potency affects one's own outlook on a future task.

In Experiment 3, we led participants to believe that they would complete a roulette task. Before completing the task, we provided participants with information that would alter their perceptions of the IL and TL associated with a particular performance-related prefactual (i.e., a tips guide that previous students utilized or did not utilize, which does or does not have an effect on performance). As with Studies 1 and 2, we hypothesized that prefactual potency would be greatest in the high IL/high TL condition. We also hypothesized that our manipulations of IL and TL would result in differences in negative affect, such that the high IL/high TL condition would report the greatest negative affect in anticipation of the task. We further expected prefactual potency to mediate the relationship between our manipulations and anticipated negative affect. This experiment is especially important because anticipatory negative affect has long been identified as having an important influence on judgment (Albarracín & Kumkale, 2003; Bless, Mackie, & Schwarz, 1992; Van den Bos, 2003) and decision making (Forgas, 1991, 1992; Graupmann, Erber, & Poe, 2011). Furthermore, anticipatory negative affect has often been shown to result in decrements in cognitive performance (Catanzaro, 1996; Cervone, Kopp, Schaumann, & Scott, 1994; Hesse & Spies, 1996; Hirt, Melton, McDonald, & Harackiewicz, 1996; Sanna, Turley, & Mark, 1996; Wittmaier, 1974); however, see Hesse and Spies (1996) and Sanna et al. (1996) for exceptions.

Method

Participants and Design. Seventy-three undergraduates (53 females, 20 males; $M_{age} = 19.34$, $SD_{age} = 1.60$), enrolled in an introductory psychology course at Wake Forest University, participated in exchange for partial course credit. The design of Experiment 3 employed a 2 (prior usage of tips guide: low vs. high) × 2 (effect of tips guide on performance: no effect on vs. improves) between-groups design. These factors were intended to manipulate perceptions of the IL and TL, respectively.

Procedure. Similar to the earlier studies, experimental materials were presented using MediaLab v2006 Research Software (Jarvis, 2006).

Manipulations. Participants then read the following statement: "Before we proceed to the roulette task, we wanted to let you know about a Roulette Tips Guide that we offer to half of our participants in the experiment. The Roulette Tips Guide includes tips and suggestions."

We then randomly assigned participants to receive information with regard to the prior usage of an alleged tips guide (intended to manipulate IL). In the *low prior usage of the tips guide* condition, participants were led to believe that when we did offer the tips guide in previous studies, only about 14% of students used it. To bolster the feasibility of this information, we added that many students comment that they are unmotivated to use the guide because roulette is "all about luck anyway." The *high prior usage of the practice guide* condition was led to believe that the rate was 86%. To bolster the feasibility of this information, we added that many students comment that they are motivated to use the guide because roulette is "not just about luck, and that some knowledge and skill is involved."

Furthermore, each participant was randomly assigned to receive information about the typical effect that the alleged

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tips guide has on roulette performance (intended to manipulate TL). In the *no effect on performance* condition, participants read the following statement:

> We also think it is fair to let you know that our data so far with the Roulette Tips Guide DOES NOT appear to affect performance in playing roulette. That is, students who do use the Roulette Tips Guide tend to perform no better than students who do not use the Roulette Tips Guide.

In the *improves performance* condition, participants read the following statement:

> We also think it is fair to let you know that our data so far with the Roulette Tips Guide DOES appear to affect performance in playing roulette. That is, students who do use the Roulette Tips Guide tend to perform better than students who do not use the Roulette Tips Guide.

Finally, to set the typical prefactual context, we then informed all of our participants that they were assigned to the condition that does not receive the Roulette Tips Guide.

Prefactual potency. We next measured the IL and TL estimates. To ensure that participants were clear about what they were to rate, we presented them with modified instructions from Petrocelli et al. (2011; Study 2). Participants read the following information:

> People often have thoughts like "If only . . . " when thinking about upcoming performances. Often, these thoughts are about things that are better than what they expect will actually happen. For example, you might be thinking "If only I could have some time with the Roulette Tips Guide, I could win in Roulette." This is an example of an if–then statement. People often make if–then statements when they consider alternatives that are better than expected. We would like to ask you questions about this "if . . . then" statement: "If only I could have some time with the Roulette Tips Guide, I could win in Roulette." 1) Consider the "IF" part of that statement: How likely would you have been to spend time reviewing the Roulette Tips Guide if it had been provided? 2) Consider the "THEN" part of that statement: Assuming you had actually decided to review the Roulette Tips Guide, how likely do you think it would be to win in Roulette? Make sure you understand the difference between these two kinds of questions before you continue.

Afterwards, participants were asked to consider just the likelihood of the first part of the prefactual thought regarding preparation time (IL), and to rate their perception of the likelihood that they would spend time reviewing the Roulette Tips Guide if it had been provided using an 11-point response scale anchored at *not at all likely* (0) and *extremely likely* (10). They were then asked to consider the second part of the prefactual thought regarding preparation time (TL). Hypothetically, if they had actually decided to review the Roulette Tips Guide, participants were asked to rate their perception of the likelihood that they would win in the roulette task using an 11-point response scale anchored at *not at all likely* (0) and *extremely likely* (10).

Anticipatory measures. Participants completed a series of measures in anticipation of the roulette task. Expectations about the outcome, negative affect, and anxiety were measured in an attempt to examine prefactual potency as a mediator of the potential relationships between the experimental conditions and anticipation of the roulette task outcome.

For expectations, participants were asked, "How well do you think you will perform on the roulette task?" "How easy do you think the roulette task will be for you?" and "How confident do you feel about your ability to perform well on the roulette task?" using 9-point response scales anchored at *not at all* (1) and *extremely* (9). These items were averaged as a single expectations index (Cronbach's $\alpha = .85$).

Negative affect was measured with the 14 items employed by Sanna (1996; Study 1). Specifically, participants rated how *happy, satisfied, pleased, delighted, content, relieved, glad, gloomy, annoyed, depressed, miserable, sad, disappointed*, and *frustrated* they were with regard to the upcoming roulette task using 9-point response scales anchored at *not well at all* (1) and *very much* (9). Positively valenced emotions were reverse scored. Because the context set by our manipulation made some of these emotions more relevant than others, we selected eight emotions (a priori) to serve as an index of negative affect, including happy, satisfied, pleased, delighted, glad, annoyed, disappointed, and frustrated. These items were averaged as a single negative affect index (Cronbach's $\alpha = .70$).[4]

State anxiety was measured using the state form of the State-Trait Anxiety Inventory (Spielberger, 1983). Participants responded to 20 statements (e.g., "I feel calm") using 4-point response scales anchored at *not at all* (1) and *very much so* (4). Items were averaged as a single state anxiety index (Cronbach's $\alpha = .93$).

Results and Discussion

Prefactual Potency. We first examined a two-way prior usage of tips guide × effect of tips guide on performance ANOVA using prefactual potency as a dependent variable. Two significant main effects (see Table 1) were qualified by the expected interaction, $F(1, 69) = 4.85$, $p < .05$. As displayed in the top panel of Figure 5, we found the same augmenting effects of the IL and TL manipulations that we found in Experiment 1 and Experiment 2. When prior usage of the tips guide was low, prefactual potency did not differ between participants led to believe that the tips guide did or did not

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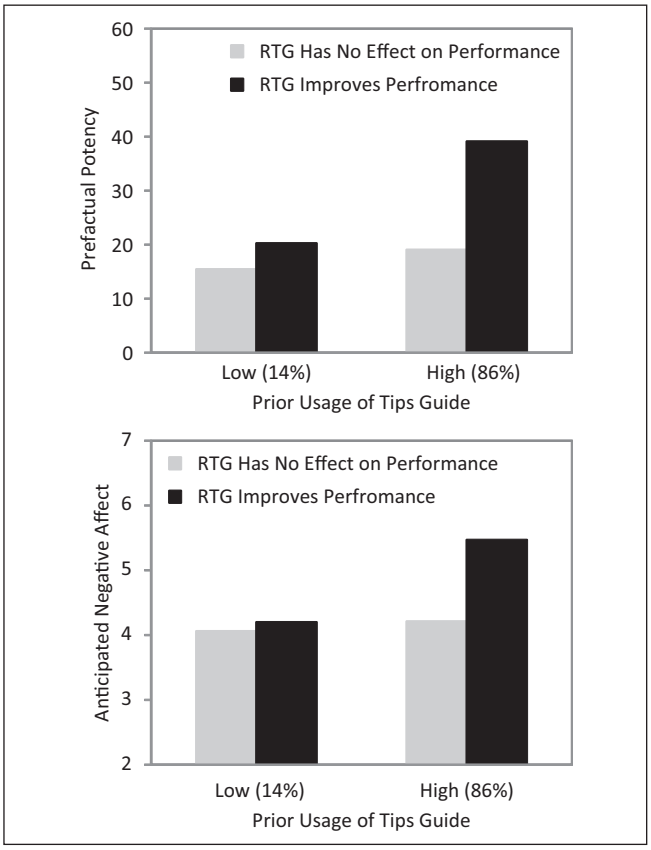

Figure 5. Mean prefactual potency and anticipated negative affect by alleged prior usage of the Roulette Tips Guide and alleged effect of the tips guide on performance conditions (Experiment 3)
Note: RTG = Roulette Tips Guide.

affect performance, $t(69) = 0.98$, *ns*. However, when prior usage of the tips guide was high, greater prefactual potency was reported when the tips guide was described as one that tends to improve performance than when it was not, $t(69) = 4.06$, $p < .001$. Furthermore, when the tips guide was described as one that tends to improve performance, greater prefactual potency was reported when prior usage of the tips guide was high than when it was low, $t(69) = 3.78$, $p < .001$; this difference was not observed when the tips guide did not improve performance, $t(69) = 0.75$, *ns*. Thus, the availability and use of the tips guide appeared to influence the perceived likelihood of alternatives to expected realities only when it was perceived to actually have influenced performance.

Anticipatory Measures. Next, we subjected each of the three anticipatory measures to the same two-way ANOVA as that used for the prefactual potency data. No significant effects emerged for expectations or state anxiety (all Fs < 1.00). However, significant effects emerged for anticipated negative affect. Again, two main effects for the IL and TL conditions emerged such that greater negative affect was reported when IL and TL were high rather than low (see Table 1). These effects were further qualified by a significant prior usage of tips guide × effect of tips guide on performance

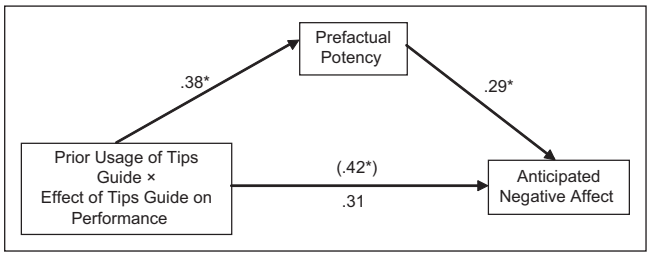

Figure 6. Results of mediated moderation analysis (Experiment 3)
*$p < .05$.

interaction, $F(1, 69) = 4.98$, $p < .05$. As expected, when prior usage of the tips guide was low, negative affect did not differ between participants led to believe that the tips guide did or did not affect performance, $t(69) = 0.39$, *ns*. However, when prior usage of the tips guide was high, more negative affect was reported when the tips guide tended to improve performance than when it did not, $t(69) = 3.53$, $p < .001$. Furthermore, when the tips guide was described as one that improves performance, more negative affect was reported when prior usage of the tips guide was high than when it was low, $t(69) = 3.51$, $p < .001$; this difference was not observed when the tips guide did not improve performance, $t(69) = 0.43$, *ns*. Thus, the availability and use of the tips guide appeared to influence negative affect only when it was perceived to actually have influenced performance.

Mediation analysis. Finally, we tested our mediation model for anticipated negative affect (see Figure 6). As described earlier, significant interactions were obtained for prefactual potency and anticipated negative affect. Prefactual potency predicted anticipated negative affect above and beyond the distal variables, whereas the distal interaction effect was reduced to nonsignificance (Sobel test: $z = 1.88$, $p = .06$).

General Discussion

The data of three studies reveal several important findings. First, it is clear that when both prefactual IL and TL are perceived to be high, prefactual thinking plays a role in the anticipation of one's future negative affect. When people consider the likelihood of a better-than-expected outcome to be high, they report greater anticipatory negative affect. We found this to be the case when dependent variables were measured before and after prefactual potency estimates were reported (Studies 1 and 2). Given that anticipated negative affect can subsequently affect actual experiences, decisions, and possibly performance, this places prefactual potency in a position of important influence.

Second, prefactual potency mediated the effect of the context (provided by our manipulations) on the anticipatory reactions. It may be the case that prefactual potency determines the strength of expectations concerning the future. Given the important role expectations play in shaping behavior, our findings have implications more generally for self-regulation and behavioral decision making. For instance, one's anticipated

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regret tends to guide risk-aversion behaviors (e.g., Kardes, 1994). Research also indicates that when the uncertainty of the future is salient, the anticipation of regret greatly impacts one's decisions (Larrick & Boles, 1995; Ritov, 1996; Ritov & Baron, 1995; Simonson, 1992; Zeelenberg & Beattie, 1997; Zeelenberg et al., 1996). Furthermore, especially among people with a future-oriented temporal focus (see Gleicher et al., 1995), anticipating the regret associated with one's decisions/behaviors appears to be a spontaneous mental activity. Interestingly, however, anticipated regret does not always appear to be spontaneous. In a situation requiring either a compliance or reactance response, Crawford et al. (2002) found that anticipated regret was judged to be greater for losing by way of reacting against a request than complying with the request. Those who anticipated regret were driven to comply, but those who did not tended to react. Thus, anticipating regret drastically altered their participant's final decisions. Interestingly, Crawford et al. also found, as in many cases, the social perceiver is wrong. That is, those who anticipated regret tended to comply because they anticipated greater regret in losing through reactance than compliance. However, when asked to rate their actual regret following the event, those who complied reported greater regret than those who had reacted against the request.

Although we examined self-reported anticipated negative affect in only one study, we find it important to note that many people find it rather easy to picture themselves in the scene of a narrative scenario and become mentally involved in it as if they, themselves, were the target (Dal Cin, Zanna, & Fong, 2004; Green, 2005; Green & Brock, 2000; Green, Brock, & Kaufman, 2004). Thus, we believe that the tendencies we found for the perceived anticipated negative affect of the social targets are similar to those of judgments for the self.

Third, prefactual potency mediated the effect of the context (provided by our manipulations) on one's anticipatory negative affect. Consistent with Sherman and McConnell's (1995) arguments that counterfactual thinking can sometimes have dysfunctional implications (also see Petrocelli & Crysel, 2009), it appears that in some cases prefactual thinking may also have some dysfunctional implications (also see Criado del Valle & Mateos, 2008; Sanna, 1996, 1998). However, it is worth noting that upward prefactuals appear to be quite functional for defensive pessimists and that upward counterfactuals appear to be functional for optimists.

Given that the perceived likelihoods of alternatives to expected realities (i.e., prefactual potency) appear to influence affect, we contend that prefactual potency is also important to judgment, decision making, and performance. However, we find it important to note that the effect of negative affect is not always negative with regard to performance. For instance, Sanna et al. (1996) showed that when people possess the goal of completing as much work as they can, negative mood is associated with putting forth greater effort and persistence, resulting in performance gains. Hesse and Spies (1996) found that task performance can increase under negative mood conditions when the task requires a systematic, analytic, and detail-oriented strategy.

Interestingly, Sanna (1996; Study 1) showed that upward prefactualizing is relatively uncharacteristic of optimists but characteristic of defensive pessimists (i.e., people who find it beneficial to take a negative outlook on upcoming performances; Norem & Cantor, 1986). This tendency appears to be associated with lesser degrees of anxiety and negative affect, and greater expectations of success among optimists than defensive pessimists. However, Sanna (Study 2) also showed that optimists, focusing on upward prefactuals, performed poorer on an anagram task relative to a distraction task (control condition). Furthermore, defensive pessimists performed better when they engaged in upward than downward prefactualizing before the task (also see Sanna, 1998). Similar findings were reported by Criado del Valle and Mateos (2008).

One possibility by which prefactual potency might influence performance may be through a defensive effort-based self-fulfilling prophecy (see Archibald, 1974). Just as a baseball player with a sore shoulder still takes his at bat, his effort may not be as great with the sore shoulder as it is when his shoulder is not sore. In the case of a sore shoulder-at bat, he may think to himself, "If only I didn't have a sore shoulder, I could hit a home run." This sort of thinking can dismiss and justify any lack of effort. Thus, future research efforts would do well to investigate the possible role of motivation.

One obvious implication of the current work is the possibility that adjustments in prefactual potency may affect the role played by prefactuals in affect, decisions, and performance. For example, when optimists are led by the context to engage in upward prefactual thinking, metacognitive adjustments might be made to prefactual potency. That is, given that we showed prefactuals were influential to the extent that they were potent, one might reduce the unwanted effects of prefactuals by thinking about reasons why his or her prefactuals might be incorrect, implausible, or unreasonable. As Byrne and Egan (2004) have shown, people tend to make assumptions about the link between the proposed alternative antecedent and the outcome. That is, once an alternative antecedent is regarded as likely, people appear to assume that the resulting outcome is certain to occur. This linkage may be the critical point to adjust prefactual potency with targeted questioning. The possibility that intentional changes in prefactual potency may attenuate the undesirable effects (or augment the desirable effects of defensive pessimists) also warrants further attention.

Conclusion

Our results show that prefactual potency had a direct effect on perceivers' judgments of a social target's anticipated negative affect (Experiment 1 and Experiment 2). Prefactual potency was also shown to have a direct effect on one's own self-experienced anticipatory negative affect (Experiment 3).

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These results provide evidence that people make judgments about the likelihood of alternatives to their expectations and that these likelihood estimates have implicit consequences in that they impact judgments and behavior.

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Notes

1. Research has shown that counterfactual thoughts influence a wide variety of responses, including causal reasoning (Wells & Gavanski, 1989), affective reactions (e.g., Johnson, 1986; Landman, 1987), feelings of satisfaction (e.g., Medvec, Madey, & Gilovich, 1995), judgments of blame and responsibility (e.g., Alicke, Buckingham, Zell, & Davis, 2008; Goldinger, Kleider, Azuma, & Beike, 2003), personal feelings of regret (e.g., Miller & Taylor, 1995), and perceptions of regret experienced by other individuals (e.g., Kahneman & Miller, 1986; Kahneman & Tversky, 1982). Counterfactuals appear to be spontaneous (Markman, Gavanski, Sherman, & McMullen, 1993; McEleney & Byrne, 2006; Petrocelli & Sherman, 2010) and automatic (Goldinger et al., 2003; Roese, Sanna, & Galinsky, 2005), particularly following undesirable outcomes.
2. Counterfactual potency is a metacognitive aspect of a counterfactual referring only to one's subjective estimates of the likelihood of alternative worlds. Thus, it is distinct from the strength or intensity by which people subjectively "experience" the counterfactual (i.e., *counterfactual intensity*; Sanna & Turley-Ames, 2000) as well as the ease with which counterfactual information is processed (i.e., perceptual and conceptual fluency; Jacoby, 1983; Jacoby & Dallas, 1981; Reber, Winkielman, & Schwarz, 1998). However, we suspect that potency, intensity, and perceptual fluency are positively correlated, and that further research is needed to define their boundaries.
3. The measurement order involving anticipated regret (before vs. after likelihood judgments) failed to qualify these effects in any way. Thus, this variable was not included in our final analysis, and it will not be discussed further.
4. Although we employed the more internally consistent 8-item measure of anticipatory negative affect, rather than the 14-item measure, all of our subsequent statistical conclusions were virtually the same with both measures.

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