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Avoiding Anxiety, Being in Denial, or Simply Stroking Self-Esteem: Why Self-Positivity?

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This article studies the presence, resilience, and direction of the self-positivity bias under various conditions to examine the role of self-esteem maintenance as an important antecedent for the bias. Experiment 1 manipulates the perceptions of the uncontrollability of cancer and presence of base-rate information as independent variables that together eliminate the self-positivity bias in perceptions of the risk of cancer. Experiment 2 shows the same effects using 4 life events that differ in terms of valence and perceived controllability; that is, base-rate information affects self-estimates for uncontrollable life events, reducing the self-positivity bias, but does not affect self-estimates for controllable events. Experiment 3 shows that these effects only apply to optimistic individuals who fail to incorporate base-rate information into their self-perceptions for controllable events. In contrast, pessimists use base rates to update their self-estimates irrespective of the controllability of the event. Overall, the pattern suggests that self-positivity is attenuated in conditions that implicate self-esteem. Implications for health care marketing are discussed.

Consumers' decisions to purchase products or services are frequently a function of the perceived risks of the product or service's performance. For example, the likelihood of purchasing a specific brand of car, appliance, software, or service is a function of the perceived risk that the product or service might perform unsatisfactorily. In other domains, purchase probabilities can be contingent on perceptions of the likelihood of an event occurring (e.g., purchasing a lottery ticket or a product with a sweepstake promotion, etc.). Consumers' health-related behavior can also depend on their perceptions of the risk of contracting a specific disease. Studying these perceptions is important in light of evidence that individuals believe they are less likely than the average person to experience a negative event ("self-positivity" bias; Perloff & Fetzer, 1986) and more likely than others to experience a positive one ("unrealistic optimism"; Weinstein, 1980). This systematic bias in perceptions of relative risk can lead to nonoptimal purchases, decisions, and behaviors. Reducing the relative bias in self-perceptions, on the other hand, has been shown to encourage preventive behavior (e.g., Raghubir & Menon, 1998).

An important public policy objective is, accordingly, to get people to perceive their own risk accurately. A question of interest to health marketers is whether providing base rates of an event can accomplish this. In fact, prior research shows that people often ignore base-rate information (Tversky & Kahneman, 1998). Therefore, incorporating base rates into self-estimates may be a necessary, but not a sufficient, condition to eliminate the self-positivity bias. It is important to

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identify factors that would attenuate the self-positivity bias in a relative sense, as otherwise, even after knowing base rates, consumers may continue to engage in nonoptimal behaviors.

This article examines the underlying reason behind self-positivity. We propose that self-positivity can result from three factors: an overall desire to feel happy (Raghubir & Menon, 1998); a reduction in anxiety about the uncertainty associated with future life outcomes (Taylor & Brown, 1988); and the desire to maintain or enhance self-esteem, defined as "confidence and satisfaction about oneself" (Weinstein, 1980). We suggest that examining the moderating effect of an event's perceived controllability, the use of base rates in self-estimates, and the manner in which optimists and pessimists estimate likelihood can help to distinguish between these three routes to self-positivity. These variables are also used to explain inconsistent effects regarding the presence of self-positivity across a range of events, the direction and presence of self-positivity for different populations (e.g., depressives), and the differential resistance of the bias to base-rate information. We argue that self-judgments are constructed to maintain self-esteem. To test this, this article examines the attenuating effects of: (a) providing reference points to act as "base rates" and (b) decreasing the perceived event's controllability on the self-positivity bias. Three studies programmatically examine this idea.

Experiment 1 shows the attenuating effect of controllability perceptions and the presence of base-rate information on beliefs about cancer. Although there are a number of ways in which an individual can reduce the risk of cancer, the relation of the disease to individual behaviors is not entirely under one's control—many individuals who do not engage in "high-risk" activity are still diagnosed with cancer. This can affect their intentions to engage in preventive behaviors. For diseases like cancer that are partially beyond the control of the individual, the public health goal is to persuade people to screen themselves proactively. Early diagnosis is a key to the successful treatment of cancer. The public policy goal is to reduce (or eliminate) the self-positivity bias in the estimates of cancer. Therefore, Experiment 1 examines whether making a relatively uncontrollable event, like cancer, perceived as even less controllable will eliminate the self-positivity bias.

Experiments 2 and 3 extend the investigation beyond the domain of cancer. Experiment 2 replicates the results of Experiment 1 under conditions in which the controllability of different behaviors is measured rather than manipulated and extends the domain of consideration to positive events as well as negative ones. It shows that when events are perceived to be beyond one's control, base-rate information attenuates the self-positivity effect, but when events are perceived to be controllable, then the presence of base rates does not attenuate the self-positivity bias as self-estimates do not incorporate provided base rates.

Finally, Experiment 3 shows that the effects of base-rate information and controllability on the self-positivity bias depend on the a priori disposition to be optimistic or pessimistic. Specifically, optimists are less likely to update self-estimates when events are controllable than when they are not. Pessimists, on the other hand, incorporate base-rate information into their self-estimates irrespective of the perceived controllability of the event. However, although this reduces self-negativity, it does not eliminate it entirely. The reduction in self-negativity for pessimists that results from base-rate information, coupled with the lack of change in self-positivity for optimists for controllable behaviors, leads to a net displacement of self-estimates away from base rates, as found in Experiment 2.

First, the literature on self-positivity effects is reviewed and the role of perceived controllability and optimism in accounting for the effects of base-rate information is discussed. Then, after presenting the results of our research, we consider their implications for health care marketers and for consumer psychologists.

THEORETICAL FRAMEWORK

Self-Positivity Bias

Among the most robust findings in research on social psychology over the last two decades is that people tend to believe that their chances of experiencing negative events are lower than those of other people, whereas their chances of experiencing positive events are higher. This tendency is known alternately as "unrealistic optimism" (Weinstein, 1980), "Self-enhancement bias" (Brown, 1986), or "self-positivity bias" (Raghubir & Menon, 1998).

An important manifestation of self-positivity bias is that people perceive themselves as being above average on a wide variety of desirable traits (Brown, 1990; Dunning, Meyerowitz, & Holzberg, 1989; Taylor & Brown, 1988). Weinstein (1980) found that college students believe that they are significantly more likely than other undergraduate students to like their post graduation jobs, own their own homes, earn a relatively high starting salary, travel to Europe, receive a work-related award, have their houses double in value within the first 5 years of ownership, live past 80, and have a mentally gifted child. Moreover, people expect others to be victims of misfortune but not themselves. Weinstein (1980) argued that such ideas imply not merely a hopeful outlook of life, but an error in judgment that he labeled *unrealistic optimism.*

Other research confirms the disposition for individuals to believe that their chances of experiencing negative events are lower than those of other people (Perloff & Fetzer, 1986). Consumer researchers are also increasingly interested in this phenomenon (Block & Ramanathan, 2002; Keller, Lipkus, & Rimer, 2002; Luce & Kahn, 1999; Menon, Raghubir, & Menon, 1998). Reducing self-positivity has been shown to encourage preventive behaviors (Menon, Block, & Ramanathan, 2002; Perloff & Fetzer, 1986; Raghubir &

Menon, 1998; Weinstein, 1980). For example, Block and Keller (1995) found that people uncertain about the efficacy of taking preventive action against skin cancer processed persuasive messages in greater depth and were more likely to engage in preventive behaviors.

One manifestation of this self-positivity bias is the tendency for people to underestimate their own health risks as compared to the risks they attribute to others. This bias is evident in estimates of the risk of getting AIDS (e.g., Bauman & Siegel, 1987; Joseph et al., 1987; Raghubir & Menon, 1998; Schneider, Taylor, Kemeny, & Hammen, 1991), cardiac diseases (e.g., Dolinski, Gromski, & Zawisza, 1987; Lee, 1989; Weinstein & Lachendro, 1982), influenza (Larwood, 1978), hepatitis C (Menon et al., 2002), cancer (Perloff & Fetzer, 1986), suicide (e.g., Drake, 1987; Perloff & Fetzer, 1986), and depression (Kuiper & Derry, 1982; Kuiper & MacDonald, 1983). These diseases differ in the extent to which the outcome is under an individual's control, and it has been suggested that higher perceived controllability leads to greater self-positivity bias (see Harris, 1996, for a review). Therefore, at one end of the continuum are AIDS and Hepatitis C, which can only be contracted via unsafe behaviors (unsafe sex or sharing needles). Preventing such diseases are within an individual's control. At the other end of the continuum are diseases that are less controllable (cancer, cardiac diseases, mental health problems), which may be partially based on genetic and environmental factors.

Three Routes to Self-Positivity

When estimating the likelihood of future events, people may be anxious about not only the problems associated with the event itself, but also the uncertainty associated with not knowing whether it is or is not going to occur. For example, people may be anxious about whether or not they will be diagnosed with cancer or will get a divorce (uncertainty of the outcome) over and above the anxiety they feel about the actual event occurring. This is because uncertainty is aversive in and of itself. A similar conclusion was drawn by Swann, Griffin, Predmore, and Gaines (1987), who argued that people's need for self-consistency can often overtake their need for self-enhancement as a result of their need to predict and control their environment.

Estimating one's risk of a negative event as lower than another person's should reduce anxiety on both counts: feeling happier because one is less at risk and feeling more certain because the risk estimate is more clearly defined. This implies two possible routes that could lead to self-positivity: an overall wish to feel happy by denying the risk, as suggested by Raghubir and Menon (1998), or a route to reduce the anxiety associated with the uncertainty of the outcome (see review by Taylor & Brown, 1988). A third route that could lead to self-positivity effect is self-esteem maintenance (Weinstein, 1980). By examining the moderating effect of perceived control of the behavior, use of base-rate information, and the moderating role of individual optimism, the influence of these three routes on self-positivity can be evaluated.

The Moderating Effect of Perceived Control

Suppose the underlying motive for self-positivity is to feel happy and that this motive gives rise to a denial that one is at much at risk as others. Then, people's beliefs should reflect optimism regardless of the perceived controllability of the behavior. On the other hand, suppose self-positivity results from its use as a mechanism to reduce anxiety about the uncertainty associated with future events. If this is so, then self-positivity should be greater when events are more uncertain. One factor that makes events more uncertain is their actual level of likelihood: events that occur with a probability of .50 are more uncertain than those that occur with a probability closer to either 0 or 1. Consistent with this argument, Zakay (1984) argued that as the actual probability of an event is low, self-positivity patterns would become less evident for positively valenced events (e.g., winning the lottery). Another manifestation of uncertainty is the controllability of the outcome. The less controllable an event, the more uncertain should be its likelihood of occurrence. Therefore, if self-positivity reduces anxiety due to uncertainty, it should be stronger for events that are less controllable.

However, if self-positivity is due to self-esteem maintenance, it should be exacerbated for controllable events. As Weinstein (1980) conjectured, "the greater the perceived controllability of a negative event, the greater the tendency for people to believe that their own chances are less than average; the greater the perceived controllability of a positive event, the greater the tendency for people to believe that their own chances are greater than average" (p. 808). If people can attribute a lower risk of a negative event (or a higher likelihood of a positive event) to their own actions, the belief that they are less at risk than others should improve their self-esteem. As individuals are more able to attribute the occurrence of controllable (vs. uncontrollable) events to their own actions, these events should have higher self-positivity. As such, if perceived controllability exacerbates the self-positivity bias, this would implicate self-esteem as an underlying cause.

Although self-positivity effects have been demonstrated across a wide continuum of diseases, there are a few notable exceptions to the bias. Perloff and Fetzer (1986, Study 1) demonstrated that self-positivity affected estimates of the likelihood of getting hypertension, being diagnosed with cancer, having a heart attack, developing a drinking problem, getting divorced, having a venereal disease, and being mugged. However, it did not influence estimates of the likelihood of a car accident, having a nervous breakdown, and diabetes. Perloff and Fetzer conjectured that the relatively lower control of an individual over the latter outcomes might account for their findings. Although other studies have shown self-positivity biases in these domains (cf. Robertson, 1977;

Weinstein, 1984), this explanation is worthy of consideration. In this regard, Harris (1996) suggested, "Perceived control is sufficient but not necessary for optimistic bias" (p. 14). Thus, although a self-positivity bias may occur in judging controllable events, it may also be evident, albeit weaker, in judging uncontrollable ones. This possibility, however, has not been empirically demonstrated via manipulating perceptions of controllability for the same event.

The Use of Base Rates

If people process information normatively, an indication of base rates should bring estimates for both self and others into line with these base rates and eliminate the self-positivity bias. However, people have been shown to disregard base-rate information or, at least, to use it inadequately (Tversky & Kahneman, 1998). Evidence regarding the effectiveness of base-rate information in eliminating self-positivity bias is mixed.

Researchers have suggested that unrealistic optimism arises in part because people lack sufficient information about others or fail to consider the circumstances of others (Regan, Snyder & Kassin, 1995). For example, Weinstein (1980) asked students to generate a list of factors that would increase or decrease their chances of obtaining specific positive and negative future outcomes. A second group of students who read these lists subsequently became significantly less optimistic about their own chances with respect to negative outcomes. Similarly, Weinstein and Lachendro (1982) demonstrated that providing undergraduate men and women with detailed, personalized information about the risk status of five other students reduced unrealistic optimism for negative events, as did simply asking participants to imagine that they were a typical same-sex student and then to fill out a list of personal risk factors as if they were that student. Although significant optimistic biases remained, both these methods attenuated unrealistic optimism.

Note that the self-positivity bias is a relative bias where self-estimates diverge from estimates of another person. The bias has been shown to be important in affecting the manner in which people process information and their intentions to engage in preventative behaviors, even when self-estimates of risk are higher than actual estimates of risk. For example, Raghubir and Menon's (1998) data on AIDS perceptions showed that self-estimates of risk were as high as 7 to 15 (on a 100-point scale), reflecting a much higher than actual risk of AIDS for an individual in Hong Kong at the time the data was collected. Similarly, Keller et al. (2002) also showed that women overestimate their risk of breast cancer. However, although relative estimates of risk are important, an important public policy objective would be to bring self-estimates in line with actual risk levels. Providing base rates might be one way to accomplish this goal. Therefore, beyond examining the relative bias in self-perceptions, we also examine the accuracy of self- and other-estimates both when the actual base rate is not provided and when it is.

The manner in which base-rate information is used to update self- or other estimates in different situations can help to understand the reason underlying self-positivity. If self-positivity is due to uncertainty reduction, then base rates should always be used as they allow a person to resolve the uncertainty that an event will occur; but if it is due to a wish to feel happy, then they should not be used. However, if self-positivity is due to self-esteem maintenance, the controllability of the behavior should moderate the extent to which base rates are incorporated into a judgment. People should be more likely to use base rates to estimate their own risk of experiencing uncontrollable events than the risk of experiencing controllable ones. If self-estimates of the likelihood of controllable events are fortuitously accurate, providing base rates could actually decrease this accuracy as a result of the desire to maintain perceptions of superiority to others.

Moderating Effect of Base-Rate Information on Optimists' and Pessimists' Estimates

A key issue that has not received much attention in the literature is whether the perceived controllability of an event will have symmetric effects for those who demonstrate self-positivity (optimists) and those who demonstrate self-negativity (pessimists). Similarly, prior literature has not systematically examined the manner in which base-rate information is integrated into a judgment and how it affects patterns of self-positivity or self-negativity.

Depressives, who typically have a pessimistic outlook on life, have been shown to be realistic about accepting their likelihood of risk ("depressive realism"; cf. Alloy & Abramson, 1979; see Ackermann & DeRubeis, 1991, for a review). They view their life and future in negative terms (Beck, 1967, 1976). Importantly, they have low levels of self-esteem (Gerrard, Gibbons, Reis-Bergan, & Russell, 2000). Their absolute estimates reflect pessimism and their relative estimates reflect self-negativity rather than self-positivity (Keller et al., 2002). Optimists, on the other hand, are defined as those whose estimates reflect an absolute level of positivity (i.e., they believe that they are less at risk for a negative event and more likely to experience a positive event than they actually are). We propose that these individuals' relative estimates will reflect self-positivity.

The manner in which base-rate information is used to update estimates as a function of the type of behavior (controllable or uncontrollable) and the type of individual (optimist or pessimist) could illuminate the underlying reason for self-positivity. If self-positivity results from an overall wish to feel happy via denial as argued by Raghubir and Menon (1998), optimists should not update their self-estimates, whereas pessimists should. This pattern across the two groups of individuals should not be contingent on the controllability of the behavior. On the other hand, if the underlying reason for

self-positivity reflects a desire to decrease uncertainty-generated anxiety, people should adjust their estimates to conform to base rates when events are uncontrollable, as the likelihood of these events is particularly uncertain. These adjustments would make people less biased overall. Note that if their prior estimates reflect positivity, the adjustments would make them unhappier, albeit less uncertain.

If self-positivity is due to self-esteem maintenance, however, optimists and pessimists should react to base-rate information differently. Optimists, who have high self-esteem and demonstrate self-positivity, should be less likely to update their self-estimates overall. When they do, they should be more likely to adjust their estimates of uncontrollable events than their estimates of controllable ones. However, pessimists with self-negativity and low self-esteem should update their estimates for events irrespective of the perceived controllability of the event.

Experiment 1 shows that self-positivity bias is contingent on perceptions of controllability as experimentally manipulated and that making an uncontrollable behavior even more uncontrollable can eliminate the self-positivity bias when base rates are available to make self and other judgments. Experiment 2 shows that the effects of controllability generalize over other domains. Experiment 3 shows that these effects apply only to optimists, who update estimates for uncontrollable events more than they do for controllable events. Pessimists, however, are positively influenced by base-rate information regardless of the controllability of the events.

EXPERIMENT 1

Experiment 1 examines the moderating effect of providing information about population base rates on the self-positivity bias for cancer under conditions when it is perceived to be differentially controllable. Cancer was chosen as the domain of experiment as it has been the leading cause of cancer in Taiwan for the past decade. The public policy goal is to eliminate self-positivity in perceptions of the risk of cancer. Note that cancer is normally viewed as an uncontrollable event. However, earlier research has found self-positivity effects in perceptions of the risk of cancer (e.g., Perloff & Fetzer, 1986). To examine if this self-positivity bias can be eliminated, we study the effect of making this disease appear to be even less controllable than it is typically seen. We predict that the self-positivity bias will be attenuated when cancer is perceived to be uncontrollable and when base-rate information is present to estimate risk. Such an effect would be of interest to health marketers who wish to eliminate the self-positivity bias in the risk estimates of cancer.

Method

Participants. A total of 96 undergraduate students at a Taiwanese university were assigned at random to one of four between-subjects conditions. The experiment was run as an in-class exercise and participants were debriefed at the end of the exercise.

Design. We used a 2 × 2 × 2 (Target Person: self vs. average person × Base Rate: present vs. absent × Controllability: no information vs. uncontrollable information) mixed design, with the target person manipulated within subjects and base rate and controllability manipulated between subjects. Participants were assigned at random to one of the four between-subjects conditions.

Procedure. The study started with a brief introduction stating that it was related to cancer awareness among undergraduates. This introduction manipulated the two between-participants factors: controllability and base rates.

Controllability over cancer was then manipulated by including (or not including) an article about cancer. In the conditions manipulating the lack of control over cancer, participants were given an excerpt from a medical magazine to read. It began with the sentence: "Do not assume that you will never get cancer if you don't have any bad habits," and described a man who led a healthy life but was diagnosed with cancer. The presence of base rates was then manipulated by including an official estimate of the average lifetime risk of cancer. Specifically, respondents were told "Based on Government Statistics, 30% of the people in Taiwan will get cancer during their life time." This sentence was absent for the "base-rate absent" condition.

To summarize, participants in the base-rate absent, no control information condition were simply told that the study was related to cancer awareness among undergraduates. Participants in the base-rate present, no control information condition were given the statement about government statistics. Participants in the base-rate absent, lack of control information condition were given the excerpt from the medical magazine. Participants in the base-rate present, lack of control information condition were given the excerpt from the medical magazine followed by the statement about government statistics. All participants completed the dependent measures.

Measures. After being introduced to the study, participants were asked to estimate the likelihood of getting cancer from 0% to 100% for the two targets: self and the average person in Taiwan. The order of elicitation of these estimates was counterbalanced. The effectiveness of the manipulation of perceived controllability was inferred from of participants' estimates of the controllability of cancer along a 7-point scale ranging from 1 (*not at all under my control*) to 7 (*totally under my control*).

Results

The manipulation of the controllability of cancer worked as intended. Cancer was perceived to be less controllable when

the article was provided, *M*'s = 3.09 vs. 3.58 for information about lack of control versus no information respectively; $F(1, 92) = 3.27$, $p < .05$. Base rates did not exert a main or interaction effect (*F*'s < 1).

We expected that self-estimates would be no different from other-estimates when cancer was perceived to be less controllable and base-rate information was provided concerning the likelihood of getting it. To evaluate this possibility, likelihood estimates were analyzed as a function of base-rate availability, controllability, and target (self vs. other). Results of this analysis, summarized in Table 1, are consistent with expectations. Participants generally judged themselves to be less at risk ($M = 31.45$) than others ($M = 39.32$), $F(1, 92) = 16.47$, $p < .001$, suggesting an overall disposition toward self-positivity. However, the magnitude of this difference, summarized in the bottom third of Table 1, depended on both the availability of base-rate information and perceptions of the disease's uncontrollability.

Specifically, a self-positivity bias was not evident when participants were informed that cancer was very uncontrollable and were provided with objective base-rate information. That is, self-estimates of the likelihood of getting cancer in this condition did not differ from their estimates of the likelihood that others would get it (*M*s = 35.73 vs. 37.77). In all other cases, however, a significant self-positivity bias occurred.

Although these differences are consistent with expectations, a closer scrutiny of the effects of perceived uncontrollability and base-rate information on self-estimates and other-estimates is provocative. These effects can be seen most clearly from the differences between each set of estimates and the objective base-rate probability, summarized in the two right columns of Table 1. When participants had not been explicitly informed that cancer was uncontrollable and no base-rate information was provided, their self-estimates of risk were substantially lower than base rates ($M_{diff} = –9.32$) whereas their estimates of others' risk were fairly accurate ($M_{diff} = 1.89$). In the other three conditions (i.e., when either base-rate information was available or the uncontrollability of cancer was explicitly emphasized), participants' self-estimates of risk were nonsignificantly higher than base rates (averaged over the three conditions, $M_{diff} = 5.04$) whereas their estimates of others' risk were substantially greater than the base-rate information they were given ($M_{diff} = 11.79$).

EXPERIMENT 2

Cancer is a negatively valenced and less controllable life event. Experiment 1 showed that making it appear to be even more uncontrollable eliminated the self-positivity bias when base rates were provided. The question remains as to how base rates are used for controllable events and for positive events. In a review of the link between perceived controllability and a general optimism bias (including self-positivity), Harris (1996) concluded that "there is a need to assess whether the association also holds for positive events and to provide further tests of the hypotheses that perceived controllability is an independent predictor of optimistic bias" (p. 33). Therefore, Experiment 2 examined whether the interactive effects of perceived controllability and base rates that were found for cancer in the first experiment would extend to other life events that are differentially controllable, differently valenced, and have different base rates. Instead of artificially manipulating controllability, we determined whether the predicted patterns occurred for events that varied a priori in perceived controllability.

We also examined the robustness of the effects of controllability for positively and negatively valenced events. As mentioned earlier, self-positivity bias could depend on the motivation that underlies it. If self-positivity bias is due to a desire to feel happy by denying the likelihood of negative events, providing base-rate information should not reduce self-positivity. If it is due to a desire to reduce anxiety that results from uncertainty, however, base rates should generally decrease the self-positivity bias for both positive and nega-

TABLE 1
Mean Perceived Likelihood of Getting Cancer: Experiment 1

	Absolute Risk Estimates		*Estimates Relative to Base-Rate (30%)*	
	No Base-Rate Information	*Base-rate Information*	*No Base-Rate Information*	*Base-Rate Information*
Self-estimates				
No uncontrollability information	20.68 (19)[a]	36.84 (19)	–9.32*	6.84
Uncontrollability information	32.54 (28)	35.73 (30)	2.54	5.73
Other-estimates				
No uncontrollability information	31.89	45.79	1.89	15.79*
Uncontrollability information	41.82	37.77	11.82*	7.77*
Difference (self-positivity bias)				
No uncontrollability information	–11.21*	–8.59*		
Uncontrollability information	–9.28*	–2.04		

[a]Number of subjects per cell is indicated in parentheses.
*Significantly different from 0 at $p < .05$.

tive uncontrollable events. Finally, if the self-positivity bias reflects a desire to maintain self-esteem, people should be less likely to incorporate base-rate information into self-estimates for both positive and negative controllable events.

Pilot Study

The purpose of the pilot study was to identify four events that varied in terms of their controllability and valence. Eight events were pretested, of which four were positive (having a happy marriage, liking a postgraduation job, having a mentally gifted child, and winning the lottery) and four were negative (getting a divorce, having an auto accident, being a victim of a burglary, and getting cancer). Note that the lottery used here was a traditional "lotto"-type lottery ticket, where a player picks 6 out of a possible 42 numbers. Draws are held every Tuesday and Friday, with matches of 3 or more numbers winning a prize. This lottery has lower odds of winning, though the prize pot is higher.

Forty first-year students drawn from the same pool as the experimental participants were asked to assess the degree to which an actor has control over an event's outcome for each of the events, using a 7-point scale ranging from 1 (*not at all under my control*) to 7 (*totally under my control*). Average controllability of the negative events showed that getting a divorce was perceived to be most within an individual's control ($M = 4.90$), followed by having an auto accident ($M = 4.58$), being the victim of a burglary ($M = 4.45$), and getting cancer ($M = 2.75$, p's $< .001$). For the positive events, having a happy marriage was perceived to be most controllable ($M = 5.68$), followed by liking a postgraduation job ($M = 4.65$), having a mentally gifted child ($M = 2.88$), and winning a lottery ($M = 1.93$, p's $< .001$). On the basis of the average scores obtained for each event, the events perceived as most and least controllable were selected for both negative and positive events.

As the perceptions of controllability are more extreme for the positive event of winning the lottery ($M = 1.93$) than for the negative event of contracting cancer ($M = 2.75$), we wish to reduce the perceived controllability of contracting cancer. The study in Experiment 1 had successfully reduced the perceptions of the controllability of cancer by half a scale point. Therefore, to attempt to equate the perceived controllability of the positive and negative uncontrollable events, the cancer condition included the article used in Experiment 1.

Method

Participants. A total of 197 undergraduate students participated in this experiment. They were assigned at random to one of the eight between-subjects conditions.

Design. A 2 × 2 × 2 × 2 × 2 (Target Person: self vs. average person × Event Valence: positive vs. negative × Degree of Controllability: low vs. high × Base-Rate information: present vs. absent × Order: self first vs. average person first) mixed design was used in this study. The target person was manipulated within subjects as in Experiment 1. The order of elicitation was counter-balanced.

The remaining factors were manipulated between subjects. The two positive and two negative events differing on controllability were chosen on the basis of the pilot test (described earlier). These were: happy marriage (positive–high control), divorce (negative–high control), cancer (negative–low control) and lottery (positive–low control).

Base rates were based on an official publication of the Government Statistical Reports: Monthly Bulletin of Statistic and were provided prior to the estimation task in the condition where they were present (Divorce = 25%, Cancer = 30%, Happy Marriage = 60%, and Lottery = 10%).

Procedure. The procedure and measures used were similar to Experiment 1. Study participants were informed that the study was to do with life events. (For the cancer condition, they were provided with the article about cancer, in the other conditions they were not). They were then asked to estimate the likelihood of the event they were assigned to, occurring for the two targets: self and average person. Manipulation checks for controllability followed at the end of the study.

Results

Manipulation checks. As expected, divorce was perceived to be more controllable than cancer, Ms = 5.12 versus 3.91; $F(1, 92) = 23.53$, $p < .0001$, and having a happy marriage was perceived to be more controllable than winning a lottery, Ms = 4.58 versus 2.10; $F(1, 101) = 74.96$, $p < .0001$.

Likelihood estimates. Likelihood estimates are shown in Table 2 as a function of a function of target (self vs. average person), valence (positive vs. negative), controllability (high vs. low) and base-rate availability. An overall analysis of these data yielded an interaction of valence and controllability, $F(1, 189) = 68.03$, $p < .001$, and a three-way interaction of target, valence, and controllability, $F(1, 189) = 27.09$, $p < .001$. Also, this three-way interaction is itself contingent on base-rate availability, $F(1, 189) = 4.73$, $p < .05$.

Negatively valenced events. The nature of this interaction can be seen from the difference between self-estimates and other-estimates at each level of controllability, base-rate availability, and valence, summarized in the bottom third of the table. Base-rate information increased the self-positivity bias when events were controllable but decreased it when events were uncontrollable. In fact, as in Experiment 1, the difference between self-estimates and other-estimates for negatively valenced events was much less when events were uncontrollable and base-rate information was available ($M_{diff} = -1.27$) than it was at any of the other three combinations of controllability and base-rate availability (averaged over con-

TABLE 2
Estimated Likelihood of Experiencing Negative and Positive Events: Experiment 2

	Absolute Risk Estimates		*Estimates Relative to Base-Rate*	
	No Base-Rate Information	*Base-Rate Information*	*No Base-Rate Information*	*Base-Rate Information*
Negative events				
Self estimates				
High controllability	24.88 (25)[a]	18.74 (23)	–0.12	–6.26
Low controllability	25.96 (24)	31.41 (22)	–4.04	1.41
Other estimates				
High controllability	33.48	35.65	8.48*	10.65*
Low controllability	36.33	32.68	6.33	2.68
Difference (self-positivity bias)				
High controllability	–8.60*	–16.91*		
Low controllability	–10.37	–1.27		
Positive events				
Self estimates				
High controllability	65.56 (27)	71.08 (25)	5.56	11.08*
Low controllability	19.44 (25)	11.46 (26)	9.44*	1.46
Other estimates				
High controllability	49.37	48.12	–10.63*	–11.88*
Low controllability	26.40	24.92	16.40*	14.92*
Difference (self-positivity bias)				
High controllability	16.19*	22.96*		
Low controllability	–6.96	–13.46*		

[a]Number of subjects per cell is indicated in parentheses.
*$p < .05$.

ditions, $M_{diff} = -11.96$, $F(1, 92) = 2.84$, $p < .10$). This pattern of results is further confirmed by an interaction of controllability, base-rate availability, and target (self vs. other) in a separate analysis of negatively valenced events alone, $F(1, 90) = 2.67$, $p < .10$.

The changes in self- and other-estimates that accounted for differences in self-positivity can be seen from the discrepancies between ratings and base rates, summarized in the two right columns of Table 2. When the event was uncontrollable, these changes were similar to those observed in comparable conditions of Experiment 1 (see Table 1). That is, participants judged their likelihood of getting cancer as not significantly different from the actual base rate to start with ($M_{diff} = -4.04$), and including base-rate information made them even more accurate ($M_{diff} = 1.41$). Furthermore, their estimates of others risk, which were higher than base rate when information about it was unavailable ($M_{diff} = 6.33$), also converged to the base rate when information about it was provided ($M_{diff} = 2.68$), thus producing a negligible self-positivity bias in this condition.

A different pattern of results emerged when the event was controllable (divorce). In this case, participants in the absence of base-rate information judged their personal risk of experiencing the event to be similar to that of the base rate ($M_{diff} = -0.12$) but judged others' likelihood of getting it to be high ($M_{diff} = 8.48$). Providing base-rate information, however, decreased participants' self-estimates risk relative to base rate ($M_{diff} = -6.26$) while not appreciably influencing their estimates that others would experience the event ($M_{diff} = 10.65$).

Positively valenced events. A different pattern of results was evident when the events being judged were positively valenced. When these events were controllable, participants estimated the likelihood of personally experiencing them to be appreciably greater than the likelihood that others would experience them and this was true regardless of base-rate availability ($M = 68.32$ and 48.75 for self-estimates and other-estimates, respectively, $M_{diff} = 19.57$). When the events were uncontrollable, however, they estimated the likelihood of personally experiencing the events to be generally much less than the likelihood of others experiencing them, ($M = 15.45$ and 25.66, for self-estimates and other-estimates, respectively, $M_{diff} = -10.21$). This was true regardless of whether or not base-rate information was provided. The interaction of controllability and target was significant in an analysis of positively valenced events alone, $F(1, 99) = 40.86$, $p < .0001$, which was independent of base-rate availability, $p > .10$.

The effects of base-rate information on the effects of positive outcomes are also worth noting. That is, participants typically estimated themselves to have positive outcomes relative to base rates in the absence of base-rate information ($M_{diff} = 5.56$ vs. 9.44, when events were controllable vs. uncontrollable, respectively). However, providing base-rate information further increased these estimates when events were controllable ($M_{diff} = 11.08$) but decreased these estimates when events were not controllable ($M_{diff} = 1.46$). In contrast, participants perceived others to be unlikely to expe-

rience controllable positive events relative to base rate (M_{diff} = –11.26) and very likely to experience uncontrollable events M_{diff} = 15.66), and this difference was evident regardless of base-rate availability.

Discussion

Experiment 2 replicated the results of Experiment 1 under comparable conditions and examined their generalizability to controllable events as well as uncontrollable ones. A self-positivity effect was particularly evident when events were perceived to be controllable and this was true regardless of their valence. This suggests that people believe themselves to be superior to others in their ability to attain outcomes they consider desirable (or to avoid those they consider undesirable). When events were uncontrollable, self-estimates changed in the direction of base rates, thus decreasing the self-positivity bias when the events were negatively valenced. However, self-estimates of controllable events changed in a direction away from base rates, increasing the self-positivity bias still further.

The manner in which base rates are differentially reflected in self-estimates cannot be explained by an overall desire to feel happy (in which case, all estimates should continue to reflect self-positivity). Nor is it attributable to a desire to reduce the anxiety due to uncertainty of future outcomes (in which case, estimates of uncontrollable events would also have shown the bias). Rather, the fact that self-estimates changed toward base rates for uncontrollable events, but away from them for controllable events, is consistent with a self-esteem explanation of self-positivity.

EXPERIMENT 3

A methodological limitation of Experiment 2 was that one of the conditions, cancer, included an article about cancer prior to estimates, whereas the remaining three events did not. This was done to make cancer appear even less uncontrollable than it was. However, the presence of an article in one condition and not in the others could have affected the pattern of the results. The study in Experiment 3 rules out this methodological shortcoming.

In addition, whereas base rates were manipulated as a between-subject variable in Experiment 2, Experiment 3 determined if similar effects would be evident in a repeated-measures design. This design runs the risk of inducing an artifactual tendency for individuals to recall and use their initial responses as bases for their later ones (e.g., Menon, Raghubir, & Schwarz, 1995). But stronger evidence of the differences in self-estimates would be provided if the same individual amended their own estimates of likelihood when base-rate information was provided, but did so contingent on the perceived controllability of the event. This study provides this evidence.

We also determined whether the patterns of updating self-estimates are different for pessimists versus optimists. We expected that pessimists with low self-esteem would show patterns of self-negativity for all events. However, pessimists who hope to improve their self-esteem should increase their self-estimates when provided base-rate information, thereby reducing their level of self-negativity. Optimists, on the other hand, should demonstrate self-positivity overall. They, however, should be more likely to update their self-estimates with base rates for uncontrollable (vs. controllable) events, as uncontrollable events do not implicate their self-esteem.

Method

Participants. A total of 375 undergraduate students, drawn from the same pool as earlier studies, participated in this study. No individual participated in more than one experiment. They were assigned at random to one of the four between-subjects conditions.

Design. The design was a 3 × 2 × 2 × 2 (Target: self-first, self-after, other-after × Valence: positive vs. negative × Controllability: low vs. high × Prior: optimist vs. pessimist) mixed design. Valence and controllability were manipulated between subjects, as in Experiment 2, using four different events. Priors were a measured variable. Optimists were defined as those whose initial self-estimate reflected an absolute level of positivity versus the actual base rate, for each of the four events. The remaining participants were categorized as pessimists.

Procedure. The target factor was administered within subjects. All respondents were asked to estimate their own likelihood of an event occurring: Self-First. After this, they were provided a one-page article about the event they were assigned to drawn from a local newspaper. In the marriage and divorce conditions, this was the same descriptive article that gave strategies to get along with one's partner. In the lottery condition, it was a descriptive article about the various types of lotteries in Taiwan. In the cancer condition, it was the article used in Experiments 1 and 2 that made cancer appear to be less controllable than it is. All participants were told to continue to the next page after they had completed reading the article.

The next page provided base-rate information for the event to which they were assigned. All participants then estimated their own likelihood: "Self-After" and the likelihood of the event occurring to an average person, in that order. The base rates used were the same as in Experiment 2, with the exception for the lottery, which was increased to 20%. The nature of the lottery was amended to make this base rate realistic. The lottery used in Experiment 3 was a "scratch-and-win" type, with six cells that need to be scratched out. If three cells of a given dollar amount are the same, the prize is the dollar amount shown.

This type of lottery was fairly new in Taiwan at the time of data collection, with actual likelihood of winning equal to 20%.

As in other experiments, manipulation checks for controllability (using a 7-point scale, with higher numbers indicating greater controllability) were collected at the end of the questionnaire, after which respondents were thanked and dismissed. Given that people may discount claims about the occurrence of events (e.g., Kunda, 1987), we also asked whether the base-rate information was believable, using a 7-point scale, with higher numbers indicating greater believability of base-rate information.

Results

Manipulation checks. As in previous experiments, divorce was perceived to be more controllable than cancer, *M*s = 4.81 versus 3.96; $F(1, 183) = 15.66$, $p < .0001$, and a happy marriage as more controllable than winning a lottery, *M*s = 5.11 versus 2.06; $F(1, 188) = 247.01$, $p < .0001$. An analysis of the believability of base-rate information as a function of experimental manipulations showed a main effect of personality, $F(1, 367) = 4.37$, $p < .05$, indicating that optimists generally believed base-rate information more than pessimists (*M* = 3.56 vs. 3.24). No other effects were significant.

Overall analysis. Analysis of likelihood estimates as a function of target (self-first vs. self-after vs. other), valence (positive vs. negative), and controllability and personality type (optimist vs. pessimist) yielded interactions of valence and controllability, $F(1, 367) = 300.95$, $p < .001$; and of valence, controllability, and target, $F(2, 734) = 6.79$, $p < .01$, similar to those observed in Experiment 2. However, a four-way interaction of these three variables and personality type was also significant, $F(2, 734) = 3.24$, $p < .05$. To evaluate the implications of this interaction in the context of our expectations, two nonorthogonal analyses were performed.

The first analysis evaluated the effects of base-rate information on self-estimates, comparing self-estimates before receiving base rates with estimates made afterward. The second evaluated self-positivity bias by comparing self-estimates with other-estimates after base-rate information became available. The results of these analyses are described in turn.

Effects of base-rate information. Experiment 2 indicated that when events were controllable, providing base-rate information decreased participants' self-estimates of the likelihood of experiencing negative events (see Table 2) but increased their estimates of the likelihood of experiencing positive ones. When events were uncontrollable, however, providing base-rate information had precisely the opposite effects.

Results of this study confirmed this conclusion, but indicated that the effects were contingent on participants' level of optimism. Data relevant to these conclusions are summarized in Table 3. This table shows self-estimates of risk both before and after receiving base-rate information as a function of the valence and controllability of the events being judged and personality type. Pooled over optimists and pessimists, base-rate information slightly decreased estimates of the likelihood of controllable negative events (mean difference between judgments when base rates were and were not provided, $M_{diff} = -1.67$) and increased estimates of the likelihood of controllable positive ones ($M_{diff} = 2.80$), consistent with the results of Experiment 2. In fact, however, this difference was only evident among pessimists.

Specifically, base-rate information decreased these participants' estimates of the likelihood of experiencing negative events but increased their estimates of the likelihood of encountering positive ones, and this was true regardless of the events' controllability. Thus, these participants appeared to change their self-estimates in the direction implied by the base-rate information. An analysis of pessimists' estimates alone yielded an interaction of rating time (before vs. after base-rate information) and valence, $F(1, 187) = 24.84$, $p < .001$, that was independent of controllability ($F < 1$). In contrast, optimists' modified their self-estimates in the direction of base-rate information only when the events were uncon-

TABLE 3
Self Estimates of Likelihood of Negative and Positive Events, Relative to Base Rate: Experiment 3

	Optimists		*Pessimists*	
	Negative Events	*Positive Events*	*Negative Events*	*Positive Events*
Controllable Events				
Base rates	25	60	25	60
Estimate before base rate	10.82 (42)[a]	81.87 (68)	50.00 (51)	42.30 (27)
Estimate after base rate	10.57	79.88	46.92	49.89
Difference	–0.25	–1.99	–3.08*	7.59*
Uncontrollable event				
Base rates	30	20	30	20
Estimate before base rate	17.33 (46)	51.61 (28)	61.74 (46)	5.64 (67)
Estimate after base rate	20.51	34.79	54.57	10.33
Difference	3.18*	–16.82*	–7.17*	4.69*

[a]Number of subjects per cell is indicated in parentheses.
*$p < .05$.

trollable. When the events were controllable, base-rate information had little influence on their self-estimates at all. This conclusion is confirmed by a three-way interaction of rating time (before vs. after base-rate information), valence, and controllability, $F(1, 180) = 14.51$, $p < .001$, in an analysis of data from optimists alone.

Self-positivity bias. Experiment 2 indicated that when base-rate information was available, participants showed a strong positivity bias in estimating the likelihood of controllable events. That is, they estimated themselves to be appreciably less likely than others to experience negative events but believed themselves to be more likely than others to experience positive ones. When outcomes were uncontrollable, however, this self-positivity bias was less evident. Results of this study show that the self-positivity bias in estimating the likelihood of controllable outcomes was evident among optimists and, moreover, generalized to uncontrollable outcomes as well. In contrast, pessimists tended to show a negativity bias in evaluating negative outcomes regardless of their controllability.

Data bearing on these conclusions are summarized in Table 4. This table shows participants' self-estimates and other-estimates after base-rate information were provided as a function of controllability, valence, and participant type. Differences between these estimates are also indicated. Optimists estimated that they were much less likely than others to experience negative outcomes ($M_{diff} = -15.87$) and also more likely than others to experience positive ones ($M_{diff} = 15.86$). Furthermore, this was true regardless of whether the events were controllable ($M_{diff} = -19.91$ vs. 22.41 for negative and positive events, respectively) or not ($M_{diff} = -11.82$ vs. 9.36). Pessimists, on the other hand, perceived themselves as more likely than others to experience negative events regardless of whether they were uncontrollable ($M_{diff} = 7.40$) or controllable ($M_{diff} = 9.88$). Moreover, they perceived themselves less likely than others to experience positive uncontrollable events ($M_{diff} = -5.93$) but showed no significantly than others to experience positive controllable ones ($M_{diff} = 4.15$). The interaction of controllability, valence, personality type, and target (self vs. other) was only marginally significant, $F(1, 367) = 2.43$, $p > .10$. However, supplementary analyses of data from optimists alone yielded a three-way interaction of valence, target, and controllability, $F(1, 180) = 14.51$, $p < .001$. In contrast, analyses of pessimists' estimates yielded an interaction of target and valence, $F(1, 187) = 8.16$, $p < .01$, that was independent of controllability.

To summarize, although controllability moderated optimists' self-positivity bias, it did not moderate pessimists' bias. Pessimists modified their self-estimates in the direction of base-rate information regardless of the controllability of the events involved. However, this change was not sufficient to eliminate their overall pessimism. Optimists, on the other hand, appear to have conformed to base rates in making self-estimates only for events that they perceived to be uncontrollable and, therefore, did not implicate their self-esteem. Even for these events, however, optimists perceived themselves to be less likely than others to experience negative outcomes and more likely than others to experience positive ones, thereby maintaining a level of self-positivity comparable to that observed when outcomes were controllable.

GENERAL DISCUSSION

The three experiments reported in this article converge on several conclusions. First, perceived controllability of an event moderates the self-positivity bias; the bias is stronger for events that are perceived to be more controllable. Second, base-rate information is more likely to be incorporated into judgments for uncontrollable outcomes than it is for controllable outcomes; when participants use base rates as a criterion for their self-judgments, the difference between these judgments and judgments of others is attenuated or eliminated. Third, individual differences in optimism and pessimism moderate the direction of the bias. That is, optimists believe that their chances of having a positive outcome and avoiding a negative one are higher than actual base rates, thus displaying self-positivity. In contrast, pessimists believe that their chances of having a positive outcome or avoiding a negative one are lower than the base rate, thus showing

TABLE 4
Differences Between Self-Estimates and Other-Estimates: Experiment 3

	Optimists		*Pessimists*	
	Negative Event	*Positive Event*	*Negative Event*	*Positive Event*
Controllable event				
Self-after estimates	10.57	79.88	46.92	49.89
Other estimates	30.48	57.47	37.04	45.74
Difference	19.91*	22.41*	9.88*	4.15
Uncontrollable event				
Self-after estimates	20.51	34.79	54.57	10.33
Other estimates	32.33	25.43	47.17	16.26
Difference	–11.82*	9.36*	7.40*	–5.93*

*$p < .05$.

self-negativity. Finally, optimists are less likely to use base-rate information for self-estimates, and do so only for uncontrollable events, whereas pessimists update using base-rate information for all events, irrespective of their perceived controllability, but do so inadequately, reducing but not eliminating their self-negativity.

Why self-positivity?

We considered three possible factors that could potentially produce a self-positivity bias: a desire to feel happy by denying the risk, a desire to reduce the anxiety associated with the uncertainty of the outcome, and a desire to maintain self-esteem. However, our three experiments show that self-positivity is lower for uncontrollable events, suggesting that it is not due to an overall wish to feel happy. Further, our results also rule out the possibility that the self-positivity bias is due to a need to reduce anxiety about uncertain future outcomes. If that were the case, base rates should have been incorporated into self-estimates irrespective of the type of behavior and the prior of the individual. Experiment 3 showed that the use of base rates was contingent on the prior of the individual and the controllability of the event.

The primary contribution of this article is to demonstrate that under conditions where individuals are motivated to maintain or enhance their self-esteem, self-estimates of the likelihood of positive experiences are resistant to base-rate information. This is particularly true of optimists who perceive these events to be controllable. When events are uncontrollable, or when people are disposed toward pessimism, base-rate information about the likelihood of an event occurring in the general population is incorporated into self-judgments, bringing these judgments closer to judgments of the average person's risk. Base-rate information can reduce self-positivity biases when outcomes are uncontrollable and can reduce dispositions toward self-negativity regardless of the controllability of the outcomes involved. These results suggest that self-positivity is a strategic device that individuals use to maintain or enhance their self-esteem.

The manipulation of controllability might have affected the ability of a respondent to imagine alternative outcomes. Specifically, individuals might find it relatively easy to generate scenarios in which their behaviors could help avoid negative controllable events or help attain positive controllable events. This would lead to a greater deviation from the population norm for controllable events. However, individuals might find it more difficult to generate scenarios in which their behavior affects the likelihood of uncontrollable events. This would result in less deviation from the population norm in these cases. This is a plausible account of the manner in which controllability perceptions affect self-estimates. However, the fact that optimists and pessimists differentially use base rates to update their self-estimates suggests that self-esteem may be a more parsimonious explanation for our results. On the other hand, disentangling the effect of perceived controllability on self-esteem versus the ability to imagine alternative outcomes would be an interesting area for future research.

Correlational evidence reported elsewhere suggests that controllability attenuates the self-positivity bias that has been found at the individual personality level (Darvill & Johnson, 1991) and with the same group of people across a range of health problems differing on their perceived controllability (Hoorens, 1996; Kos & Clarke, 2001). Some researchers cast cross-cultural differences between UK and U.S. populations in the size of the self-positivity bias in the context of cancer within a "perceived control" framework as well (Fontaine & Smith, 1995).

The relation between perceived controllability and self-positivity bias may have important theoretical and practical implications (Harris, 1996). Perceived controllability is a powerful and robust construct that can predict variables as diverse as behavior, emotion, motivation, and performance (Skinner, 1995). In fact, research on perceived controllability has emphasized its many psychological benefits. Taylor and Brown (1988, 1994) argued that self-positivity may be advantageous psychologically, promoting relevant goal attainment and mental health. In some occasions, however, exaggerated perceptions of control could backfire by promoting complacency (Skinner, 1995) rather than effective goal-relevant behavior (Weinstein, 1989). In any event, the propensity to perceive events to be controllable may make it one of the more pervasive causes of optimistic bias. Practically, it may be difficult to challenge optimistic expectations that are rooted in such powerfully held convictions as individual's control beliefs, even if it is desirable to do so (Harris, 1996).

Relating Effects to Self-Construal and Cultural Differences

Cross-cultural variations in self-positivity have been proposed and examined (Chang, 1996; Heine & Lehman, 1995). For example, Heine and Lehman (1995) showed that the belief that positive events are more likely to happen to one's self (relative to one's peer) was significantly reduced for Japanese individuals relative to Canadian individuals. Similarly, Chang (1996) found that across multiple measures, Chinese individuals were more pessimistic than were their American peers.

However, Raghubir and Menon (1998) used a Hong Kong sample and showed self-positivity in the perceptions of the risk of AIDS. Our results show that self-positivity biases are a robust phenomenon, as they were conducted in a country with a "collectivist" orientation: Taiwan (Hofstede, 1990). This cross-cultural orientation could, however, explain why such a large percentage of the group we studied in Experiment 3 (over 50%) demonstrated pessimism in absolute terms, albeit with optimism appearing to be contingent on event (being highest for "happy marriage" and lowest for "winning the lottery"). Evidence of a self-negativity bias for winning the lottery is consistent with the cross-cultural finding that members of eastern cultures appear to be consider-

ably more pessimistic than members of Western cultures—so much so that Chang (1996) referred to pessimistic thinking as an integral component of Asian thinking. Thus, the results of this article may offer a parsimonious framework for viewing the pervasive differences in positivity bias and pessimism between Asian and North American cultures.

Self-Negativity Effects

Experiment 3 provided a startling demonstration of a strong and persistent reversal of the robust self-positivity effect. That is, individuals whose self-estimates relative to the actual base rate were generally pessimistic showed self-negativity effects. Our results highlight the importance of examining the moderating role of individual differences. With heterogeneity in groups, opposite effects may cancel out in the aggregate and disguise what are, in fact, strong patterns of self-negativity in one group and self-positivity in the other.

Implications for Consumer Welfare

As consumers' purchases are based on their perceptions of risk of product failure or performance, a systematic bias in assessing these risks could lead to nonoptimal purchase patterns. For example, it could lead consumers to overestimate the chances of winning a lottery or a promotional sweepstakes or to invest in the stock market and, therefore, to over-invest in these ventures. Alternatively, it could lead people to spend too much money on products whose benefits are uncertain.

On the other hand, if people believe that they are invulnerable to controllable negative events (such as contracting the HIV virus), they may be less likely to get screened. Self-positivity biases in personal risk perceptions are important because they may seriously hinder efforts to promote risk-reducing behaviors. If people believe they are not susceptible to AIDS (or, at least, less susceptible than others), it may be more difficult to convince them to adopt prudent precautions. There are many positive correlations in the literature between beliefs of personal vulnerability and protective behavior (Menon et al., 2002; Raghubir & Menon, 1998).

One of the major implications of our results regarding the resilience of the self-positivity bias to base-rate information is that providing base-rate information may be a necessary, but not a sufficient, condition to eliminate biases in the perceptions of risk. By not incorporating base rates into self-risk estimates for controllable behaviors, consumers may not only engage in nonoptimal behaviors to start with (e.g., forego making purchases, not engage in preventative behaviors, not undergo screening for cancer, etc.), but may continue to engage in them even when they are informed of their level of risk (e.g., continue smoking). Making the outcomes associated with such behaviors appear to be less controllable than they are could have positive consequences. For example, highlighting that smoking-related cancers (e.g., lung, oral, etc.) are partially uncontrollable, along with information about the base rates for these cancers, should bring estimates of risk in line with actual risk levels as well as reduce the self-positivity bias. It may have favorable consequences in terms of encouraging smokers to test for cancers frequently and regularly. However, demonstrating these effects on behavior is an area for future research.

Study Limitations and Areas for Future Research

An often puzzling, and, at times, inconsistent pattern of results in our studies was estimates of winning the lottery. We examined whether individual heterogeneity in playing the lottery could account for the pattern of results and found tentative evidence that it did so (see Experiment 3). However, one of the limitations of the studies reported in this article is that we did not manipulate base rates within the same domain in any of the studies. Thus, we were unable to rule out Zakay's (1984) suggestion that uncontrollable events probably represent luck, either good or bad, and what happens to different targets in terms of luck might also happen to one's self. This would lead to self-negativity for positive events. The rationale for this is that because motivational biases should not be strong due to the lack of identification with a distant target, cognitive biases, especially availability of a specific reference (Tversky & Kahneman, 1974), will influence estimation to a large extent. It is far easier to bring to mind events about good luck (e.g., winning a lottery) or bad luck (e.g., being a robbery victim) events happening to other unknown people as reported daily in mass media. In contrast, it is difficult to find instances of such events happening to oneself or to close relatives and friends. Hence, the much more available information about others could bias estimation. Experimental manipulations of base rates within an event would help to separate more effectively the incremental effects of actual base-rate level over and above the level of controllability.

Finally, the link between self-positivity (or negativity), and over- (or under) confidence also deserves further examination. If strategic considerations maintain or enhance self-esteem lead to the self-positivity bias and to its being immune to base-rate information for controllable events, then it is possible that individuals who are prone to these effects may also demonstrate over-confidence in their estimates as a self-defense mechanism that allows them to hold on to their unrealistic optimism. This would be an interesting area for future research.

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