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I'm Feeling Lucky: The Relationship Between Affect and Risk-Seeking in the Framing Effect

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Engagement in risky behavior has traditionally been attributed to an underestimation of the associated risks, but recent perspectives suggest that affective reactions toward a risky option may better explain risk-seeking than risk perception. However, the precise relationship between emotion and risk-seeking remains unclear. The current set of studies elucidates the relationship between emotion and risk-seeking in risky choice framing, using a gambling task. In Study 1, reliance on emotion was related to risk-seeking, but goals to regulate emotion mitigated these effects. In Study 2, positive affect was associated with risk-seeking in loss frames, but unrelated to risk aversion in gain frames. Collectively, these findings indicate a general role for emotion reliance on risk-seeking and a specific role of positive affect on risk-seeking in the loss trials of the framing effect.

Keywords: risk-seeking, framing effect, emotion, affect, decision making

Have you ever considered engaging in a risky activity, such as riding a skateboard? The associated exhilaration is alluring, but the associated risks pose a serious threat. What guides the decision to step onto a skateboard? A student in our laboratory, Eli, recently rode his skateboard into the lab and offered skateboarding lessons. After an arduous day analyzing data, these lessons were highly welcome. Eli left the lab feeling so positive he decided to attempt new skateboarding tricks, subsequently spraining his ankle. This anecdotal story suggests that emotions can influence our decision to engage in a risky activity. When deciding to take a risk, in what direction do our emotions guide us?

Affect in Risky Decision Making

Traditionally, risky decisions have been assumed to be based on cognitive assessments of outcomes, with risk-seeking a result of underestimating the associated risks (see Reyna & Farley, 2006; Loewenstein, Weber, Hsee, & Welch, 2001, for reviews). However, affect has recently been theorized to play an integral role in risky decision making. According to the risk-as-feelings model (Loewenstein et al., 2001), individuals react to the prospect of risk both cognitively and emotionally. Although the two reactions are interrelated, they can diverge from one another. When this divergence occurs, affective reactions are believed to supersede cognitive assessments in influencing risky decision making.

Similarly, the affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2002) has been applied to risky decision making, such that affective impressions have been posited to directly inform individuals' judgments of risks and benefits for a given option (Slovic, Finucane, Peters, & MacGregor, 2004). Slovic and colleagues have suggested a dynamic relationship between affect and judgments of risk and benefit, such that positive affect toward an option is associated with lower perceptions of risk and higher perceptions of benefits, and negative affect toward an option is associated with higher perceptions of risk and lower perceptions of benefit. This dynamic relationship has been observed and manipulated in several studies examining the role of affective evaluations on risk and benefit judgments in a variety of risky activities (Alhakami & Slovic, 1994; Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic et al., 2002, 2004).

Romer and Hennessy (2007) have applied the affect heuristic to explain risk-taking in adolescence with their biosocial-affect model. In this model, Romer and Hennessy explain risk-taking as a function of affective and social processes. The model integrates multiple influences on decision making to delineate the specific processes involved in risk assessment and subsequent behavior. More specifically, positive affect associated with a risky behavior may lead to discounting associated risks and may thereby increase the likelihood of engaging in that behavior. In other words, positive affect can override original dangerous or risky assessments. Evidence supports this postulate in research on both adolescent and adult smoking behavior (Romer & Jamieson, 2001; Slovic, 2001) and adolescent drug use (Romer & Hennessy, 2007). In this research, positive affective evaluations were predictive of engagement in risky activities, regardless of risk perception.

These lines of research on affect and risk-seeking have primarily been descriptive in nature. The current research sought to empirically elucidate the specific relationship between affect and risk-seeking by assessing the influence of affect on decision making.

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We chose to use a gambling paradigm of risky choice framing, as this type of paradigm is a relatively benign way to measure risky decision making in a laboratory setting. Moreover, prior research has employed such a design exploring the role of emotion when making decisions with different frames (De Martino, Kumaran, Seymour, & Dolan, 2006).

The Framing Effect

The framing effect is the robust tendency for people to make different decisions based on whether alternatives are framed positively as gains or negatively as losses (Tversky & Kahneman, 1981). When decision options are presented in terms of certain gains, people tend to be risk-averse, whereas when options are presented in terms of certain losses, people tend to be risk-seeking (for a review, see Kahneman & Tversky, 2000). Since Tversky and Kahneman's (1981) original demonstration of the framing effect, a great deal of research has explored framing across a variety of different domains, including health decisions, consumer choices, and perceptual judgments, to name a few. Moreover, there are different types of framing, including risky choice framing (i.e., how framing options with different levels of risk influences one's risk preference), attribute framing (i.e., how framing a characteristic of an object or event may influence one's overall evaluation of the item), and goal framing (i.e., how framing a goal or an action may influence the likelihood of adopting the behavior) (see Levin, Schneider, & Gaeth, 1998, for a typology of framing effects).

The classic paradigm used to demonstrate the framing effect is the "Asian Disease Problem" (Tversky & Kahneman, 1981), a hypothetical scenario in which individuals are asked to choose from two alternative programs (one certain and one risky program) to combat an outbreak of an unusual Asian disease that is expected to kill 600 people. Individuals who are presented with options described in terms of lives saved (i.e., the "gain frame") will overwhelmingly choose the sure option of saving 200 people versus taking a risky option of a one-third chance of saving all 600 people. Conversely, if individuals are presented with the same options described in terms of lives lost (i.e., the "loss frame"), they will overwhelming choose the risky option of taking a one-third chance that nobody will die versus choosing the sure option of losing 400 people. This pattern consistently emerges, despite the fact that the expected outcomes of the options are objectively equivalent.

Two major theories have been proposed to explain framing effects: prospect theory and fuzzy-trace theory. Prospect theory (Kahneman & Tversky, 1979) is an economic theory of decision making under risk and uncertainty. According to prospect theory, people evaluate an option in terms of gains and losses. Framing can be described in terms of an s-shaped value function, in which the function is concave for gains (implying risk aversion), convex for losses (implying risk-seeking), and steeper for losses than for gains (implying loss aversion). Loss aversion (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991) is the tendency for losses to have a larger psychological impact on individuals relative to gains. In fact, theorists have estimated that people are twice as sensitive to losses as they are to gains (e.g., Tversky & Kahneman, 1991).

Whereas traditional models, such as prospect theory, assume framing biases that result from deliberative, verbatim-based processing (i.e., computing the expected value of options), fuzzy-trace theory offers an alternative account. Fuzzy-trace theory holds that gist-based processing (i.e., general meaning-based assessments) may underlie framing decisions and that it is the differences between the gist of the options that accounts for framing (Reyna & Brainerd, 1991, 1995; Reyna, Lloyd, & Brainerd, 2003). In a series of experiments using the Asian Disease Paradigm, Reyna and Brainerd (1991) found evidence supporting a fuzzy-trace account of framing. Framing effects remained when numerical information about the probabilities and outcomes were omitted from the problems (e.g., substituting "some," "many," and "higher" in place of the numbers and probabilities), suggesting that people rely on the gist, rather than numerical information, when making decisions.

In addition, a recent study by Kühberger and Tanner (2010) tested prospect theory against fuzzy-trace theory, using varying versions of the Asian Disease Paradigm applied to environmental issue scenarios (e.g., fish species saved, acres of forest saved, etc.), in which they omitted parts of the gamble option, manipulating the gist, but not the expected value. Consistent with fuzzy-trace theory, they found that people chose according to the gist of the options, rather than the expected value. Collectively, these findings suggest that people rely on gist-based processing when making framing decisions.

How can theories of affect in risky decision making (Loewenstein et al., 2001; Romer & Hennessy, 2007; Slovic et al., 2002) inform theories explaining the framing effect? Given the recent emphasis on the importance of affect in risky decision making, it seems likely that affect should also play a role in risky choice framing. Perhaps one component of the gist-based processing emphasized in fuzzy-trace theory may be one's affective reactions when making framing decisions. Consistent with the affect heuristic, people may use their affective reactions toward the options as the "gist" of the risk and benefits they derive from the options. Moreover, following the biosocial-affect model, feeling positive affect toward an option may lead one to the "gist" that an option has higher benefits and lower risks, and may thereby increase the individual's likelihood to engage in a risky activity.

In fact, recent research has found neural support for a role of the affect heuristic in the framing effect. De Martino et al. (2006) conducted a neuroimaging study, using a monetary gambling task, and found that framing-consistent decisions were associated with greater activity in the amygdala, a brain region associated with emotional processes, whereas framing-inconsistent decisions were associated with greater activity in the prefrontal cortex, a brain region associated with control processes. These neural findings suggest an association between affect and framing; however, the precise relationship remains unclear.

The current set of studies was designed to empirically investigate the relationship between affect and risk-seeking, using a gambling paradigm of risky choice framing. In Study 1, we sought to examine the general role of affect and risk-seeking by manipulating reliance on emotion in a gambling task. Given that emotional reactions often drive risky decision making (Loewenstein et al., 2001), emotion reliance should be related to risk-seeking. In Study 2, we sought to explore the specific role of positive affect in risk-seeking in the gambling task. Based on Romer and Hen-

nessy's (2007) biosocial-affect model, positive affect should be associated with risk-seeking in decisions framed as losses.

Study 1

In Study 1, we examined the role of emotion in the framing effect by manipulating participants' use of emotion in a monetary gambling task. Participants completed the aforementioned De Martino et al. (2006) gambling task, in which they made a series of decisions, choosing between a sure option and a risky gamble option framed either in terms of losses or gains. Participants were given one of three strategy instructions when making choices: no instructions (control), making decisions using emotions (emotion-focused condition), or making decisions without using emotions (emotion-regulation condition). After making each decision, participants in the experimental conditions reported the extent they relied on their emotions when making the decision.

Participants in the emotion-regulation condition were instructed to adopt a cognitive reappraisal strategy. Cognitive reappraisal is an emotion-regulation strategy that acts early on in the emotion-generative process and involves reinterpreting a potentially emotion-eliciting situation in nonemotional terms before the emotion is experienced (Gross, 1998). We chose to use reappraisal in favor of other emotion-regulation strategies (e.g., suppression), because reappraisal has been found to be successful in downregulating behavioral and subjective expressions of affect (Gross, 1998) and amygdala activation (Goldin, McRae, Ramel, & Gross, 2008), with converging evidence using multiple channels of measurement (e.g., expression, experience, and physiology) (Ray, McRae, Ochsner, & Gross, 2010). An alternative emotion-regulation strategy, suppression (a response-focused strategy that involves decreasing emotionally expressive behavior) has not been found to be as successful in downregulating affect. In fact, suppression has been linked with increased activation of the cardiovascular system and amygdala (Gross, 1998; Goldin et al., 2008).

Consistent with previous studies on the framing effect (e.g., De Martino et al., 2006; Kahneman & Tversky, 2000; Kühberger, 1998), we expected participants in the control condition to be risk-averse when options are framed in terms of gains and to be risk-seeking when options are framed in terms of losses. De Martino et al.'s (2006) findings linking neural activation in the amygdala with framing-consistent behavior indicate that the framing effect emerges when emotional processes are activated. Therefore, we expected participants who relied on their emotions when making decisions to display a comparable or larger framing effect relative to those who did not rely on their emotions when making decisions. Moreover, given that emotional reactions often supersede cognitive assessments in driving risky behavior (Loewenstein et al., 2001), we expected participants who did not use their emotions to guide their decision making to be less likely overall to choose the gamble option, instead favoring the sure option. Likewise, we expected a positive relationship between reported emotion reliance and choosing the gamble option in both experimental conditions.

Method

Participants. Sixty-five undergraduate students (age range: 18–23 years; $M = 19.66$, 37 females and 28 males) participated for payment of $5 or course credit.

Apparatus. The task was presented to participants on a 17 in LCD screen using a Dell (OptiPlex GX270; Dell Inc., Round Rock, TX) desktop with E-Prime® experimental software (Psychology Software Tools, Inc., Sharpsburg, PA). Participant responses were recorded via a standard keyboard.

Procedure. Participants were randomly assigned to a condition. In order to ensure the task was personally meaningful, participants were informed that they would receive a sum proportional to their total winnings at the end of the study. Before beginning the task, participants were given instructions designed to manipulate their use of emotions when making decisions. In the control condition, participants completed the original task from De Martino et al. (2006) without decision strategy instructions. In the emotion-focused condition, participants were instructed to let their emotions guide their choices. They were to consider how positive or negative they felt about each option and to make their choice using their emotions. Participants in the emotion-regulation condition were given instructions (adapted from the reappraisal manipulation from Gross, 1998) to not let their emotions influence their choices. Instead, they were to consider how they felt about each option, and were to reevaluate the options in a manner that reduced their emotional reactions and to make their choices without using their emotions.

After the instructions, participants completed a computerized gambling task. The gambling task, adapted from De Martino et al. (2006), consisted of 96 gambling trials: 32 trials framed in terms of gains, 32 trials framed in terms of losses, and 32 catch trials.

In each trial, participants were first endowed with a sum of money, ranging from $25 to $100 in increments of $25. Then, they were presented a choice situation, in which they had to choose between a sure option (lose/keep a certain amount for sure) and a gamble option (gamble on a set probability of retaining the full endowment). The gamble options were presented as pie charts depicting the probability of keeping or losing the full endowment. Probabilities in the gamble option ranged from 20% to 80% in increments of 20%. Both options were displayed simultaneously on the computer screen. Notably, the expected outcomes of the sure option and the gamble option were equivalent. All participants made their choice with a key press. After making each decision, participants in the experimental conditions responded to the emotion reliance query, "How much did your emotions influence your decision?" by indicating, on a 7-point Likert-type scale, their response from 1 (*not at all*) to 7 (*very much so*) on the keyboard. This query was used both as a prompt to reinforce participants' assigned emotion-reliance strategy and also as a manipulation check.

An example of a gain-framed trial can be found in Figure 1. First, participants are endowed $25. Then, they are presented with two options: They can choose the sure option (keep $20) or the gamble option (gamble with an 80% of keeping all $25). After they make their choice, they rate how much their emotions influenced their decision by indicating their response on the keyboard.

The complementary loss-framed trial of this example would be as follows. First, participants are endowed $25. Then, they are presented with two options: They can choose the sure option (lose $5) or the gamble option (gamble with a 20% of losing all $25). After they make their choice, they rate how much their emotions influenced their decision by indicating their response on the keyboard.

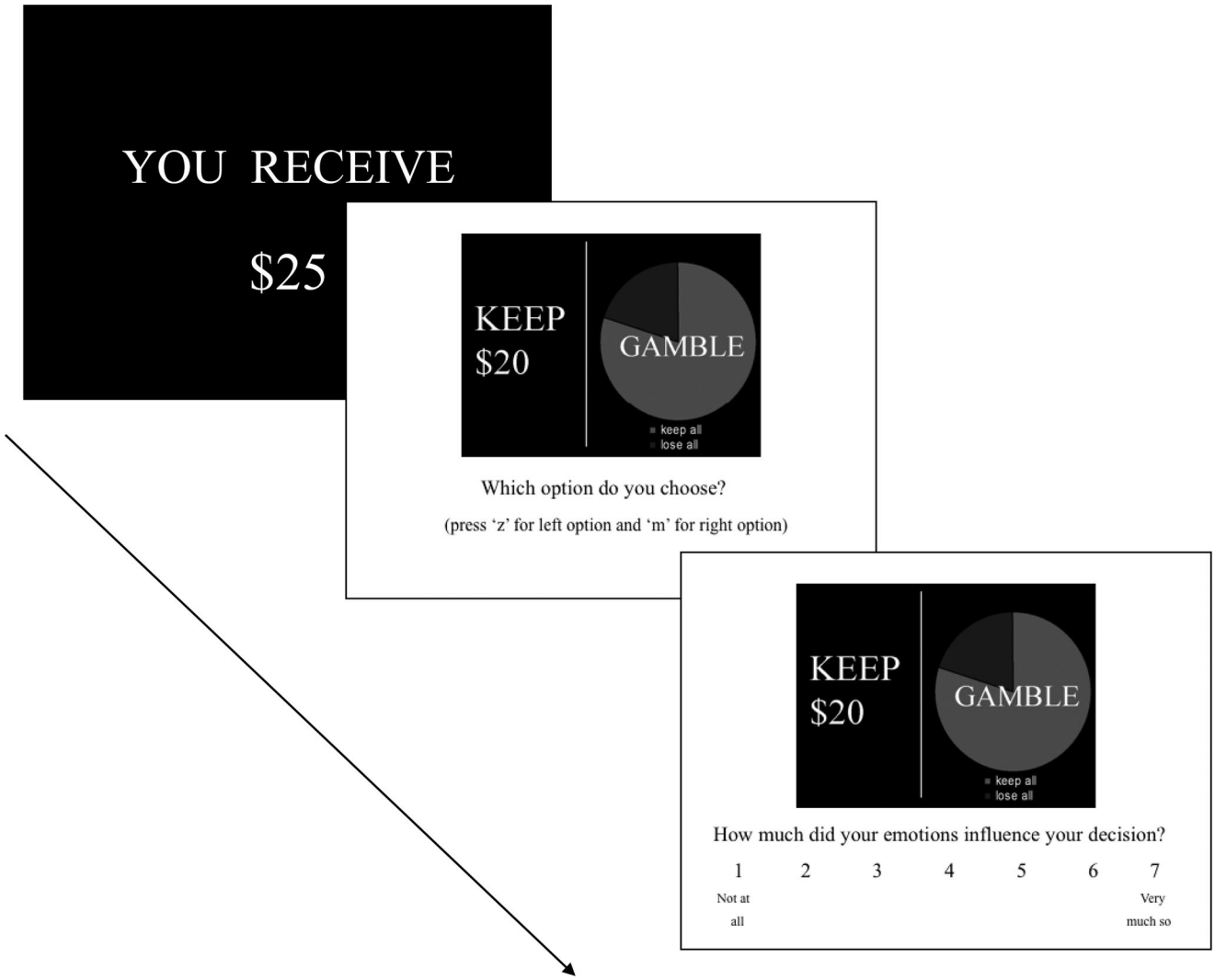

Figure 1. An example of a gain trial in Study 1. In this example, participants received an initial endowment of $25. Then, they were presented with the choices, with the sure option presented on the left side of the screen ("Keep $20") and the gamble option on the right side of the screen and with the gamble probability (80% of keeping all $25) depicted in a pie chart. Participants then rated how much their emotions influenced their decision.

In the catch trials, the expected outcomes of the sure option and the gamble options were not held constant; rather, the expected outcomes were skewed so that there was a "superior" response. In these trials, the sure option was always presented as keeping/losing 50% of the initial endowment, and the probabilities in the gamble options were always either a 95% or 5% chance of keeping/losing the entire endowment. The purpose of these trials was to ensure that participants were actively engaged in the task.

Results and Discussion

This study had one between-subjects factor (condition: control vs. emotion-focused vs. emotion regulation) and one within-subjects factor (frame: gain vs. loss). The dependent variable for this study was calculated as the percentage of trials participants chose the gamble option. Given our focused predictions, we compared the pattern of framing displayed in the experimental conditions to the control condition using planned 2 × 2 contrasts (as recommended by Keppel & Zedeck, 1989). The emotion-focused condition did not differ from the control condition in the gain or loss trials, ts(43) = .07 and .08, respectively, *ns*. Conversely, participants in the emotion-regulation condition were significantly less likely than those in the control condition to choose the gamble option in both the gain and loss trials, ts(42) = 2.46 and 2.82, respectively, ps < .05 (see Figure 2).

To examine whether emotion reliance differed by condition, we conducted a 2 (condition: emotion-focused vs. emotion regulation) × 2 (frame: gain vs. loss) analysis of variance

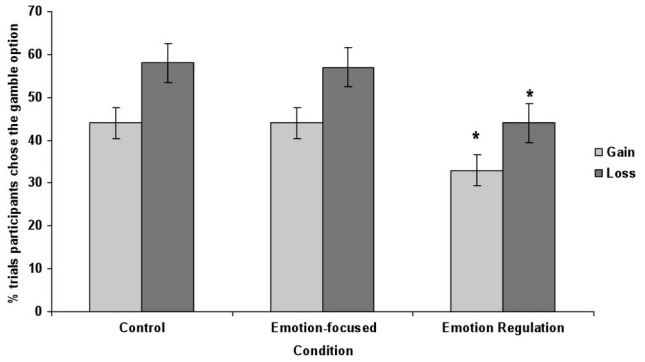

Figure 2. The percentage of trials participants chose the gamble option in gain and loss frames for the control, emotion-focused, and emotion-regulation conditions. * $p < .05$. Error bars represent ± 1 *SE*.

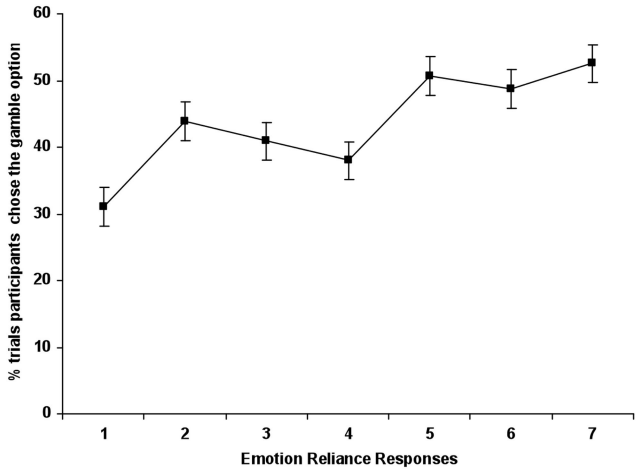

Figure 3. The percentage of trials participants chose the gamble option for each emotion-reliance response from 1 (*not at all*) to 7 (*very much so*). Error bars represent ± 1 *SE*.

(ANOVA) on participants' emotion-reliance responses. As expected, participants' emotion reliance significantly differed by condition, ($F(1, 41) = 175.32$, $p < .001$, $\eta^2 = 182.35$), such that emotion reliance was higher in the emotion-focused condition relative to the emotion-regulation condition in both gain and loss trials (see Table 1).

To determine whether reliance on emotion was related to choice, we conducted a generalized estimating equation (GEE) analysis. The GEE controls for within-cluster correlation in regression models with binary outcomes. In this task, participants completed 96 repeated trials; the GEE takes into consideration repeated measures of binary outcomes within individual participants. Choice in each trial resulted in a binary outcome of either the sure or the gamble option; for this analysis, we coded choice of the sure option as 0 and the gamble option as 1. Condition (emotion-focused vs. emotion regulation) and emotion-reliance responses were predictors in this analysis.

Emotion-reliance responses were significantly related to choice, $\chi^2(1, N = 2752) = 12.03$, $p < .01$, such that higher emotion-reliance responses were associated with choosing the gamble option, $\beta = .22$, $SE = .09$ (see Figure 3). There was no significant main effect of condition or significant interaction of condition and emotion reliance.

Analysis of the catch trials did not reveal differences across conditions or frame. Moreover, when the catch-trial scores were included as covariates in the analyses, the findings remained significant. As a result, these trials are not discussed further.

The purpose of Study 1 was to examine the role of emotion in the framing effect. Consistent with previous studies of the framing effect (e.g., De Martino et al., 2006; Kahneman & Tversky, 1981, 2000; Kühberger, 1998), participants in the control condition were risk-averse when options were framed in terms of gains and risk-seeking when options were framed in terms of losses. Participants in the emotion-focused condition showed comparable framing effects to the control condition. On the other hand, participants in the emotion-regulation condition were less likely to choose the gamble option for both gain and loss trials relative to the control condition. This finding, coupled with the finding that emotion-reliance responses in both experimental conditions were positively associated with choosing the gamble option, suggests that rather than having a specific role in the framing effect, relying on emotion may increase one's overall likelihood of choosing the risky option.

Table 1
Mean Emotion Reliance Responses in the Gain and Loss Frames for the Emotion-Focused and Emotion-Regulation Conditions in Study 1

	Emotion-focused		Emotion regulation	
	M	*SD*	*M*	*SD*
Gain	4.89	1.04	1.96	.95
Loss	4.95	1.06	2.05	1.02

Study 2

Study 1 revealed a positive relationship between emotion reliance and risk-seeking. In the second study, we sought to further delineate this relationship by using a more specific measure of affect, taking into account valence. According to Romer and Hennessy's (2007) biosocial-affect model, positive affect toward an option should lead to an increased likelihood of risk-seeking. In the present study, participants completed the gambling task from De Martino et al. (2006), adapted to include a measure of affect. In the control condition, participants completed the original task from De Martino et al. (2006). In the affect-probe condition, participants completed the task with the addition of affect ratings before each decision. We predicted that participants in both the affect-probe and control conditions would be risk-averse when options were framed in terms of gains and risk-seeking when options were framed in terms of losses. Consistent with Romer and Hennessy's (2007) biosocial-affect model, we expected positive affect to be related to choosing the risky option.

Method

Participants. Sixty-four undergraduate students (age range: 18–23; $M = 19.27$, 38 females and 26 males) participated in exchange for course credit.

Procedure. The procedure was identical to Study 1 for the control condition. In the affect-probe condition, the gambling task was adapted from De Martino et al. (2006) to include a measure of affect. Each participant was randomly assigned to either the affect-probe or control condition. Before making each decision, participants in the affect-probe condition responded to an affect probe (adapted from Nielson, Knutson, & Carstensen, 2008), "How do you feel about this decision?" by indicating their response on a 7-point Likert-type scale ranging from −3 (*very negative*) to + 3 (*very positive*) on the keyboard. Participants in the control condition were not presented with any probe.

Results and Discussion

Once again, the dependent variable for this study was calculated as the percentage of trials participants chose the gamble option. To determine the effects of condition and frame, we conducted a 2 (condition: affect-probe vs. control) × 2 (frame: gain vs. loss) ANOVA on the percentage of trials participants chose the gamble option. As expected, we found no significant difference by condition, $F(1, 62) = .115$, *ns*, $\eta^2 = .001$. There was a significant effect of frame, such that the gamble option was chosen less frequently in the gain frame (42.5%) than the loss frame (57.6%) across both conditions, $F(1, 62) = 18.2$, $p < .001$, $\eta^2 = .128$. There was no significant frame by condition interaction, $F(1, 62) = .002$, *ns*, $\eta^2 = .000$.

In a similar manner to Study 1, we conducted a GEE analysis in the gain and loss frames to examine the influence of affect on choice. Again, we coded choice of the sure option as 0 and the gamble option as 1. Analyses were run with affect treated both as a continuous and categorical variable. No differences emerged in the pattern of findings when affect was treated as a continuous versus categorical variable. Here, we present the findings for affect as a categorical variable.

In the gain trials, affect was not related to choice, $\chi^2(1, N = 1{,}024) = .298$, *ns*; participants displayed equal levels of risk aversion, regardless of their reported affect. However, in the loss trials, affect was significantly related to choice, $\chi^2(1, N = 1{,}024) = 7.83$, $p < .05$, such that positive affect was associated with choosing the gamble option (see Figure 4).

Similarly to Study 1, analysis of the catch trials did not reveal differences across conditions or frame. In addition, when the catch-trial scores were included as covariates in the analyses, the findings remained significant. As a result, these trials are not discussed further.

The purpose of Study 2 was to examine the relationship between affect valence and risk-seeking. Replicating previous findings of the framing effect (e.g., De Martino et al., 2006; Kahneman & Tversky, 2000; Kühberger, 1998), participants were risk-averse when options were framed in terms of gains and risk-seeking when options were framed in terms of losses. More important, as predicted by Romer and Hennessy's (2007) biosocial-affect model, we found that positive affect was associated with risk-seeking—but only in the loss frame and not the gain frame.

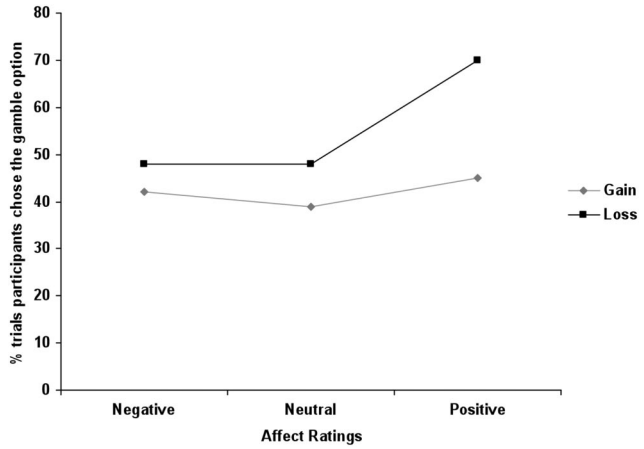

Figure 4. The percentage of trials participants chose the gamble option in gain and loss frames for negative, neutral, and positive affect ratings.

General Discussion

The present studies investigated the relationship between affect and risk-seeking in the framing effect. In Study 1, we examined the role of affect in framing, showing that relying on emotion is positively related to overall risk-seeking. Specifically, those in the emotion-focused condition showed comparable levels of framing effects relative to the control condition, whereas those in the emotion-regulation condition were less likely to choose the gamble option for both gain and loss trials. Further, emotion-reliance responses were positively associated with choosing the gamble option across experimental conditions. In Study 2, positive affect was associated with risk-seeking in the loss trials, but affect was not associated with choice in the gain trials. Altogether, the findings from the present research suggest that affect, specifically positive affect, is related to risk-seeking in the framing effect.

The current investigation is the first, to our knowledge, to provide empirical evidence for a role of positive affect on risk-seeking in the framing effect. These findings offer an experimental complement to De Martino et al.'s (2006) neuroimaging work linking emotion with framing. Moreover, these findings offer further support for Romer and Hennessy's (2007) biosocial-affect model, which proposes that positive affect associated with a risky behavior should increase the likelihood of engaging in that behavior.

Loss aversion (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991) may explain why the relationship between affect and choice was limited to the loss frame in Study 2. Given that people are estimated to be twice as sensitive to losses as to gains, the loss frame may have been more effective at eliciting affective reactions to risk. More specifically, it is possible that in a loss-framed decision, relative to a gain-framed decision, people may feel disproportionally more positive affect toward the gamble option. Alternatively, due to the heightened sensitivity to a sure loss, the appraisal of the gamble option may appear as more positive relative to an increased negative appraisal of the sure loss. To disentangle these possible explanations, future research will be necessary.

Another important future direction would be examining different components of an affective response in order to more finely distinguish the mechanisms at work in the present findings. Although the current project only examined affective valence, another important component of an emotional response is arousal. It

is, indeed, quite likely that the risk inherent in the task influences general affective arousal, to some extent. As such, risky options may be more arousing than the sure option, or vice versa, depending on the frame. As such, arousal may play an important role in the framing effect and is a promising avenue for investigation.

Future research also should elucidate the role of discrete emotions underlying risky decision making. Lerner and Keltner (2001) found that fear and anger, two discrete emotions of the same valence, had opposite effects on risky choice in a framing task. Specifically, fearful individuals tended to choose risk-averse options, whereas angry individuals tended to choose risk-seeking options, regardless of frame. Given the findings of the present research, it seems that investigating the influence of discrete negative and positive emotions on risk-seeking would be a promising direction for future research.

Moreover, the risk as feelings model (Loewenstein et al., 2001) distinguishes between *anticipatory* and *anticipated* emotions in risky decision making. Anticipatory emotions are immediate visceral reactions to risk and uncertainty (e.g., fear, excitement), whereas anticipated emotions are emotions that are expected to be experienced in the future (e.g., regret, joy). The present research primarily focuses on anticipatory emotions. In Study 1, we had participants adopt a reappraisal strategy, which is an antecedent-focused strategy that serves to down-regulate emotions early on in the emotion-generative process, before the anticipatory emotions can be experienced. Moreover, in Study 2, we assessed participants' anticipatory emotions during the decision-making process. However, it is unclear, from our design, the extent to which anticipated emotions may have influenced our results. Future research would benefit from clarifying the differential influences of anticipated versus anticipatory emotions on risk-seeking.

In the present paradigm, the participants were not provided feedback as to whether they won or lost each trial. Although providing feedback would have been more naturalistic, the results would have likely influenced participants' affect and future choices, making it difficult to study the pure relationship between affect and risk-seeking. For example, Gehring and Willoughby (2002) found that when participants were provided feedback in a gambling scenario, participants who were told they lost a trial became increasingly risky in subsequent trials to make up for their losses. Moreover, a study by Jessup, Bishara, and Busemeyer (2008) found that giving participants feedback on a gambling task altered their choices. Specifically, participants who were given trial-by-trial feedback were less likely to display the tendency of overweighting small probabilities relative to a no-feedback group, even when both groups were provided complete descriptive information about the choices. The researchers posit that the combination of feedback and the descriptive information led to rapid learning in the task. The current procedure, although less naturalistic, allows for a more controlled test of the role of affect in the framing effect.

The present investigation explored the relationship between affect and risk-seeking in the framing effect. We found that relying on emotion when making decisions resulted in framing effects, whereas regulating emotion led to a decreased likelihood of choosing the gamble option for both gain and loss trials. Additionally, positive affect was a significant predictor of risk-seeking in the loss trials, but affect was not related to risk preference in the gain trials. Collectively, these findings indicate a general role for emotion reliance on risk-seeking and a specific role of positive affect on risk-seeking in the loss trials of the framing effect. Risk-seeking—whether it is in the form of skateboarding, gambling, smoking, or drug use—can pose serious threats on one's safety, health, and well-being. It is thereby crucial to understand the processes underlying risky decision making, so that we may develop effective ways to manage risk. However, we cannot simply avoid risks altogether; there are also benefits to risk-taking. As the old idiom goes, nothing ventured, nothing gained.

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