Psychology of Addictive Behaviors
2009, Vol. 23, No. 2, 287–294

0893-164X/09/$12.00 DOI: 10.1037/a0014783

Winning and Positive Affect Can Lead to Reckless Gambling

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Experiments 1 and 2 examined whether winning versus losing led to reckless betting for real prize money. Experiment 2 also assessed whether positive or negative emotions were linked to such reckless betting. College students were randomly assigned to experience primarily either wins or losses during the rigged first round of a computerized card tournament that had 2 independent rounds. For the second round, participants' chip totals were reset and cards were dealt randomly. In Experiment 1 ($N = 107$), participants in the Initial-Winning, as compared with the Initial-Losing, condition bet more recklessly (i.e., bet too many chips when a loss was likely). Experiment 2 ($N = 72$) again showed that Initial-Winning participants bet significantly more recklessly than did Initial-Losing participants. It also revealed that positive affect was significantly positively correlated with such reckless betting. These findings have implications for understanding how college students, those at an age when they are especially vulnerable to problem gambling, can come to lose more money than they can afford. Initially winning and positive affect when gambling could be risk factors.

Keywords: gambling, winning versus losing, risk factors, positive affect

In the past 30 years, more and more people have become willing to risk their money, possessions, home life, and future in hopes that the cards will turn out in their favor. According to the most recent report of the National Gambling Impact Study Commission, between 1975 and 1999, the proportion of individuals in the United States who reported having gambled at least once in their lifetime increased from 68 to 86 percent (University of Chicago, 1999). The advent of online casinos has made people particularly vulnerable to the hazards of gambling. In fact, the proximity of a casino to one's home strongly predicts the likelihood of developing problem gambling (University of Chicago, 1999), which is defined broadly as gambling that causes harm to self or others. A critical element of problem gambling occurs when one begins to lose and then continues to make bets to recover previous losses (Campbell-Meiklejohn, Woolrich, Passingham, & Rogers, 2008).

Young adults aged 18 to 24 years are particularly vulnerable to problem gambling (Gerstein et al., 1999; Productivity Commission, 1999; Volberg, Abbott, Ronnberg, & Munck, 2001). A recent meta-analysis of 19 studies of college students in North America revealed an alarmingly high lifetime rate of problem gambling of 16.4% among college students (Shaffer & Hall, 2001). As such, it is important to predict and understand how intelligent, educated young adults can come to lose more money than they can afford, so that interventions ultimately can be developed to combat this key element of problem gambling.

Williams and Connolly (2006) did attempt an intervention for problem gambling in one recent study. They educated a sample of college students on the probabilities associated with gambling in an attempt to reduce the students' subsequent problem gambling behavior. The educational intervention did lead students to improve their ability to calculate odds of winning and increased their resistance to gambling fallacies six months after the intervention. However, students receiving the intervention, as compared with those who did not receive it, showed no difference in self-reported time spent gambling, likelihood of being a problem gambler, or amount of money spent gambling. The researchers suggested that mathematically-based interventions are insufficient to produce behavioral changes in gambling.

Indeed, emotions are likely to play a large role in problem gambling, particularly in losing more money than one can afford through reckless betting aimed at chasing previous losses. But which is more likely to lead to reckless betting—initially winning or initially losing, and feeling good or feeling bad while gambling? The purpose of the present pair of experiments was to provide answers to these questions. Currently, there is no clear consensus in the literature on whether prior wins or prior losses lead to riskier betting behavior. Some studies suggest that individuals are more willing to take risks following a period of success (see for example Thaler & Johnson, 1990), but others have found the opposite to be true (e.g., Leopard, 1978).

In a study by Thaler and Johnson (1990), participants were presented with a list of hypothetical statements in the form "you have won/lost X, now choose between gamble A and sure outcome B" (Thaler & Johnson, 1990, p. 652). In each statement, gamble A was a risky option with greater potential pay-off, and sure-outcome B was a riskless option with a smaller pay-off. The results revealed

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This research was made possible in part by funding support from the Undergraduate Research Opportunity Program, Institute for Scholarship in the Liberal Studies, College of Arts and Letters, and the University of Notre Dame. The two experiments were conducted toward fulfillment of the requirements of honors theses under the direction of Anita E. Kelly.

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that following a win, as compared with a loss, participants were more likely to choose the risky option.

In contrast, Leopard (1978) found that following a loss, individuals became more risk-taking. In her study, Leopard provided participants with $10 at the beginning of each of four gambling tasks. The amount of cash participants had at the end of each gambling task was combined to determine an overall payout, which was awarded at the conclusion of the last gambling task. Results revealed that 67% of the time the participants became more risk-taking when they were losing rather than when they were winning.

However, there are some noteworthy limitations of these studies. Thaler and Johnson (1990) used hypothetical scenarios rather than an actual gambling task. This is problematic because individuals' choices in a hypothetical scenario and their actual behaviors might not converge. Moreover, the results of Leopard's (1978) study might be confounded by the payoff scheme she used. Because the results of all four of her gambling tasks were combined to determine an overall payoff, it would have been beneficial for participants who were losing to place riskier bets. By doing so, these participants would have a better chance of making up for their losses and increasing their ultimate payoff. Thus, additional studies are needed to assess risky betting after actual gambling tasks where prior losses cannot directly influence the participants' final payoff.

In Experiments 1 and 2, we tested whether college students bet more recklessly following an experimentally induced winning or losing streak in a computerized game of cards. Reckless betting was operationalized as betting too much on hands that were likely to lose. We studied samples of college students because they are particularly vulnerable to problem gambling and to losing more money than they can afford. Moreover, in Experiment 2, we examined the relationship between affect and reckless betting. In both experiments, college students played in a two-round card tournament, where the first round of the tournament was manipulated so that participants experienced either a majority of wins or a majority of losses. In order to make the experience of winning or losing salient to participants, they had the opportunity to win one of three large, actual cash prizes. As such, these studies improved upon Thaler and Johnson's study by measuring participants' risky betting in an actual gambling task. They also improved upon Leopard's study because instead of combining the rounds of the tournament, we reset participants' chip totals at the beginning of the second round and told them that their better score from the two rounds would be used to determine the winners of the cash prizes. Having two independent rounds would not put participants in the position of having to make riskier bets in the second round to compensate for any earlier losses. Thus, these experiments filled a gap in the gambling literature by providing a means of testing (a) more definitively whether winning versus losing causes reckless betting and (b) the role of affect in reckless betting.

Experiment 1

Based on Thaler and Johnson's (1990) findings from hypothetical gambling scenarios, we predicted that individuals who experienced a majority of wins during the first round of the tournament would perform worse in the second round of the tournament than would those who experienced a majority of losses during the first round of the tournament. In particular, we predicted that participants would bet too much on hands that they were likely to lose (i.e., would bet recklessly) because of the over-confidence they would develop from winning so many hands in the first round.

Method

Overview and design. Participants were randomly assigned to either the Initial-Winning condition or the Initial-Losing condition for the first round of the tournament. Participants in the Initial-Winning condition experienced a win on 80% (24 of 30) of hands, whereas participants in the Initial-Losing condition experienced a loss on 80% (24 of 30) of hands. Chip totals were reset, and cards were dealt at random for the second round of the tournament. The key dependent measures were how skillfully participants bet during the second round when they were likely to lose a given hand (i.e., betting a minimum number of chips) or win a given hand (i.e., betting a maximum number of chips).

Participants. Participants were 108 students at a private university in the Midwest. They were selected for this study either because they responded to an advertisement posted online and in the undergraduate residence halls or because they signed up to participate through the psychology department. All participants had the opportunity to win a $250, $100, or $50 cash prize, and those who signed up through the psychology department also received extra credit for a psychology class. One participant was dropped from analyses because he did not complete the materials properly. Therefore, analyses were conducted using data from 107 participants. Eighty-eight participants identified themselves as Caucasian (82.2%), 3 as African American (2.8%), 6 as Hispanic or Latino (5.6%), 7 as Asian (6.5%), and 3 as "other" (2.8%). They ranged in age from 18 to 32 years, with a mean age of 19.2 (SD = 1.72) and the majority of were male (73.8%).

Measures. To get a sense of participants' experience playing cards, 2 items were developed. The first item was "How skilled are you at card games?" It was scored using a 7-point Likert scale from 1 (*not at all skilled*) to 7 (*extremely skilled*). The second item was "How much card playing experience do you have?" and was scored on a 7-point Likert scale from 1 (*none*) to 7 (*a great deal*).

Participants' betting behavior was assessed using only the bets they placed during the second round of the tournament. For each hand, the Acey-Deucey software stored in a data file the number of chips bet, the percentage of maximum possible bet placed, the probability of winning the hand, and whether the hand resulted in a win or a loss of chips for each of the 30 hands. (Note that there was a computer glitch that did not allow us to use the data from the last 4 of the 30 hands.) Skill of betting was measured by our 2 key dependent variables, *Expected Chips Won* and *Expected Chips Lost*, which removed the chance factor behind the randomly dealt cards. These variables broke down the bets placed on hands where a win versus a loss would be expected. To explain how these variables were computed, we first must provide details on how the card game is played. The game is called Acey-Deucey, and for each hand, two outer cards are dealt to the player face-up, and the middle card is displayed face-down. The participant must place a bet on the likelihood that the middle card will have a value between the two outer cards. An example of a hand likely to win is two outer cards of a Deuce (i.e., a 2 of any suit) and a King. The bettor should place a maximum bet because there is an 80% chance

that the middle card will have a value between a 2 and a King. That is, only 10 (i.e., 3 Deuces, 3 Kings, and 4 Aces) of the possible 50 cards remaining in a 52-card deck will cause a player to lose on that hand. *Expected Chips Won* was how much participants bet when the probability of winning was greater than 50%. It was calculated using the formula $\sum_{h=1}^{26} B_h^* P_h = ExpectedChipsWon$, where h is the hand number, B is the actual bet placed, and P is the probability of winning. This formula was used only for those hands where the probability of winning was greater than or equal to 50%. A higher number is good, meaning that the participant bet more on hands that were likely to win.

Expected Chips Lost was how much the participant bet on hands in which the probability of winning was less than 50%. An example of a hand likely to lose is two outer cards of a 6 and an 8 because there is only an 8% chance (i.e., only 4 cards out of the remaining 50) that the middle card will have a value between 6 and 8. In this instance, the bettor should place the minimum bet. *Expected Chips Lost* was calculated using the formula $\sum_{h=1}^{26} B_h^*(1-P_h) = ExpectedChipsLost$, where h is the hand number, B is the actual bet placed, and P is the probability of winning. This formula was used only for those hands where the probability of winning was less than 50%. A higher number means more reckless, poorer betting.

To illustrate the way the formulas above were employed, consider the following example of calculating Expected Chips Won (which was computed only on the hands that had greater than or equal to a 50% chance of winning). A participant plays three hands of the tournament. On the first hand, the probability of winning is 80% and the participant bets 100 chips. On the second hand, the probability of winning is 72% and the participant bets 100 chips. On the third hand, the probability of winning is 88% and the participant again bets 100 chips. The expected winnings for each of the three hands are 80, 72, and 88 chips, respectively. Thus, the value of Expected Chips Won for this participant at the conclusion of the three hands played equals the sum of the expected winnings on each hand, or 240 chips. When calculating Expected Chips Lost, the same procedure was used, except that the computations were performed only on hands that had less than a 50% chance of winning and that the number of chips bet on each hand was multiplied by the probability of losing, or 1 minus the probability of winning the hand.

Participants also were asked to indicate their age, sex, and race. Manipulation checks were included at the conclusion of the first round of card play to ensure that participants perceived themselves as experiencing a majority of wins or losses, depending on their assigned condition. These checks included the following 2 items: (a) "On what percentage of hands played did you experience a win?" and (b)"On what percentage of hands played did you experience a loss?" For these items, participants entered a number in the space provided. A filler stream-of-consciousness writing task was included to between the two rounds of the tournament to give participants a mental break between the rounds.

Apparatus. The apparatus for the Acey-Deucey game was an IBM-compatible computer equipped with a keyboard and mouse. This computer utilized the Windows XP Home Edition operating system. The Acey-Deucey software was produced by DeMent Contract Software, Inc. using Microsoft Visual C++ 5.0 with Microsoft Foundation Class Library. Upon starting the program, the experimenter is prompted to enter the subject number and select the condition number. After this, the program proceeds to a screen of text instructions for the participant, and the participant presses a button marked "Begin" to start playing the game.

Procedure. Participants came to the laboratory at their assigned times and were randomly assigned to either the Initial-Winning or Initial-Losing condition upon arrival. All participants signed a consent form and were told that their questionnaires would be placed in a locked box to which the experimenter would not have access. To provide a rationale for the study, they were told that its purpose was to examine the personality characteristics of different types of card players. Participants responded to the card playing attitudes and behaviors items, and then the experimenter read the instructions for the Acey-Deucey game:

> Now you will participate in the actual tournament. For the tournament, we will be using a computerized version of a card game called Acey-Deucey. When you press the [Begin] button, the computer will display three randomly selected cards. The two outer cards will be displayed face-up, and the middle card will be displayed face-down. You must place a bet on the likelihood that the middle card will have a value between the two outer cards. If the middle card has a value between the two outer cards, then you will win chips on the hand. If the middle card has the same value as one of the outer cards, this is counted as a loss. An Ace is the highest card, followed by a King, Queen, and Jack. An Ace can be either a high or a low card. For example, if you have the cards Ace, Queen, and Five, then the Ace is higher than the Queen. However, if you have the cards Ace, Three, and Six, then the Ace is lower than the Three.

Following additional instructions about how many chips they would start with and how much they could bet on each hand, each participant engaged in the first round of play, where the experimental manipulation occurred. All participants started with 1,500 chips. A maximum bet was set at 20% of the total chip count to ensure that all participants would have enough chips to play all hands in the round. (The use of this specific maximum bet amount ensured that even if a participant bet the maximum number of chips allowed and lost on every hand, he or she would finish the round with exactly zero chips.) Participants were required to bet a minimum of one chip on every hand, and maximum allowed bets were rounded down to the nearest whole chip.

Participants clicked the "Deal a New Hand" button and the computer displayed three cards. The two outside cards were displayed face-up and the middle card was displayed face-down. Participants then typed a bet (number of chips) and pressed the "Enter Bet" button. Once the participant entered his or her bet, the computer displayed the middle card face-up, and below the cards the word "Win" or "Lose" was displayed to indicate whether chips were won or lost on the hand. Participants then pressed the "Deal a New Hand" button and a new hand was dealt. Each participant played 30 hands in the first round of cards.

At the conclusion of the first round of play, participants were prompted by the computer to respond to a few questions about their first round of tournament play (the manipulation checks). Participants were then asked to "just take a break and write down everything that comes to mind for the next five minutes" (the stream-of-consciousness writing task). Participants typed their responses into a basic textbox while a timer counted down from five

minutes. At the conclusion of this writing task, participants notified the experimenter that they had finished.

The experimenter then returned to the participant and told him or her that he or she would have a second chance at winning the tournament. The experimenter informed the participant that the rules for the second round of play would be the same as during the first round. All participants started with a fresh set of 1,500 chips. The second round of the tournament was exactly the same as the first round, with the exception that during this round of play the cards were not rigged. Instead, the computer actually randomly selected three cards from a standard 52-card deck. Participants once again played 30 hands of cards during the second round and notified the experimenter when they had finished.

At the conclusion of card play, all participants were then given a partial debriefing about the purpose of the study and told that they would be contacted via campus mail regarding the winners of the prize money. They were not informed that the winners of the tournament would be chosen using a random drawing because the study was contingent upon the participants' belief that players with the highest chip totals would win the tournament prizes. At the conclusion of the study, participants were mailed a full debriefing form explaining the purpose of the deception (regarding the distribution of prizes) in the study. Those participants whose names were drawn as winners were notified and retrieved their cash prizes from the authors.

Results

Before describing our results, we must mention that we initially tested to see whether participants' gender would moderate the relation between our manipulation and reckless betting. However, including participants' gender as a factor in our analyses of variance (ANOVAs) revealed no interactions between gender and condition for any of our dependent variables in either Experiment 1 or Experiment 2. Thus, we dropped gender as a factor in our analyses.

Card playing experience. For the pretest item assessing the participant's self-reported skill at playing cards, the mean for this sample was 4.46 ($SD = 1.32$), with 1 = *not at all skilled* and 7 = *extremely skilled*. For their self-reported experience playing cards, their mean was 4.44 ($SD = 1.41$), with 1 = *none* and 7 = *a great deal*. Thus, on average, the participants in this sample perceived themselves to be moderately skilled and moderately experienced at card playing.

Manipulation checks. Preliminary analyses were conducted using data collected from the two manipulation checks concerning participants' perceptions of the number of hands that they had just won or lost in the first round of the tournament. One-way between-participants ANOVAs comparing the responses of participants in the Initial-Winning and Initial-Losing condition on each item revealed an overall significant effect at the $p < .0001$ level for condition for both items. Individuals in the Initial-Winning condition reported experiencing a win on a greater percentage of the hands, as compared with those in the Initial-Losing condition, $F(1, 106) = 1369.70$. And they reported experiencing a loss on a lower percentage of the hands, as compared with those in the Initial-Losing condition, $F(1, 106) = 1369.70$. See Table 1 for the means and *SD*s. In fact, participants guessed very closely the actual percentage of hands that they won or lost. These results strongly supported the idea that the manipulation in the first round of the tournament was successful.

Table 1
Experiments 1 and 2: Mean Scores (and SDs) on Manipulation Checks

Experiment	Item	Condition: Initial-Winning	Condition: Initial-Losing
Experiment 1	On what percentage of hands played did you experience a win?	80.84 (7.96)$_a$	18.71 (9.38)$_b$
	On what percentage of hands played did you experience a loss?	19.16 (7.96)$_a$	81.29 (9.38)$_b$
Experiment 2	On what percentage of hands played did you experience a win?	81.00 (11.56)$_a$	19.41 (10.73)$_b$
	On what percentage of hands played did you experience a loss?	19.00 (11.56)$_a$	80.59 (10.73)$_b$

Note. Means in the same row that do not share subscripts differ at $p < .0001$.

Betting behavior. We conducted one-way between-participants ANOVAs on Expected Chips Won and Expected Chips Lost. The analysis revealed no significant difference in Expected Chips Won for individuals in the Initial-Winning and Initial-Losing conditions ($p > .10$). However, the analysis of Expected Chips Lost did reveal a significant difference for individuals in the Initial-Winning and Initial-Losing conditions $F(1, 106) = 4.18$, $p = .04$. See Table 2 for the means and *SD*s. Participants in the Initial-Winning, as compared with the Initial-Losing, condition bet more chips on hands where the probability of winning was less than 50%.

Discussion

Consistent with our hypothesis, participants in the Initial-Winning condition bet more recklessly in the second round of the tournament than did those in the Initial-Losing condition. Specifically, they placed inappropriately high bets on hands where their probability of winning was below 50%. At the same time, there was no significant difference between the Initial-Winning and Initial-Losing groups in their betting when a win was likely.

These results demonstrate that winning actually can cause an individual to play worse on subsequent gambles. This finding is consistent with the findings of Thaler and Johnson (1990) and supports the notion that their results can apply in an actual gambling scenario. As predicted, the results of this study contradict those of Leopard (1978), where most participants had become more risk-taking in response to a losing streak.

One possible explanation for these findings is the same reason that individual investors in the stock market tend to invest poorly, buying stocks when they have recently risen in value and selling them when they have recently lost value (Dalbar Inc., 2003): People expect trends to continue when they are gambling. If they

Table 2
Experiments 1 and 2: Mean Scores (and SDs) on Expected Chips Won and Lost

		Condition	
Experiment	Dependent variable	Initial-Winning	Initial-Losing
Experiment 1	Expected chips won	1227.70 (875.88)$_a$	1061.44 (715.78)$_a$
	Expected chips lost	791.38 (535.79)$_a$	577.65 (545.19)$_b$
Experiment 2	Expected chips won	1176.42 (752.67)$_a$	1028.35 (719.54)$_a$
	Expected chips lost	756.34 (468.96)$_a$	321.59 (229.84)$_b$

Note. Means in the same row that do not share subscripts differ significantly at $p < .05$.

have defied odds by winning more than they than they should in previous gambles, then they expect to continue to win even in the face of slim odds and thus end up betting recklessly. In a similar phenomenon known as "playing the rush" in casinos across the world, when card players are winning they often decide to play hands that they would normally fold because they expect to continue to win despite the odds (Miller, Sklansky, & Malmuth, 2004).

Although playing the rush typically is a conscious process, another possible explanation for why participants in the Initial-Winning condition bet recklessly in the second round of the tournament does not require conscious thought. It is simply that because they had been reinforced for betting recklessly in the first round, they continued in the second round to bet on hands that were likely to lose. After all, many studies have shown that reinforcement of a given behavior leads to an increase in that behavior (see Skinner, 1963).

Yet another possible explanation for the present findings is that participants in the Initial-Winning condition experienced an elevation in positive mood after the first tournament relative to those in the Initial-Losing condition. Several studies suggest that people experiencing positive affect tend to overestimate the likelihood of experiencing positive events (Johnson & Tversky, 1983; Nygren, Isen, Taylor, & Dulin, 1996; Wright & Bower, 1992). Thus, in the present study, individuals in the Initial-Winning, as compared with those in the Initial-Losing, condition may have felt more positive at the end of the first round of the tournament and subsequently overestimated their likelihood of winning on hands where the odds were not in their favor. This notion is consistent with the research of Anderson and Galinsky (2006), who have shown that having a more optimistic perception of risk leads individuals to make riskier choices on decision-making tasks. Perhaps the experience of winning leads to more positive affect, which in turn results in more optimistic perceptions of risk. However, Experiment 1 did not assess participants' affect after the first tournament. Moreover, there are reasons to believe that not just positive affect, but also negative affect could lead to reckless betting based on observations that feeling aggravated after losing is linked to impulsive acts (e.g., Parke & Griffiths, 2004, 2005a, 2005b). Thus, a follow-up experiment was necessary to test the role of affect in reckless betting.

Experiment 2

The first purpose of Experiment 2 was to try to replicate the findings from Experiment 1, which showed that winning in one tournament led to betting too much on hands that were likely to lose (i.e., betting recklessly) in the next. The second purpose was to investigate the role of affect, both positive and negative, in such reckless betting. We predicted that participants in the Initial-Winning condition would experience more positive affect than would those in the Initial-Losing condition, and that positive affect would be linked to betting too much on hands that were likely to lose. At the same time, we predicted that negative affect also would be associated with more reckless betting. We based this latter prediction on the growing number of findings that have linked gambling to negative affect (see Daughters, Lejuez, Lesieur, Strong, & Zvolensky, 2003, for a review) and to aggressive behaviors, such as impulsively verbally lashing out at a bypassing casino employee (Griffiths, Parke, & Parke, 2003; Mulenman, DenOtter, Wadman, Tran, & Anderson, 2002; Parke & Griffiths, 2004, 2005a, 2005b). We reasoned that these findings might be accounted for by the negative emotions that likely occur when gambling and underlie such impulsive acts.

Method

Participants. Participants were 73 students at a private university in the Midwest. They were selected for this study because they signed up to participate through the psychology department. All participants had the opportunity to win a $250, $100, or $50 cash prize, and they all received extra credit in a psychology course in exchange for their participation. One male participant was dropped because he was approximately 8 *SD*s from the mean on the primary dependent variable, Expected Chips Lost. This left 72 participants who ranged in age from 18 to 22 years, with a mean age of 19.2 years ($SD = 1.18$). Of the participants, 58 identified themselves as Caucasian (81.7%), 2 as African American (2.8%), 6 as Hispanic or Latino (8.5%), 3 as Asian (4.2%), 2 as "other" (2.8%). Approximately 61% of the participants were male ($N = 43$). One participant did not respond to the demographic questions. The same participant also did not complete the affect measure and therefore was excluded from analysis of the affect data. This participant was included in the analyses of betting behavior.

Measures. The Positive and Negative Affect Schedules (PANAS; Watson, Clark, & Tellegen, 1988) were included to assess affect following the experience of induced winning or induced losing in the first round of the tournament. The PANAS is a 20-item measure. Participants are provided with a list of adjectives (e.g., for positive affect: inspired, attentive, and excited; for negative affect: hostile, scared, and upset) and are asked to rate the extent to which each adjective describes their feelings at the moment on a scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Supporting its validity are correlations between the PANAS and related constructs of distress, depression, and state anxiety (see Watson et al., 1988). Cronbach's alphas for this experiment were .90 for positive affect (PA) and .82 for negative affect (NA).

Once again, participants' betting behavior was assessed using the bets they placed during the second round of the tournament. For each hand, the Acey-Deucey software stored the number of chips bet, the percentage of maximum possible bet placed, the probability of winning the hand, and whether the hand resulted in a win or a loss of chips in a data file.

This experiment also included demographic questions regarding the participants' age, sex, and race. The same manipulation-check items used in Experiment 1 were included at the conclusion of the first round of card play to ensure that participants perceived themselves as experiencing a majority of wins or losses, depending on their assigned condition.

Procedure. Participants came to the laboratory at their assigned times and were randomly assigned to either the Initial-Winning or the Initial-Losing condition upon arrival. All participants signed a consent form and were given instructions by the experimenter.

The procedure for Experiment 2 was largely the same as Experiment 1, except that the participants did not complete a writing task after answering the manipulation check questions. Instead, they completed the PANAS. They also completed the Iowa Gambling Task (Bechara, Damasio, Tranel, & Anderson, 1994) as a filler task to provide a break between the Acey-Deucey rounds. The experimenter then read them instructions, and they played the second round of Acey-Deucey.

Results

Manipulation checks. Means and *SD*s for each manipulation-check item in Experiment 2 are reported in Table 1. On average, individuals in the Initial-Winning condition, as compared with those in the Initial-Losing condition, reported experiencing a win on a greater percentage of the hands, and experiencing a loss on a lower percentage of the hands. One-way between-participants ANOVAs conducted on the responses to each item revealed significant differences between the two conditions, $F(1, 71) = 545.01$, $p < .0001$, for both items. We concluded that the manipulation in the first round of the tournament was successful once again.

Primary analyses. A one-way between-participants ANOVA revealed no significant difference in Expected Chips Won between participants in the Initial-Winning and Initial-Losing conditions ($p > .10$). However, a one-way between-participants analysis of Expected Chips Lost did reveal that participants in the Initial-Winning condition bet more chips on hands that were likely to lose than did those in the Initial-Losing condition, $F(1, 71) = 24.03$, $p < .0001$. See Table 2 for the means and *SD*s. This result replicates the findings of Experiment 1.

Also, consistent with the suggestion that participants in the Initial-Winning condition experienced an elevation in positive mood following their winning streak relative to participants in the Initial-Losing condition, a one-way between-participants ANOVA on affect scores revealed that participants in the Initial-Winning condition ($M = 31.78$, $SD = 6.49$), compared with those in the Initial-Losing condition, had significantly higher levels of positive affect ($M = 28.29$, $SD = 8.45$), $F(1, 70) = 3.85$, $p = .05$. (Note that this result does not indicate whether participants in the Initial-Winning condition had an increase in affect relative to a baseline of affect, given that pretest affect was not measured.) There was no significant difference in negative affect between the two groups ($p > .10$).

We followed up these between-participants ANOVAs with correlational analyses, collapsing across conditions. The scores on positive affect and negative affect ranged from 10 to 49 and from 10 to 25, respectively. As predicted, we found a significant positive correlation between positive affect and Expected Chips Lost, $r(71) = .29$, $p = .01$. At the same time, we found a significant negative correlation between positive affect and Expected Chips Won, $r(71) = -.24$, $p = .04$. Thus, positive affect was linked to poorer betting. However, contrary to our predictions, we found no significant correlation between negative affect and Expected Chips Lost or Expected Chips Won, ps $> .10$.

We next conducted a multiple-regression analysis that entered condition (coded as *1* for Initial-Winning condition and *2* for Initial-Losing condition) and positive affect scores simultaneously as predictor variables of Expected Chips Lost (i.e., reckless betting) to see if the effect of our manipulation on reckless betting was mediated by positive affect. Together, these 2 predictors accounted for 30% of the variance in Expected Chips Lost. A significant unique predictive effect was obtained for condition, standardized $\beta = -.47$, $t(70) = -4.51$, $p < .0001$; and a marginally significant effect was obtained for positive affect scores, standardized $\beta = .19$, $t(70) = 1.78$, $p = .08$. Because this analysis still showed a strong significant link between winning in the first tournament and reckless betting in the second tournament even when statistically controlling for positive affect scores, it suggests that this link was not mediated by positive affect.

General Discussion

Experiments 1 and 2 tested whether winning versus losing in an initial tournament would lead college students to bet more recklessly and poorly in a second tournament. In both experiments, the first tournament was rigged so that participants assigned to the Initial-Winning condition would win 80% of the hands, and participants assigned to the Initial-Losing condition would lose 80% of the hands. The second tournament was not rigged; and the participants were given a fresh set of chips. They were told that their performance in the second tournament would give them an independent opportunity to win one of the large cash prizes.

The results from both experiments demonstrated that the students in the Initial-Winning condition, as compared with those in the Initial-Losing condition, bet significantly more chips on hands that were likely to lose in the second tournament (i.e., they bet recklessly). Moreover, Experiment 2 showed that participants in the Initial-Winning condition experienced significantly more positive affect than did those in the Initial-Losing condition after the first tournament, and that positive affect was significantly positively correlated with reckless betting in the second tournament. In fact, the condition to which participants were assigned and how positive they felt before playing in the second tournament accounted for a fairly large percentage (30%) of the variability in their reckless betting. However, our findings did not support the idea that the effect of winning versus losing on reckless betting was mediated by participants' affect. We say this because the condition to which participants had been assigned was still a significant predictor of reckless betting even when the analyses partialled out their positive affect scores. What our findings did show is that, separately, winning was a strong predictor and positive affect was a moderate predictor of reckless betting.

What implications do these findings have for predicting and understanding the problem gambling to which young adults and college students are particularly vulnerable? Our findings suggest that if college students find themselves experiencing an unusually

big winning streak and/or find themselves feeling particularly good while gambling, these could be warning signs that they might start betting recklessly. Indeed, winning in both experiments caused the student participants to bet recklessly, perhaps because they expected their good luck to continue despite the odds (see Johnson & Tversky, 1983; Nygren et al., 1996; Wright & Bower, 1992). After all, previous research has demonstrated that having a more optimistic perception of risk can lead individuals to make riskier choices on decision-making tasks (Anderson & Galinsky, 2006). Our findings are particularly informative given the recent emphasis in the positive psychology literature on the benefits of positive emotions (see Fredrickson, 2008, for a review). In contrast to the thrust of that literature, we have provided clear evidence that being successful and feeling good when gambling may actually set a person up for making poor, risky betting decisions.

Understanding these risk factors may be essential to inform interventions designed to prevent reckless betting and therefore help short-circuit the problem gambling that could follow in gamblers' attempts to recoup losses from such reckless betting (see Campbell-Meiklejohn et al., 2008). Recent research suggests that merely trying to intervene by educating college students on gambling odds and fallacies is insufficient to reduce problem gambling (Williams & Connolly, 2006). Therefore, we suggest that a two-pronged approach could be tested in future research that might help in the following way. First, college students can be educated that winning can cause them to lose perhaps because it sets them up to expect that unlikely wins will continue and thus to bet recklessly. They can be trained to constantly reset their expectations for outcomes in subsequent independent bets and to be especially vigilant of their betting behavior after they have been winning. However, given Williams and Connolly's (2006) findings on the insufficiency of mathematically-based interventions, this intervention is unlikely to be sufficient to change behavior without addressing the role of emotions in reckless betting. Therefore, the second step would be to use traditional negative mood management techniques, such as those involved in cognitive–behavioral treatment, that have been shown to be effective in experiments, multiple-baseline studies, and case studies with a wide range of clinical populations (see Chemtob, Novaco, Hamada, & Gross, 1997; Novaco, 1994). But rather than help gamblers become more aware of negative feelings, perhaps these techniques could be used help gamblers become more aware of the positive feelings that they might experience while playing and help them avoid letting their emotions cause them to bet recklessly.

Before closing, we note that a key limitation to the present research was that there was variability in the reckless betting of participants within each condition of these experiments. Thus, although our experiments captured differences between the Initial-Winning and Initial-Losing groups on the average, they were not able to tell us about individual differences in reckless betting. Perhaps future researchers could examine potential moderators of the relationship between winning versus losing and reckless betting. Such moderators might include impulsiveness, sensation-seeking, and competitiveness, given that these have been tied to problem gambling in past research (e.g., McDaniel & Zuckerman, 2003; Parke, Griffiths, & Irwing, 2004; Vitaro, Arsenault, & Tremblay, 1997).

Conclusion

Previous research had left open the question of whether winning or losing is more likely to lead to risky, poor betting. These experiments point to the conclusion that winning can cause losing, and so gamblers need to be aware of the dangers of previous winning streaks. The findings also point to the idea that managing positive emotions could be an essential part of avoiding reckless betting. Thus, although the findings from the present experiments do not answer the question of why winning causes losing or why feeling positive is linked to more reckless betting, they do help researchers and clinicians by identifying these as key risk factors in college students' losing more money than they can afford.

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Received April 16, 2008
Revision received November 7, 2008
Accepted November 12, 2008 ■