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Gambling in a Laboratory Setting: A Comparison of Gambling for Positive Reinforcement Versus as a Potential Escape

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Research has shown that most individuals' gambling is maintained more by positive, than by negative, reinforcement but that disordered gambling is more strongly related to gambling maintained by negative, than positive, reinforcement. Forty five participants were recruited to play video poker in two different sessions: one in which they competed for a $50 gift card and one in which they could play after trying to solve unsolvable anagrams. Higher measures of gambling were observed in the gift-card, than in the anagram, session, but none of the differences were statistically significant and the observed effect sizes were small. Participants' annual income did predict their behavior in the gift-card, but not the anagram, session while their endorsing gambling as an escape on the Gambling Functional Assessment – Revised predicted their behavior in the anagram, but not the gift-card, session. Thus, the procedure failed to produce different gambling behavior as a function of manipulating the contingencies in the laboratory. However, the results replicate previous ones showing that certain subject variables are predictive of gambling behavior under certain situations.

Keywords: Gambling, Positive reinforcement, Escape, Video poker, University students

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A great deal of effort has been exerted by the research community to identify potential pathological gamblers. Perhaps the most famous of these attempts was the creation of the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), which is a self-report questionnaire that asks about the respondent's gambling history. SOGS scores identify potential problem or pathological gamblers, which is an important contribution to the field given that problem and pathological gambling are huge societal problems (see Petry, 2005, for a review). For better or worse, however, more research has been devoted to identifying when people display problem or pathological gambling than to the contingencies that may maintain disordered gambling behavior.

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The first major attempt to do so was the creation of the Gambling Functional Assessment (GFA; Dixon & Johnson, 2007). The GFA was a 20-item self-report measure based on a similar measure developed for individuals displaying self-injurious-behavior (Durand & Crimmins, 1988). The GFA was designed to identify four possible maintaining contingencies for the respondent's gambling behavior (i.e., tangible outcomes, social attention, sensory experience, and/or escape). Subsequent research with the GFA has found several things. First, the GFA appears to measure two contingencies (positive reinforcement & escape) rather than the four it was designed to measure (Miller, Meier, Muehlenkamp, & Weatherly, 2009). Second, respondents generally tend to endorse gambling for positive reinforcement more than they do gambling as an escape (e.g., Miller et al., 2009). Third, endorsing gambling as an escape is more predictive of problem and pathological gambling than is endorsing gambling for positive rein-

forcement (Miller, Dixon, Parker, Kulland, & Weatherly, 2010).

The GFA has since been revised (GFA-R; Weatherly, Miller, & Terrell, 2011) so as to specifically measure gambling for positive reinforcement and/or escape. Research with the GFA-R has further supported the latter two of the above findings. Specifically, research continues to show that respondents endorse gambling for positive reinforcement to a greater degree than they endorse gambling as an escape (Weatherly, 2011; Weatherly et al., 2011; Weatherly, Miller, Montes, & Rost, 2012). Further, endorsing gambling as an escape is more predictive of problem and pathological gambling than is endorsing gambling for positive reinforcement (Weatherly & Derenne, 2012; Weatherly, McDonald, & Derenne, 2012).

Perhaps interestingly, results from laboratory-based studies have not always produced similar outcomes, at least not when it comes to positive reinforcement. Specifically, a number of studies have demonstrated that when participants "gamble" in a laboratory environment for something of value (e.g., money or a chance to win a gift card), indices of their gambling behavior decrease as the value of that something increases (Weatherly & Brandt, 2004; Weatherly & Meier, 2007; Peterson & Weatherly, 2011). Overall, results from these studies indicate that participants' risk less as the value of what is being risked increases.[1] Given that the vast majority of people tend to report gambling to get something more than gambling to get away from something, these results might seem counter-intuitive. One might expect to see an increase in gambling behavior as the magnitude of the positive reinforcer is increased.

On the other hand, results have found that behavior in a laboratory setting does vary as a function of endorsing gambling as an escape on the GFA or GFA-R. For instance, Weatherly, Montes, and Christopher (2010) found that endorsing escape on the GFA was directly related to the number of credits participants bet on video poker. Martner, Montes, and Weatherly (2012), using the GFA-R, found that endorsing escape was directly related to the number of hands participants played on video poker.

A related aspect of Martner et al.'s (2012) procedure, however, failed to produce an effect of "escape." Specifically, these researchers had participants complete two sessions. In one, participants were asked to solve a series of anagrams for up to 10 minutes. After 10 minutes had elapsed, or when the participant decided to quit solving the puzzles, the participant played video poker. The other session was identical with the exception that the anagrams were unsolvable. Martner et al. postulated that the unsolvable anagrams would constitute an aversive situation, and thus participants would display increased gambling to escape the unsolvable anagrams. However, the results did not show differences in video-poker play as a function of whether the anagrams were solvable or unsolvable. Martner et al. offered several potential reasons for why the predicted results were not observed. One was that the solvable and unsolvable anagrams were equally aversive. Another was that the relationship of escape and gambling represented a general behavior pattern that was not necessarily sensitive to moment-to-moment environmental influences.

The present study was designed as a systematic replication of these previous laboratory-based studies. Specifically, participants were recruited to play video poker in two different sessions. In one, they were informed that the participant who won the most credits would win a $50 gift card to a national retail

[1] Peterson and Weatherly (2011) did report, however, that this effect was only observed when controlling for the participants' annual income. That is, the monetary value of the outcome did not alter the behavior of participants who reported having a high annual income.

outlet. In the other session, they were asked to solve a series of unsolvable anagrams for 10 minutes, which they could quit doing at any time to play video poker.[2]

Given previous research has shown that gift cards appear to maintain similar rates of gambling behavior in the laboratory as cash (Peterson & Weatherly, 2011) and that most people gamble more for positive reinforcement than as an escape (e.g., Weatherly et al., 2011, 2012), our primary hypothesis was that participants would show heightened levels of gambling behavior when playing video poker for the chance to win the gift card than when playing after experiencing a potentially aversive situation. Our secondary hypotheses were that certain subject variables would be predictive of video-poker play. That is, Peterson and Weatherly (2011) showed that participants' gambling behavior maintained by monetary incentives varied as a function of participants' annual income. We therefore predicted to find the same effect in the present study. Likewise, Martner et al. (2012) and Weatherly et al. (2010) found that participants gambling behavior was related to their endorsement of gambling as an escape on the GFA or GFA-R. We therefore predicted to find the same effect here.

METHOD

Participants

The participants were 45 (31 female; 14 male) undergraduate psychology students attending the University of North Dakota. The mean age of the participants was 21.2 years (*SD* = 4.6 years) and their mean self-reported grade point average was 3.3 out of 4.0 (*SD* = 0.5). Forty one of the participants (91.1%) self-reported as Caucasian, while two self-reported as American Indian (4.4%) and two as Asian (4.4%). Thirty nine of the participants reported an annual income of below $10,000 per year, with three reporting earning between $10,000 - $25,000 per year, and the remaining three reporting earning more than $25,000 annually. Participants received (extra) course credit in their psychology class in return for the participation, as well as the opportunity to win a $50 gift card.

Apparatus and Materials

The study was conducted in 1.5- by 4.0-m room containing a desk, two chairs, and a file cabinet. An IBM-compatible computer, equipped with dual monitors, was located on the desk. The computer ran WinPoker 6.0 video poker software (see Jackson, 2007, for a description). Participants played "Loose Deuces," which is a five-card draw poker game in which 2's are wild. This particular game was chosen because participants typically play this particular game inefficiently (i.e., make a large number of non-optimal choices; Weatherly, Austin, & Farwell, 2007), which potentially allowed for significant differences in accuracy of play to be observed as a function of the manipulation of the independent variable (i.e., it help to avoid potential ceiling effects). The game allowed participants to wager between 1 – 5 credits per hand.

Participants completed several paper-pencil measures. The first was an informed consent form, which the participant signed after completing the informed-consent process with the researcher. The present study was approved by the University of North Dakota's Institutional Review Board. The second measure was a brief demographic survey that asked participants about their sex, age, grade point average, race, and annual income.

[2] Pathological gamblers were not specifically targeted for participation for two different reasons. First, from a behavioral perspective, pathological gambling is at the extreme end of a continuous spectrum of level of gambling behaviors and is not a "disease" *per se*. From this perspective, pathological and non-pathological gamblers do not represent mutually exclusive populations. Second, we had no theoretical reasons to expect our independent variables (i.e., a gift card & unsolvable anagrams) to differentially influence pathological vs. non-pathological individuals.

The third measure was the GFA-R (Weatherly et al., 2011). The GFA-R is a 16-item self-report measure that has eight items that are designed to measure gambling maintained by positive reinforcement and eight that are designed to measuring gambling as an escape. Answers are provided on a scale of 0 (never) to 6 (always) and scores on the eight items in each subscale are summed to provide a score for that subscale. No items are reverse coded. Research on the GFA-R has demonstrated that is has sound construct validity (Weatherly et al., 2011), very good internal consistency (Weatherly et al., 2012), and good temporal reliability (Weatherly et al., 2012).

The final paper-pencil measure was a series of 16 unsolvable anagrams that ranged in length from five to ten letters. The list of unsolvable anagrams was identical to that used by Martner et al. (2012).

Procedure

Participants were run individually. Upon the participant entering the room, the participant was seated at the desk and the researcher initiated the informed-consent process, which culminated in the participant signing the informed-consent form. The participant then completed two sessions, with the order of the two determined randomly across participants.

One of the sessions was the gift-card session. Prior to this session, the researcher had the participant complete the demographic survey and the GFA-R. After the participant had completed these measures, the researcher read the participant the following instructions:

> You will now be given the opportunity to play video poker. Specifically, you will be playing the game Loose Deuces, which is a 5-card-draw poker game in which 2's are wild. You have been staked with 100 credits. These credits have no monetary value. However, at the end of this study, the participant who had the most credits at the end in this particular session will receive a $50 gift card to Target®. Your goal should be to end the session with as many credits as you can. The game will end when you have lost all your credits, you choose to quit, or 15 minutes has elapsed. Do you have any questions?

Any questions by the participant were answered by repeating the relevant portion of the above instructions. This session then proceeded until one of the three criteria for ending the session was met.

The other session was initiated by the researcher presenting the participant with the series of unsolvable anagrams. The instructions given to the participant were identical to those in Martner et al. (2012). The participant was given 10 minutes to solve as many anagrams as s/he could, but could quit at any time to play video poker. Prior to playing the video-poker segment of the session, the researcher read the participant the following instructions:

> You will now be given the opportunity to play video poker. Specifically, you will be playing the game Loose Deuces, which is a 5-card-draw poker game in which 2's are wild. You have been staked with 100 credits. These credits have no monetary value, but we ask that you treat them as if they did. Your goal should be to end the session with as many credits as you can. The game will end when you have lost all your credits, you choose to quit, or 15 minutes has elapsed. Do you have any questions?

Questions were again answered by repeating the relevant portion of the instructions. After the second poker session had been completed, the participant was debriefed and dismissed.

Upon completion of the study, the $50 gift card was provided to one participant whose name was drawn at random from all participants.

Dependent Measures and Data Analysis

There were three main dependent variables in the study that pertained to playing video poker. One was the number of hands played per session, which can be interpreted as a measure of persistence. A second was the number of credits bet per session, which can be interpreted as a measure of risk. The number of hands played and the number of credits bet are positively correlated. However, because participants could bet between 1 – 5 credits per hand, this correlation will be less than perfect. The third dependent measure was the percentage of hands played correctly (i.e., choosing to keep and discard the cards that maximize the player's overall rate of return), which can be interpreted as a measure of accuracy.[3]

To determine whether the manipulation of the gift card vs. the unsolvable anagrams produced different video-poker play, the above dependent variables were subjected to a repeated-measures analysis of variance (ANOVA).

To determine whether participants' annual income and/or endorsement of gambling as an escape was related to their video-poker play, both annual income and GFA-R escape subscale scores were coded into categorical variables.[4] These measures were then entered as predictor variables in a series of simultaneous linear regressions, one each for each of dependent measures in each video-poker session. The results from all statistical analyses were considered significant at $p \leq .05$.

RESULTS AND DISCUSSION

Participants played more hands in the gift-card poker session (Mean = 85.5, *SD* = 41.8) than in the anagram poker session (Mean = 77.2, *SD* = 46.3). Likewise, they bet more credits in the gift-card poker session (Mean = 224.1, *SD* = 128.4) than in the anagram poker session (Mean = 211.3, *SD* = 114.3) and played more accurately in the gift-card poker session (Mean = 50.4% correct, *SD* = 41.8) than in the anagram poker session (Mean = 49.5% correct, *SD* = 46.3). However, none of these differences were statistically significant. That is, analyses of the number of hands played, $F(1, 44) = 1.71$, $p = .198$, $\eta^2 = .037$, number of credits bet, $F(1, 44) = 0.39$, $p = .537$, $\eta^2 = .009$, and percentage of hands played correctly, $F(1, 44) = 0.09$, $p = .761$, $\eta^2 = .002$, all failed to reach statistical significance.

The first three linear regressions were conducted on the dependent measures from the gift-card poker sessions. The regression on the number of hands played showed that the overall model was significant, $F(2, 42) = 3.62$, $p = .036$, $R^2 = .147$. The only predictor variable that was significant was annual income, $\beta = -0.290$, $p = .048$. Thus, participants with lower reported annual incomes tended to play more hands than those with higher reported annual incomes. Analysis of the number of credits bet per session yielded no sig-

[3] One could argue that, because we did not screen for poker knowledge or experience, that accuracy of play would be expected to vary widely across participants. Not screening for these things was done by design. Not only did we not have a theoretical reason to predict that the factors under study (i.e., gambling for positive vs. negative reinforcement, annual income, & endorsing gambling as an escape) would vary as a function of poker knowledge/experience, allowing variance in this measure potentially allowed for any existing relationships to be identified, which would not necessarily be the case if this measure was constrained.

[4] Both of these variables were positively skewed and therefore there is reason to believe that their relationship with the dependent measures of video-poker play would not be linear unless recoded. Annual income data were coded into five categories. GFA-R negative reinforcement subscales scores were coded into three categories (0 = 0; 1 – 5 = 1; >5 = 2).

nificant effects. With percent of hands played correctly, the overall regression model was significant, $F(2, 42) = 3.92$, $p = .028$, $R^2 = .157$. Again, the only predictor variable that was significant was annual income, $\beta = -0.390$, $p = .009$, indicating that those participants reporting high levels of annual income tended to play video poker more inefficiently than those reporting low levels of income in the gift-card session.

The last three linear regressions were conducted on the dependent measures from the anagram poker sessions. The regression on the number of hands played showed that the overall model approached significance, $F(2, 42) = 3.20$, $p = .051$, $R^2 = .132$. The only predictor variable that was significant was the escape subscale score on the GFA-R, $\beta = -0.356$, $p = .017$. Thus, participants who tended to endorse gambling as an escape tended to play an increased number of hands in this session. Analysis of the number of credits bet per session yielded no significant effects, which was also the case when percent of hands played correctly was the dependent measure.

The first goal of the present study was to determine whether participants' video-poker play would differ as a function of whether they were playing for a gift card with monetary value or as a potential escape from unsolvable anagrams. Although all behavioral measures were higher in the gift-card video-poker session than in the anagram session, none of these differences reached statistical significance. Thus, one cannot say from the present results that participants' behavior was differentially motivated in these two conditions. Likewise, it is possible that the contingencies in both conditions were equally reinforcing.

Results from the linear regressions would appear to support the latter of these possibilities. That is, a subject variable known to be related to how participants gamble for monetary rewards in a laboratory situation (i.e., the participants' annual income) was again shown to be related to such behavior in the present study, but only in the gift-card session. Likewise, the present results also showed that participants' endorsement of gambling as an escape on the GFA-R was predictive of how many hands they played, but only in the anagram poker session. Together, these results suggest that the gift card and anagram manipulations did alter the contingencies in the situation, but that these manipulations interacted with certain subject variables and ultimately resulted in similar measures of video-poker play.

With that said, the present results further support the idea that there are important subject variables that researchers who study gambling behavior experimentally should try to control. The present study, for instance, replicates the finding that a manipulation intended to maintain gambling behavior via positive reinforcement (i.e., a gift card with monetary value) varies in its effectiveness as a function of the participants' annual income (Peterson & Weatherly, 2011). Thus, researchers who use this reinforcement contingency in their procedures might wish to either screen participants based on annual income or ensure that the offered monetary incentive is sufficient to control the behavior of all participants regardless of annual income. On the other hand, it should also be noted that participants in the present study were university students and thus the modal annual income across participants was less than $10,000. One cannot assume that similar results would be observed if the sample had a large amount of variance in income levels, which should be investigated in future research.

Likewise, the present study joins others that have found that gambling behavior in the laboratory is related to participants' endorsement of gambling as an escape (Martner et al., 2012; Weatherly et al., 2010). Like Martner et al., the present results found such a relationship in the number of hands participants

played. Unlike Martner et al., who found such a relationship in the number of hands played in both anagram conditions (i.e., solvable and unsolvable), however, the present study found such a relationship only in the anagram session and not in the gift-card session. The difference in results between the studies suggests two things. First, it suggests that the failure of Martner et al. to find a difference in video-poker play as a function of the anagrams being solvable vs. unsolvable was potentially the outcome of both sets of anagrams being aversive. Second, it suggests that participants' endorsement of gambling as an escape will differentially predict behavior as a function of the contingencies in effect in that particular gambling context.

The failure of either Martner et al. (2012) or the present study to find significant differences in gambling behavior using the same unsolvable anagram procedure should, however, warn researchers against using this particular approach. Of course it is possible that, under certain conditions (e.g., using extremely large sample sizes), such a manipulation would alter gambling. However, it would seem wise at this point for future researchers to pursue other methodology. For instance, instead of setting up the gambling session as a potential escape from something the participant has been doing, one could inform the participant that after the gambling session they would be asked to engage in a behavior that might be aversive (e.g., calculating square roots by hand). Such a manipulation might increase gambling behavior even in individuals who do not typically report gambling as a means of escape.

As with any study that relies on university psychology students as the participants, the results of the present study should be generalized with caution. Different results may have been observed had a more diverse sample been employed. For instance, one could legitimately argue that different results would have been observed had the present study specifically targeted pathological gamblers. Likewise, one could also legitimately argue that the generalizability of the present results are further limited by the fact that participants did not complete the SOGS (Lesieur & Blume, 1987) and thus it is not known what percentage of participants in the study may have displayed problems with gambling.

It is also the case that although several of the analyses yielded statistically significant results, the variance accounted for by these variables was not extremely high. That result indicates that other factors not measured in the current study likely play a large role in controlling behavior. Thus, while the present results help identify several factors that are related to gambling behavior, at least in the laboratory, much remains to be learned about the conglomeration of factors that control gambling behavior in general.

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