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DISCOUNTING BY PROBLEM AND NON-PROBLEM GAMBLERS WHEN THE HYPOTHETICAL CONTEXT IS MANIPULATED

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The majority of the previous research on delay discounting in pathological gamblers has found that these individuals discount monetary consequences more steeply than do non-gamblers. The present study attempted to replicate this effect, as well as determine whether changes in the context in which the discounting decision was made would differentially influence the discounting of non-gamblers and problem/pathological gamblers. Participants discounted $1,000 after being informed that their hypothetical annual salary was a certain amount. Participants then completed the discounting task a second time after being informed that their hypothetical annual salary remained the same, had been halved, or had been doubled. Manipulation of the participants' hypothetical salaries did not alter rates of delay discounting, but the problem/pathological gamblers discounted the $1,000 significantly less than did the non-gamblers. These results suggest that steeper rates of discounting will not always be observed in problem gamblers relative to non-problem gamblers. Potential reasons for the present results and their implications for understanding the relationship between discounting and pathological gambling are discussed.

Keywords: delay discounting, problem/pathological gambling, university students

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Over the past several years, there has been an increasing amount of research conducted on the process of delay discounting as it pertains to gambling, particularly as it pertains to pathological gamblers (e.g., Dixon, Jacobs, & Sanders, 2006; Dixon, Marley, & Jacobs, 2003; Holt, Green, & Myerson, 2003; Petry & Madden, 2010; Weatherly & Derenne, 2010). Delay discounting is said to occur when the subjective value of a reinforcing outcome decreases because its delivery is delayed in time (see Madden & Bickel, 2010, for a recent review). Overall, research has indicated that, for pathological gamblers, the subjective value of outcomes decrease more steeply as the outcomes are delayed than they do for non-pathological gamblers (e.g., Dixon et al., 2003, 2006). However, such an outcome is not always reported (Holt et al., 2003). Likewise, although some researchers have suggested that there is an integral connection between the phenomenon of delay discounting and the disorder of pathological gambling (e.g., Petry & Madden, 2010; Weatherly & Dixon, 2007), others have questioned whether the relationship is as meaningful as some have supposed (Weatherly, 2010).

A recent report by Weatherly and Derenne (2010) both supported the general findings in the literature on the subject, as well as identifying aspects of the relationship between discounting and gambling that are not yet understood. In their study, university students completed the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), which is the most widely used diagnostic screen for pathological gambling. Participants then completed a delay-discounting task that involved five

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different outcomes. The results demonstrated that SOGS scores were directly correlated with the rates of discounting of the monetary outcomes studied, but not the non-monetary outcomes. Thus, consistent with the bulk of the previous literature, higher scores on a measure of gambling pathology were related with steeper rates of discounting. However, this finding was limited to only monetary outcomes. Finding that the measure of gambling pathology was not related to rates of discounting for non-monetary outcomes leaves open the possibility that differences in discounting in between pathological gamblers and non-gamblers is not a general one. Rather, the difference may be isolated to certain contexts.

Pursuing this latter possibility is potentially critical because determining how important understanding delay discounting will be for ultimately understanding pathological gambling depends on the exact relationship between the two. That is, if how steeply someone discounts delayed outcomes is a trait variable as some have argued (Odum, 2011; and see Odum & Baumann, 2010, for a discussion), then finding that rates of discounting are correlated with problem or pathological gambling suggests that problem or pathological gambling are likely also trait variables. However, if changes in rates of discounting contribute to the appearance of pathological gambling as some researchers have suggested (e.g., Weatherly & Dixon, 2007), then determining what factors alter rates of discounting could help identify prevention or treatment techniques for problem or pathological gambling. On the other hand, if the appearance of pathological gambling leads to an alteration in how the individual discounts delayed outcomes, then studying delay discounting is not going to be informative as how to prevent or treat the disorder. In such a situation, the reverse would be true; understanding pathological gambling would enhance our knowledge of the process of delay discounting.

One of the deficits of the current literature on delay discounting and problem/pathological gambling is that most of the studies to date have been correlational or pseudo experimental. Weatherly and Derenne (2010), for instance, reported correlations between rates of discounting and participants' score on the SOGS. The Dixon et al. (2003) study, on the other hand, was pseudo experimental in that participants' group assignment was determined prior to the study. That is, Dixon et al. (2003) compared rates of discounting of pathological and non-pathological gamblers, but because these groups were pre-existing, one cannot determine the direction of the relationship between discounting and pathological gambling prior to the disorder. The procedure employed by Dixon et al. (2006) did involve direct manipulation. That study demonstrated that pathological gamblers tended to display steeper rates of discounting when they completed the discounting task in a gambling environment (e.g., a racetrack) than they did in a non-gambling environment. Dixon et al. (2006), however, only studied gamblers. Thus, it is not possible to determine whether or not similar changes in discounting rates would have been observed if non-gamblers were tested in the same environments.

In terms of delay discounting, research has demonstrated that rates of discounting can be altered by how the discounting task is framed. For instance, Weatherly, Derenne, and Terrell (2010) had two groups of university students complete a discounting task involving hypothetical monetary outcomes. One group was told that the outcomes were money they had won. The second group was told that the outcomes were money that they were owed. Results showed that the participants who had supposedly won the money displayed steeper rates of delay discounting than did participants who were supposedly owed the money. Because rates of discounting vary inversely with the magnitude of the outcome being discounted, a finding called the magnitude effect (Chapman, 1996; Thaler, 1981), these results indicated that framing the money as "owed" increased its subjective value relative to if it had been "won." Weatherly and Terrell (2011) subsequently replicated the same finding, indicating that the effect of framing the discounting task reliably alters rates of discounting.[1]

The present study was designed to determine if the previously reported differences in discounting would be observed between non-gamblers and problem/pathological gamblers (as measured by the SOGS), whether altering how the discounting task was framed would alter the observed rates of discounting, and whether the effect of changing how the task was framed would differ for the non-gamblers relative to the problem/pathological gamblers.

University students were recruited to complete a delay-discounting task and were randomly assigned to one of four groups. Participants then completed the SOGS. They then completed a discounting task that involved discounting the hypothetical monetary amount of $1,000 on two separate occasions. Prior to completing the task the first time, participants were informed to complete the task under the assumption that they were earning a particular annual salary. Prior to completing the task the second time, they were informed (depending on the group) that their hypothetical salary was unchanged, had been halved, or had doubled.

Given the existing literature, the hypothesis was that participants who qualified as problem/pathological gamblers would display steeper rates of delay discounting than would non-gamblers. The current literature, however, does not point to a specific hypothesis in terms of the other manipulations. That is, one might predict that if one's annual salary was decreased, then the relative value of money would increase, which would result in a decrease in how steeply one discounts a delayed monetary outcome. Then again, if one was in greater need of money now than before, then one might behave more impulsively, which would result in an increase in how steeply one discounts a delayed monetary outcome. The reverse arguments could potentially be made when one's annual salary was increased. Lastly, if the difference in discounting rates between non-gamblers and problem/pathological gamblers is a trait variable, then one would predict a constant difference between these participants regardless of the context of one's hypothetical annual salary. However, if state factors contribute to the difference in discounting between non-gamblers and problem/pathological gamblers, then one might predict to observe an interaction between group affiliation and the rates of discounting observed in the different contexts.

METHOD

Participants

The original sample of participants consisted of 279 undergraduate students enrolled at the University of North Dakota. Participants were excluded from data analysis if they did not qualify as a non-gambler (operationally defined in the present study as scoring 0 on the SOGS) or a problem/pathological gambler (i.e., a SOGS score of $\geq$ 3). In other words, participants who scored one or two on the

[1] It should be noted that Weatherly et al. (2010) and Weatherly and Terrell (2011) both employed the fill-in-the-blank method of measuring delay discounting (Chapman, 1996), which was also used in the present study. This method has shown to produce temporally reliable data (Weatherly, Derenne, & Terrell, 2011), although it has also been shown to potentially produce different rates of discounting relative to other methods of measuring delay discounting (e.g., see Smith & Hantula, 2008; Weatherly & Derenne, in press). With that said, research has not determined whether the rates of discounting measured using this particular method are less, or more, accurate than other methods. Variability across different methods of measuring delay discounting is another potential reason to be cautious when interpreting the relationship between gambling and delay discounting.

SOGS completed the procedures, but were excluded from all analyses.

Thus, the final sample employed in the present study consisted of 151 (109 females; 42 males) undergraduate students. The mean age of the participants was 20.7 years (SD = 4.8 years) and the self-reported grade point average was 3.27 out of 4.00 (SD = 0.50). The sample was racially homogenous, with 140 (92.7%) self-reporting as Caucasian. Ninety five participants scored 0 on the SOGS and 56 scored 3 or higher (Mean SOGS = 3.93; SD = 1.56; Range = 3 – 9). Participants received (extra) course credit in their psychology class for their participation.

Materials and Procedure

Participants completed the study using an online research administration program (SONA Systems, Ltd; Version 2.72; Tallinn, Estonia), which was accessible through their psychology class. This system tracked participation at the individual level. That is, the system ensured that any individual could participate in the study only one time even if s/he was enrolled in more than one psychology class. Participants could access the system wherever they could access the Internet. In other words, the researcher was not present when the participants completed the materials.

Participants were randomly placed into one of four groups. After the group assignment, the first item that was presented to each participant was the informed consent form that outlined the study as approved by the Institutional Review Board at the University of North Dakota. Continuation beyond this item constituted the granting of informed consent. The next item was a demographic questionnaire, which asked the participant about his/her sex, age, grade point average, and ethnicity.

The next measure was the SOGS (Lesieur & Blume, 1987). The SOGS is a 20-item questionnaire that asks about the respondent's gambling history. A SOGS score of 5 or more suggests the potential presence of pathological gambling and scores of 3 or 4 suggest the potential of problem gambling. The SOGS was employed because it is the most commonly used diagnostic screening measure for pathological gambling (Petry, 2005). Research suggests that the SOGS has good internal consistency and test-retest reliability (Lesieur & Blume, 1987; Stinchfield, 2002).

The final measure that was identical for all participants was the Gambling Functional Assessment (GFA; Dixon & Johnson, 2007). The GFA is a 20-item self-report questionnaire that was designed to identify the contingencies that maintain the respondent's gambling behavior. The four contingencies tested are tangible (i.e., money), sensory experience, social attention, and escape. The GFA has been shown to have good internal consistency (Miller, Meier, & Weatherly, 2009) and adequate temporal reliability (Miller et al., 2009), although its construct validity is marginal (Miller, Meier, Muehlenkamp, & Weatherly, 2009).

The final task was a delay-discounting procedure that involved two phases. Participants assigned to the 50-50 group were initially presented with the statement: "For the following questions, please assume that you have recently signed a contract to start a new job that pays $50,000 per year[2]." They then completed the delay discounting task, which consisted of the following question:

[2] The hypothetical salary amounts in the present study were chosen with three criteria in mind. First, they needed to be realistic. That is, although the present participants were university students and most, if not all, had an annual income below those tested in the present study, the goal was to use salaries the participants would recognize as being earned in the "real world." Second, it needed to be possible to parametrically manipulate the salaries and still keep them realistic. Third, when they were manipulated, the goal was to maximize the manipulation (i.e., make the increase or decrease in salary "substantial").

> You have won a raffle in which the prize is $1,000 in cash. However, it will be X time before you receive the prize. What is the smallest amount of money you would accept today rather than having to wait X time for your prize?

This type of discounting task is called the fill-in-the-blank method (Chapman, 1996), with the participant supplying the indifference point at each delay. This method is potentially preferable to the typical binary-choice method because it greatly reduces the number of questions posed to, and answered by, the participant (see Smith & Hantula, 2008, for a discussion). Participants were tested at five different delays, meaning they answered the above question five times. The five delays that were used were 1 week, 1 month, 6 months, 1 year, and 5 years. The order of the five different delays varied randomly across participants.

After answering the initial five delay-discounting questions, phase 2 began with the participants being presented with the statement: “For the following questions, please assume that you are in the third year of that job and are still making $50,000 per year.” The participants then completed the identical delay-discounting task a second time.

Participants in the 100-50 group were presented with the statement: “For the following questions, please assume that you have recently signed a contract to start a new job that pays $100,000 per year” at the beginning of phase 1 and the statement: “For the following questions, please assume that, after three years, you were laid off from your job that paid $100,000 per year and you have had to accept employment at a new job that pays only $50,000 per year” at the beginning of phase 2. Participants in the 200-200 group were presented with the statement: “For the following questions, please assume that you have recently signed a contract to start a new job that pays $200,000 per year” at the beginning of phase 1 and the statement: “For the following questions, please assume that you are in the third year of that job and are still making $200,000 per year” at the beginning of phase 2. Lastly, participants in the 100-200 group were presented with the statement: “For the following questions, please assume that you have recently signed a contract to start a new job that pays $100,000 per year” at the beginning of phase 1 and the statement: “For the following questions, please assume that, after three years at your job, you have been promoted to a position that pays $200,000 per year” at the beginning of phase 2.

Data Analysis

Rates of discounting were determined by calculating the area under the discounting curve (AUC) as proposed by Myerson, Green, and Warusawitharana (2001):

$$x_2 - x_1\ [(y_1 + y_2)/2] \quad \text{(Equation 1)}$$

AUC is calculated by summing the areas of the trapezoids formed by the indifference points (i.e., the participant’s responses) across the different delays. AUC can vary between 0 and 1, with the value varying inversely with the rate of discounting (i.e., high AUC values indicate little or no discounting and low AUC values indicate steep discounting).

Although there are other methods for measuring rates of discounting (e.g., fitting the data to a hyperbolic equation; Mazur, 1987), Equation 1 was employed for several reasons. For one, it is does not presuppose the form discounting should take (i.e., a hyperbola). Secondly, AUC is a direct measure of the data rather than being estimated from the data. Thirdly, AUC values are typically parametric and therefore do not require data transformation prior to statistical analysis (see Myerson et al., 2001, for a discussion).

Participants’ data were excluded from analysis if their SOGS score was either 1 or 2.

The remaining participants were divided into groups depending on their score on the SOGS. Participants scoring 0 were placed into one group (non-gamblers; NG) and participants scoring 3 or more were placed in the other group (problem/pathological gamblers; PG). Thus, the final design consisted of eight groups 50-50NG (n = 29), 50-50PG (n = 16), 100-50NG (n = 29), 100-50PG (n = 16), 200-200NG (n = 18), 200-200PG (n = 13), 100-200NG (n = 19), and 100-200PG (n = 11). The AUC values from each phase of the procedure were then analyzed by conducting a three-way (Group by Type of Gambler by Phase) mixed-model analysis of variance (ANOVA), with group and type of gambler serving as between-group measures and phase being a repeated measure. Results were considered significant at $p \leq .05$

RESULTS AND DISCUSSION

Results of the ANOVA indicated that the main effect of group was not significant, $F(3, 143) = 0.54$, $p = .658$, $\eta^2 = .011$, indicating that discounting did not vary systematically as a function of the contexts presented to the different groups. The main effect of type of gambler, however, was significant, $F(3, 143) = 4.39$, $p = .038$, $\eta^2 = .030$. Interestingly, participants in the PG groups (Mean AUC = 0.69; SD = 0.26) displayed significantly *less* discounting than did participants in the NG groups (Mean AUC = 0.60; SD = 0.26). The main effect of phase was not significant, $F(1, 143) = 0.81$, $p = .370$, $\eta^2 = .006$, indicating that overall rates of discounting did not differ between phases 1 and 2. The interaction between group and type of gambler, $F(3, 143) = 1.25$, $p = .295$, $\eta^2 = .025$, phase and group, $F(3, 143) = 1.10$, $p = .351$, $\eta^2 = .023$, phase and type of gambler, $F(1, 143) = 0.01$, $p = .919$, $\eta^2 = .000$, and all three factors, $F(3, 143) = 0.39$, $p = .760$, $\eta^2 = .008$, all failed to reach statistical significance.

Thus, the present results indicate that problem and pathological gamblers discounted the $1,000 prizes at a significantly different rate than the non-gamblers. However, the difference was perhaps not in the expected direction. Rather, the problem and pathological gamblers displayed significantly less discounting than the non-gamblers, which is contrary to some past reports (e.g., Dixon et al., 2003, 2006). Thus, one could entertain the idea that the present participant sample and/or data set were suspect.

However, there are numerous reasons to believe otherwise. For instance, although the differences across groups were not statistically significant, the rates of discounting in phase 1 of the discounting task were consistent and interpretable. That is, the mean AUC values of the participants hypothetically making $50,000, $100,000, or $200,000 per year were 0.606, 0.630, and 0.642, respectively. These results can be interpreted as, the lower the hypothetical annual income, the greater the tendency toward getting the prize money now rather than waiting. Likewise, again although the results were not statistically significant, the change in rates of discounting for the 100-50 and 100-200 groups between phases 1 to 2 were in the direction one might expect. That is, the mean AUC values for the 100-50 groups went from 0.636 in phase 1 to 0.693 in phase 2, indicating that the hypothetical decrease in annual income tended to increase the subjective value of the $1,000 in prize money. Likewise, the mean AUC values for the 100-200 groups went from 0.623 in phase 1 to 0.604 in phase 2, indicating that the hypothetical increase in annual income tended to decrease the subjective value of the $1,000 in prize money.

It is also the case that other aspects of the data were consistent with previous research. That is, participants' GFA scores for gambling for tangible outcomes ($r = .557$, $p < .001$), the sensory experience ($r = .568$, $p < .001$), social attention ($r = .343$, $p < .001$), and escape ($r = .599$, $p < .001$) all correlated significantly with SOGS scores (Miller, Dixon, Parker, Kulland, & Weatherly, 2010). Furthermore, escape scores correlated more strongly with SOGS scores than any of the other contingencies (Miller et al., 2010). In fact, when only the data from the 56 participants who scored 3 or more on the SOGS were analyzed, escape was the only contingency on the GFA that significantly correlated with SOGS scores ($r = .358$, $p = .007$)[3]. It was also the case that SOGS scores were significantly correlated with gender ($r = .229$, $p = .005$), with males tending to score higher on the SOGS than females. That result is consistent with the established idea that males are at higher risk for pathological gambling than females (see Petry, 2005).

Finally, not all previous research on discounting has found that gamblers discount delayed rewards more steeply than non-gamblers (see Holt et al., 2003). In fact, it is possible that aspects of the present procedure contributed t to the finding of less discounting in the problem/pathological gamblers than in the non-gamblers. Specifically, in the present procedure, the hypothetical outcome that was being discounted was a monetary sum that had been won through gambling. In contrast, the participants in Dixon et al. (2003, 2006), for instance, were asked to make choices between two different hypothetical sums of money without mention as to why those sums were available. By phrasing the outcome as money that had been won through gambling, the outcome may have held greater subjective value to the gamblers than to the non-gamblers. If that were the case, one would expect the gamblers to display less discounting of that outcome than the non-gamblers (i.e., the magnitude effect; Chapman, 1996; Thaler, 1981). Future research could potentially test this possibility by manipulating how the monetary outcome was framed to see if rates of discounting displayed by problem/pathological gamblers vary as a function of whether the money has been won gambling or gained by some other means. Future research might also pursue whether the present results were influenced by the procedure used to collect the discounting data. That is, the fill-in-the-blank method (Chapman, 1996) allows for the participant to generate the response rather than choosing from a set of researcher-determined responses. Doing so may have maximized any potential differences in interpretation of the source of the $1,000 between the gamblers and non-gamblers.

One goal of the present study was also to determine whether any differences in the rates of discounting between non-gamblers and problem/pathological gamblers would be differentially affected by similar changes in the context in which the discounting occurred. As no significant interactions were observed, the present results do not provide evidence to indicate that the process of discounting for non-gamblers and problem gamblers is differentially affected by such manipulations. Phrased differently, altering the participants' hypothetical annual income did not produce statistically significant changes in the rates of discounting in the present study for either the non-gamblers or the problem/pathological gamblers. Taken together with the finding that rates of discounting differed between the non-gamblers and the problem/pathological gamblers, these results suggest that difference between these populations in terms of discounting is one of absolute rate, at least when it comes to monetary outcomes (Weatherly & Derenne, 2010), and not how the process is influenced by other contextual factors such as changes in one's hypothetical salary. Finding a difference in rates of discounting between non-gamblers and problem gamblers, but not how discounting is influenced by contextual

[3] Scores on the GFA were not, however, significantly predictive of rates of discounting. That is, when regression analyses were conducted on discounting rates in phases 1 and 2 using the scores for the different contingencies on the GFA as predictors, no significant effects were observed.

manipulations, could also be seen as support of delay discounting being a trait, rather than a state, variable (Odum, 2011). However, the problem gamblers in the present study displayed *less* delay discounting than the non-gamblers. Thus, from a trait perspective, one would need to explain why in some situations gamblers discount more steeply than non-gamblers (e.g., Dixon et al., 2003, 2006), in some instances similar to non-gamblers (e.g., Holt et al., 2003), and in some instances less steeply than non-gamblers (e.g., present study).

It should also be noted that the present results do not indicate that rates of discounting by problem or pathological gamblers could never be altered by contextual changes. In fact, the idea that their rate of discounting might be influenced by whether or not the monetary sum being discounted had been won gambling is one potential example. Although the present results did not produce a change in discounting with changes in contexts, the idea may be worth pursuing in future research. That is, inasmuch as the process of delay discounting may contribute to the disorder of pathological gambling (e.g., see Petry & Madden, 2010), determining how to alter rates of discounting by pathological gamblers will be important in identifying successful treatment approaches for the disorder. Perhaps the most important contribution of the present data is the results indicate that rates of discounting by problem and/or pathological gamblers will not *always* be steeper than for non-problem gamblers.

In closing, aspects of the present procedure should be recognized as potentially limiting how broadly the results can be generalized. For one, the present participants were all university students attending a Midwestern university, they were relatively young, and the sample itself was racially homogenous. Any of these factors could have influenced the results. Non-gamblers and problem/pathological gamblers in the present study were identified by the SOGS, which may be important because, although the SOGS is the most widely used diagnostic screen for pathological gambling, it is not without its critics (e.g., see Gambino, 1997). Lastly, had more participants been employed the results, and thus the interpretation of the results, might have been different. Thus, as is the case with most research reports, the present results require replication before the conclusions drawn from them are roundly accepted.

REFERENCES

Chapman, G.B. (1996). Temporal discounting and utility for health and money. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 22*, 771-791.

Dixon, M.R., Jacobs, E.A., Sanders, S. (2006). Contextual control of delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis, 39*, 413-422.

Dixon, M.R., & Johnson, T.E. (2007). The gambling functional assessment (GFA): Anassessment device for identification of the maintaining variables of pathological gambling. *Analysis of Gambling Behavior, 1*, 44-49.

Dixon, M.R., Marley, J., & Jacobs, E.A. (2003). Delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis, 36*, 449-458.

Gambino, B. (1997). The correction for bias in prevalence estimation with screening tests. *Journal of Gambling Studies, 13*, 343-351.

Holt, D.D., Green, L., & Myerson, J. (2003). Is discounting impulsive? Evidence fromtemporal and probability discounting in gambling and non-gambling college students. *Behavioural Processes, 64*, 355-367.

Lesieur, H.R., & Blume, S.B. (1987). The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. *American Journal of Psychiatry, 144*, 1184-1188.

Madden, G.J., & Bickel, W.K. (eds.) (2010). *Impulsivity: The Behavioral and Neurological Science of Discounting*. Washington, D.C.: American Psychological Association.

Mazur, J.E. (1987). An adjusting procedure for studying delayed reinforcement. In M.L. Commons, J.E. Mazur, J.A. Nevin, & H. Rachlin (Eds.), *Quantitative Analyses of Behavior: Vol. 5. The Effect of Delay and Intervening Events on Reinforcement Value* (p. 55-73. Hillsdale, NJ: Erlbaum.

Miller, J.C., Dixon, M.R., Parker, A., Kulland, A.M., & Weatherly, J.N. (2010). Concurrent validity of the Gambling Functional Assessment (GFA): Correlations with the South Oaks Gambling Screen (SOGS) and indicators of diagnostic efficiency. *Analysis of Gambling Behavior, 4*, 61-75.

Miller, J.C., Meier, E., & Weatherly, J.N. (2009a). Assessing the reliability of the Gambling Functional Assessment. *Journal of Gambling Studies, 25*, 121-129.

Miller, J.C., Meier, E., Muehlenkamp, J., & Weatherly, J.N. (2009b). Testing the validity of Dixon & Johnson's (2007) gambling functional assessment. *Behavior Modification, 33*, 156-174.

Myerson, J., Green, L., & Warusawitharana, M. (2001). Area under the curve as a measure of discounting. *Journal of the Experimental Analysis of Behavior, 76*, 235-243.

Odum, A.L. (2011). Delay discounting: Trait variable? *Behavioural Processes, 87*, 1-9.

Odum, A.L., & Baumann, A.A.L. (2010). Delay discounting: State and trait variable. In G.J. Madden & W.K. Bickel (Eds.) *Impulsivity, The Behavioral and Neurological Science of Discounting* (p. 39 – 65). Washington, D.C.: American Psychological Association.

Petry, N.M. (2005). *Pathological Gambling: Etiology, Comorbidity, and Treatment*. Washington, D.C.: American Psychological Association.

Petry, N.M., & Madden, G.J. (2010). Discounting and pathological gambling. In G.J. Madden and W.K. Bickel (Eds.) *Impulsivity: The Behavioral and Neurological Science of Discounting* (pp. 273-294). Washington, D.C.: American Psychological Association.

Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the South Oaks Gambling Screen (SOGS). *Addictive Behaviors, 27*, 1-19.

Smith, C.L., & Hantula, D.A. (2008). Methodological considerations in the study of delay discounting in intertemporal choice: A comparison of tasks and modes. *Behavior Research Methods, 40*, 940-953.

Thaler, R. (1981). Some empirical evidence on dynamic inconsistency. *Economics Letters, 8*, 201-207.

Weatherly, J.N. (2010). Temporal discounting and gambling: A meaningful relationship? *Analysis of Gambling Behavior, 4*, 27-37.

Weatherly, J.N., & Derenne, A. (2010). SOGS scores correlate with rates of delay discounting of hypothetical monetary amounts, but not non-monetary outcomes. *Analysis of Gambling Behavior, 4*, 103-112.

Weatherly, J.N., & Derenne, A. (in press). Comparing delay discounting rates when using the fill-in-the-blank and multiple-choice methods. *Journal of General Psychology*.

Weatherly, J.N., Derenne, A., & Terrell, H.K. (2010). College students discount money "won" more than money "owed." *Psychological Record, 60*, 463-472.

Weatherly, J.N., & Dixon, M.R. (2007). Toward an integrative behavioral model of gambling. *Analysis of Gambling Behavior, 1*, 4-18.

Weatherly, J.N., & Terrell, H.K. (2011). Delay discounting of different commodities II: Confirmatory analyses. *Journal of General Psychology, 138*, 35-48.

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