

## Wagering Preferences of Problem Gamblers

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The wagering preferences of 16 male problem gamblers and a matched control group of 16 social gamblers were examined both through a questionnaire and in an experimental context in which the opportunity to gamble was auctioned between 8 pairs of gamblers in each group. Six prize levels (\$50 to \$1,000) and seven probabilities of winning (.01 to .99) were combined to provide 42 hypothetical bets for both the questionnaire and experimental measures. The results from the experimental auctioning measure showed that there was a tendency for problem gamblers to bet more heavily than social gamblers when there was less probability of winning, whereas social gamblers were found to bid more when there was a higher probability of winning. Different prize levels did not produce significant differences in amounts gambled, nor did the questionnaire measure show any significant differences in wagering preference between the groups.

Although there is a large theoretical literature pertaining to the causes (e.g., Bergler, 1957; Cornish, 1978, Freud, 1928/1974) and definition (e.g., Lewis, 1936; Moran, 1970a, 1970b) of problem gambling, there are no controlled studies comparing the gambling behavior of problem gamblers with those of social gamblers (Dickerson, 1979).

Swyhart (1976), in one of the few studies of risk-related behaviors of problem gamblers, used a sample of Gamblers Anonymous (GA) members to investigate levels of risk taking, wagering preference, impulsivity, money-management strategies, and knowledge of probabilities, compared with a nonpathological control sample. Swyhart found significant differences between test and control groups on measures of money management and impulsiveness. He found no significant differences between the groups on a measure of

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wagering preferences. However, Swyhart acknowledged limitations in his study, which was carried out solely through questionnaires, administered by an intermediary.

The question to which Swyhart (1976) addressed himself seems to be important. How do problem gamblers gamble, in comparison with nonproblem gamblers? For example, prevailing themes of psychoanalytic theorists (e.g., Bergler, 1957) would predict a pattern of comparatively heavier betting at lower probabilities of winning by problem gamblers than by social gamblers because of a psychomasochistic need to lose. Support for this position may be found by examining the differences, if any, between problem gamblers and nonproblem gamblers in the levels of risk taking in an experimental situation.

The problem gambler cannot ethically be placed in an actual gambling situation. For this reason we adapted the experimental procedure developed by Preston and Baratta (1948) to compare wagering preferences of problem gamblers and social gamblers. Their procedure requires participants to bid in an auction to win the opportunity of placing a "bet." Preston and Baratta tested the betting behavior of students and found that probabilities of less than .25 were subject to systematic overvaluation, whereas probabilities of more than .25 were subject to systematic undervaluation. Nogee and Lieberman (1960),



using the same procedure with psychiatric aides, replicated the findings of Preston and Baratta, despite obvious differences between the two groups of subjects on educational level and socioeconomic status (SES). These findings have also been observed in a variety of other studies. For example, Attneave (1953) found similar results to Preston and Baratta's in a guessing game with airmen trainees, as did Sprowls (1953) in an analysis of French, Spanish, and Mexican lotteries. Comparable findings have been obtained in situations involving a great deal of skill in addition to chance (Cohen, 1964) and in those situations in which skill and chance are equally important (Griffith, 1949; McGlothlin, 1956). Finally, McGlothlin's study describes similar behavior by American horse-race bettors at the race track.

Preston and Baratta's (1948) technique, therefore, although laboratory based, produced results similar to those obtained from field observations. Their study appears to be a useful paradigm for investigation of the wagering preferences of gamblers where fullon gambling cannot be allowed, and an adaptation of it was used in the present study.

This study compares a group of male problem gamblers with a matched control group of male nonproblem gamblers on questionnaire and experimentally determined wagering preferences. We hypothesize that problem gamblers will bet significantly more heavily than will social gamblers as risks become higher (e.g., Bergler, 1957; Roston, 1961) and that this effect will be linear. We also hypothesize that problem gamblers will bet significantly more heavily than will social gamblers at high prize levels (Fink, 1961).

## Method

### *Subjects*

Sixteen members of Gamblers Anonymous and 16 social gamblers participated in the study. Social gamblers were defined, for the purposes of this study, as "men who bet on horses (the commonest feature of the GA group) not more frequently than twice weekly or less frequently than once every three months and who reported that they had never regarded their gambling as a problem." The social gambler was matched on characteristics of age, number ability, race, and socioeconomic status with a corresponding member of the GA group. The choice of this particular gambling range as a control was arbitrary. Some may regard gambling twice a week as being close to problem gambling. Nevertheless, none of our social gamblers reported having problems. Social gamblers were recruited and tested outside local Totalisator Agency Board offices (off-track betting shops). Between 250 and 300 gamblers were interviewed before an adequate control group was obtained.

A Personal History Questionnaire was administered. This provided information on marital status, age, and gambling history. Number ability was measured on a number series test previously used as a test of intelligence (Richardson & Stanton, 1973). This test from Lumsden (1959) is a 20-item unidimensional measure and has a time limit of 3 min. Socioeconomic status was determined using the protocol of Hall & Jones (1950). It was decided that plus or minus 3 years would be acceptable in terms of matching age, plus or minus one group for matching SES and plus or minus one point for matching the ability to compute number series.

The mean age of the social gamblers was 33.4 years (range = 19-62), and of the problem gamblers, 33.6 years (range = 21-64). Mean scores on the numbers test were also similar: for the social gamblers, 10.7, and for the problem gamblers, 10.6. Finally, the mean SES score for both the social and the problem gamblers was 4.9. Although marital status was not controlled, the groups were very similar in their distribution of marital status.

All of the problem gamblers reported gambling primarily on horse racing. Problem gamblers estimated they had lost an average of \$45,500 gambling, whereas the social gamblers estimated they had lost an average of \$1,245. The average number of years spent gambling was 13.13 for the problem gamblers and 16 for the social gamblers. According to Ashton (1979) correlational analysis indicated that, for heavy gamblers, years of gambling had a positive relationship with risk-taking and, therefore, the difference between the means must be considered in interpreting the results of this study. Although the yearsof-gambling variable was not controlled in this study, it is fortunate that, *in the event*, no significant difference on that variable exists between the test and control groups,  $t(30) = 0.78$ ,  $p > 0.05$ . Thus gambling experience would not explain any observed differences between the two groups.

### *Procedure*

*Wagering Preference Questionnaire.* For the Wagering Preference Questionnaire each subject was asked to imagine that he was taking part in an auction for each prize, in which his opponent(s) did not stop bidding. He was asked to imagine the highest bid he was prepared to make before dropping out of the auction. Each respondent was told "you must allocate something to each bet. You may use up to \$4,000, which you may imagine has been made available for the purpose." The Wagering Preference Questionnaire assessed wager preferences for different combinations of prize and probability of winning. The six prize levels were \$5, \$50, \$100, \$250, \$500, and \$1,000. The seven probability levels were .01, .05, .25, .50, .75, .95, and .99. In all, 42 different combinations of prize and probability were available for the "gambler" to invest his "money". This questionnaire was administered individually before the auction bid experiment, either at home or at a Gamblers Anonymous meeting.

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The participant had the opportunity to view all gambles before completing the questionnaire and could change his responses if he so desired. All Wagering Preference Questionnaires were completed before the experimental auction game.

*Auction bid experiment.* The data for the auction bid experiment were collected from a game based on the procedure used by

Preston and Baratta (1948). The game was played by dividing the subjects into pairs within each group, thus forming eight problem-gambling pairs and eight social-gambling pairs. In the problem-gambling group, subjects were paired as closely as possible with a subject of similar age. The control group subjects were then paired in the same order as the subjects whom they matched from the problem-gambling group. Four sessions were run in the following order: six problem-gambling pairs, six social-gambling pairs, two problem-gambling pairs, and two social-gambling pairs. No pairs of subjects were personal friends, although some GA participants were acquainted. Before the game started, each pair was told that they would now play out each auction represented in the Wager Preference Questionnaire. All of the subjects had previously completed this and, therefore, were familiar with the range of auctions to be held. The instructions were given as follows:

1. It was explained that the value of the prize for each auction would be written on the blackboard, together with the chance of winning that prize. This would be done separately for each auction after the results for the previous auction had been established.

2. It was stressed that the winner (highest bidder) of each auction had not yet won the prize. Winning the auction entitled the winner to have the chance of winning the prize at the probability of winning stated. The winner of the auction (highest bidder) could either win the prize or lose his stake, depending on the draw of tickets representing the probability of winning the prize. The loser of the auction could neither win the prize nor lose anything for that particular auction.

3. If the winner of the auction also successfully won the prize, he would also keep the amount that he had bid. The difference in this regard from the Wagering Preference Questionnaire was underlined.

4. It was explained that the winning of the prize would be determined by drawing a ticket from a tub. Six marked tubs were on display, with the winning probability of 1 in 100, 5 in 100, 25 in 100, 50 in 100, 75 in 100, 95 in 100, and 99 in 100 represented. Depending on the particular auction, a tub would be selected and the contents of 100 tickets, representing numbers 1 to 100, stirred up. The number of winning tickets in each tub corresponded with the odds of winning displayed. After selection, an announcement of winning ticket or losing ticket would be made. A losing ticket would mean that the subject who made the highest bid in the auction would lose the highest amount bid, which would be subtracted from the amount left in the subject's personal bank. The ticket would be replaced in the tub.

5. The same subject in each pair was to open the bidding for each auction.

6. If the highest bid for each subject in a pair was the same, then the first bidder would win the auction.

7. No bargaining or contracting within each pair would be allowed.

8. There would be no time limit for bidding.

Instructions were repeated on request, and a trial auction was held to demonstrate the procedure. The general mood in all sessions was one of good-humored competitiveness. Typical remarks in problem-gambler groups were "No surprises on the card at GA today" and "They are taking a long time because won't accept each-way bids!" The excitement and competition were apparent, too, as subjects in all groups keenly anticipated the result of the ticket draw and some made vigorous motions as if they were whipping a horse, with comments like "Come on!" or "Get in there!" Jubilation

greeted successful outcomes, particularly for the larger prizes.

Outcomes for first six groups in the problem-gambler session were determined by chance. These outcomes were noted, and the same outcomes were presented in all of the other sessions.

The experiment lasted about 2 hr, and the data consisted of the highest bids for each pair for each of the 42 auctions. Subjects received no monetary prizes for winning. On follow-ups 1 month and 6 months later, none of the problem gamblers had relapsed into problem gambling and no regrets about participating in the experiment were expressed.

## Results

*Wagering Preference Questionnaire measures.* Inspection of the data revealed substantial differences in variance between the different experimental conditions (prizes and probabilities). It was, therefore, decided to transform the data to stabilize the variance, and the transformation used was  $\ln(B + 1)$ , where B = bids. Plotting residuals versus fitted values indicated that this was a satisfactory transformation. A 2 X 7 X 6 repeated measures analysis of variance (ANOVA) was conducted for the transformed data (see Winer, 1971, p. 539).

Only the main effect of probabilities,  $F(6, 180) = 120.17, p < 0.001$ , and prize,  $F(5, 150) = 332.37, p < 0.001$ , were significant. None of the F values for the group main effect or any of the interactions exceeded 1.9, and all were nonsignificant.

There was also no significant difference,  $t(30) = 1.24, p > 0.05$ , between the groups in their ability to budget their spending. The average amount spent by problem gamblers was \$3,737, whereas the mean for social gamblers was \$2,836.

*Auction bid measures.* Because of the unusual nature of the data (i.e., the winning bid of a pair in an auction), the appropriate analysis is problematical. The bids of both individuals of a pair appear at different stages

in the data, the differences between the bids offered by the two contestants varied considerably between the pairs, and the problems of deciding how to view the independence of the matched pairs all had to be considered. The chosen analysis was that of a 2 X 6 X 7 ANOVA, with the winning bid in each gamble by each pair, the basic data point. Thus 8 subjects were in each of the two experimental groups. As there were seven probabilities and six prizes, the total number of observations for bids was 16 X 7 X 6 = 672, or a total of 671 degrees of freedom when accounting for the grand mean. The data were transformed as for the questionnaire analysis. The transformed bids in the auction bid experiment are plotted against probability of winning at various prize levels in Figure 1.

Although the treatments were presented to the 16 pairs in a random order, some intrasubject serial correlation is expected. There are 14 X 41 (=574) degrees of freedom for error. They were split into

three sets of 84, 70, 420 degrees of freedom, to test (a) probability and Probability X Group Interaction, (b) prize and Group X Prize, and (c) Probability X Prize and Group X Probability X Prize, respectively. The mean squares for the three sets were .98, .51, and .30, respectively.

The ANOVA shows, as might be expected, highly significant main effects for prize,  $F(5, 70) = 494.67$ ,  $p < 0.001$ , and probability,  $F(6, 84) = 281.64$ ,  $p < 0.001$ . Larger prizes attracted higher bets, and higher bets were wagered on those gambles with a greater chance of success. There was no significant main effect for problem- versus social gambling group membership,  $F(1, 14) = 0.28$ ,  $p > 0.05$ .

A significant Probability X Prizes interaction,  $F(30, 420) = 16.81$ ,  $p < 0.001$ , was also observed, as might be expected. Higher prizes and higher probabilities of winning attracted the largest bets, whereas those with very little chance of winning had little attraction.

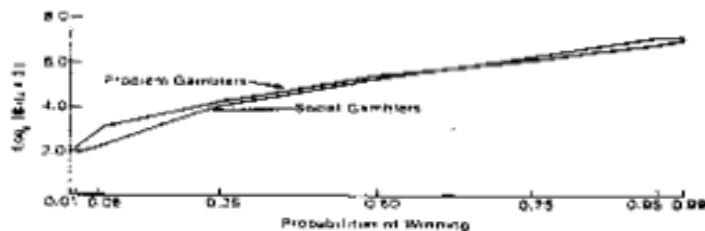
Perhaps of most importance for this study was the marginally significant Group X Probability interaction,  $F(6, 84) = 2.24$ ,  $p < 0.05$ , which was mostly due to the linear component,  $F(1, 14) = 9.24$ ,  $p < 0.01$ . No other interaction was statistically significant.

It can be seen that problem gamblers tend to bid more than do social gamblers at low probabilities of winning (.01, .05, .25), whereas social gamblers tend to bid more at higher probabilities of winning (.95, .99). As mentioned, this interaction was found to have a highly significant Group X Probability linear component, supporting our hypothesis that problem gambling would increase directly with increased risk taking.

There was no significant interaction effect of group and prize. In this experiment, problem gamblers did not bid significantly more heavily than did social gamblers at high prize levels. The second-order interaction Group X Probability X Prize was close to significance,  $F(30, 420) = 1.48$  ( $F_{05} = 1.49$ ).

*Correlations of wager preference between questionnaire and experimental measures.* The correlation between the questionnaire wager preference and the auction bid was .18 for the problem-gambling group and .07 for the social gambling group. It would seem that the response of subjects on the questionnaire measure bore little relationship to the response to the experimental situation. A significant difference between the groups appeared in an experimental situation that was not detected by a questionnaire measure.

*Comparison of winnings between the groups.* Despite differences between the groups in betting behavior at different probabilities of winning, both groups ended the experiment with more than double the endowment (\$4,000) allowed at the beginning. In effect, the \$4,000 stake was never in danger of being depleted, so that lack of funds was never an



<sup>1</sup> The test of sphericity (W) of the pooled variance-covariance matrix was satisfied,  $W = 0.0205$ , for which  $\chi^2(20, N = 16) = 18.585$ . Therefore, the  $F$  test with 6 and 84 degrees of freedom can be used to test this interaction (see Huynh & Feldt, 1970).

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absolute constraint on bids. The mean amount for problem gamblers was \$8,259 and for social gamblers, \$8,178. There was not a significant difference,  $t(30) = 0.08$ ,  $p > 0.05$ , between the winnings of the groups.

### Discussion

We hypothesized, in line with psychoanalytic theorists such as Bergler (1957), that problem gamblers would bet significantly more heavily than would social gamblers at low probabilities of winning. We also adopted the view that problem gamblers would also bet more highly than would social gamblers at higher prize levels.

As in a previous study (Swyhart, 1976) we found no difference in wagering preferences between problem gamblers and social gamblers on a questionnaire measure when paper and pencil tests were used to compare preferences.

The first hypothesis obtained some support in the experimental auctioning situation. As postulated by psychoanalytic and other theorists, problem gamblers did gamble significantly more highly at low probabilities of winning than did social gamblers, and a linear trend was clearly evident.

The second hypothesis that problem gamblers would bid more at higher prizes was not supported, although there was a near significant interaction between prize level and probabilities of winning in governing amounts invested at auctions. Problem gamblers tended to bid more highly than did social gamblers with high prizes and lower probabilities of winning.

There was a low correlation between responses to the questionnaire and responses during the auction experiment. This may have been expected. On the questionnaire measure there was no feedback after each bet as to whether that bet was a winner or a loser. For practical purposes, the bet had to be considered by the subject as a loss in terms of husbanding his remaining capital for further bets, except in cases where the initial capital endowed is unrealistically high. In the experiment, immediate feedback as to the success of the bet gives an up-to-date account of capital. Wins could be added to capital available. In this way it was a closer approximation to actual betting than was the questionnaire.

There are a number of methodological issues that must be considered before interpreting the findings from the auction experiment. Although the auction experimental situation overcomes some of the difficulties of the questionnaire methodology (for example, it provides social and competitive elements), a criticism of this study may be that all subjects, although not winning every bet, were able to husband their resources sufficiently well to increase their profits throughout the experiment. This was because the amounts lost on low-winning probability bets were small in comparison with the amounts won on higher winning probability bets. In this way, perhaps, the effect of suffering losses was obscured. Thus, there were no differences in budgeting between the two groups. A further problem for interpretation is that within the parameters of this experiment there was an absolute level of capital, and this is not the case in real life. Deficiencies may be overcome by borrowing or stealing.

Edwards (1954) remarked that "subjects tend to change their habits when they lose money, but not when they win" (p. 452). It would be interesting to repeat the experiment in situations in which a loss or deficit was more likely. This could be accomplished using the experimental paradigm reported here. The size of prize hypothesis could also be retested using larger prizes than were employed in the current study.

The results of this study do not explain why compulsive gamblers prefer more risk than do social gamblers. The reason may be more complex than a psychic masochism or the need to lose, as postulated by the psychoanalysts. Understanding of the risk-preference phenomenon may arise from further behavioral studies using the Preston and Baratta (1948) technique with a variety of different types of problem gamblers (Moran, 1970a, 1970b). Basic research should also concentrate on issues such as measurement of excitement or arousal during high-risk bets (Dickerson, 1979), measurement of superstitiousness and status of risk (e.g., Tversky & Kahneman, 1974), as well as the reinforcement value of beating the odds (Rule & Fischer, 1970). All of these issues should have a high research

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priority if future therapies are to be specific enough to be effective.

## References

- Ashton, N. (1979). Gamblers-disturbed or healthy? In D. Lester (Ed.), *Gambling today* (pp. 53-70). Springfield, IL: Charles C Thomas.
- Attneave, F. (1953). Psychological probability as a function of experienced frequency. *Journal of Experimental Psychology*, 46, 81-86.
- Bergler, E. (1957). *The psychology of gambling*. New York: Hill & Wang.
- Cohen, J. (1964). *Behavior in uncertainty and its social implications*. London: Allen & Unwin.
- Cornish, D. B. (1978). *Gambling: A review of the literature and its implications for policy and research* (Home office research study No. 42). London: Her Majesty's Stationary Office.
- Dickerson, M. C. (1979). FI schedules and persistence at gambling in the U.K. betting office. *Journal of Applied Behaviour Analysis*, 12, 315-323.
- Edwards, W. (1954). Variance preferences in gambling. *American Journal of Psychology*, 67, 441-452.
- Fink, H. K. (1961). Compulsive gambling. *Acta Psychotherapy* 9, 251-261.
- Freud, S. (1974). Dostoevsky and parricide. In J. Halliday & P. Fuller (Eds.), *The psychology of gambling* (pp. 157-174). London: Allen Lane. (Original work published 1928)
- Griffith, R. M. (1949). Odds adjustment by American horse-race bettors. *American Journal of Psychology* 62,290-294.
- Hall, J., & Jones, D. C. (1950). Social grading of occupations. *British Journal of Sociology*, 1, 31-55.
- Huynh, A., & Feldt, L. S. (1970). Conditions under which mean square ratios in repeated measurement designs have exact F-distribution. *Journal of the American Statistical Association*, 65, 1582-1589.
- Lewis, D. (1936). Problems of obsessional illness. *Proceedings of the Royal Medical Society*, 29, 325-336.
- Lumsden, J. (1959). *The construction of unidimensional tests*. Unpublished master's thesis, University of Western Australia.
- McGlothlin, W. H. (1956). Stability of choices among uncertain alternatives. *American Journal of Psychology*, 69,604-615.
- Moran, E. (1970a). Gambling as a form of dependence. *British Journal of Addiction*, 64, 419-428.
- Moran, E. (1970b). Pathological gambling. *British Journal of Hospital Medicine*, 3, 59-70.
- Nogee, P., & Lieberman, B. (1960). The auction value of certain risky situations. *Journal of Psychology*, 49, 167-179.
- Preston, M. G., & Baratta, P. (1948). An experimental study of the auction value of an uncertain outcome. *American Journal of Psychology*, 61, 183-193.
- Richardson, A., & Stanton, M. (1973). Role strain among salesgirls in a department store. *Human Relations*, 26, 517-536.
- Roston, R. A. (1961). *Some personality characteristics of compulsive gamblers*. Unpublished doctoral dissertation, University of California, Los Angeles.
- Rule, B. G., & Fisher, D. G. (1970). Impulsivity, subjective probability, cardiac response, and risk-taking: Correlates and factors. *Personality*, 1, 251-260.
- Sprowls, R. C. (1953). Psychological-mathematical probability in relationships of lottery gambles. *American Journal of Psychology* 66, 126-30.
- Swyhart, P. R. (1976). *The relationship of pathological gambling to money management, impulsiveness and wager preferences*. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.
- Tversky, A., & Kahneman, D. (1974). Heuristics and biases. *Science*, 185, 1124-1131.
- Winer, B. J. (1971). *Statistical principles in experimental design* (2nd ed.). New York: McGraw-Hill.

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