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Examining Slot Machine Play with Varying Percentages of Losses Disguised as Wins

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EXAMINING SLOT MACHINE PLAY WITH VARYING AMOUNTS OF LOSSES DISGUISED AS WINS

MAJOR PROFESSOR: Dr. Mark Dixon

When playing on multiline slot machine games, small “wins” often amount to less than the original spin wager, which results in a financial loss to the gambler. However, the gambler may feel as if he is winning because these “wins” are paired with audio-visual feedback. The influence of losses disguised as wins was examined to determine if this had an influence on latency, trial ratings, and the number of trials played. Thirty-one participants played a minimum of 50 trials on a simulated multi-line slot machine. The participants were divided into three groups with 16%, 30%, and 46% of trials being losses disguised as wins. Results showed that trial type had a significant impact on latency and rating, as losses disguised as wins fell between wins and losses in terms of latencies and ratings. Clinical implications and future directions are discussed.

Keywords: gambling, slot machine, losses disguised as wins

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CHAPTER 1

INTRODUCTION

The popularity of gambling has risen immensely over the past two decades. Prior to 1988 there were only two states, Nevada and New Jersey, which allowed casino gambling. Today, the opposite is true. There are now only two states, Hawaii and Utah, which outlaw all forms of gambling (Ghezzi, Lyons, & Dixon, 2000). The gross gaming revenue for 2011 was 35.64 billion dollars (American Gaming Association, 2011). Slot machines make up the greatest proportion of this figure (Eadington, 1999). Since 1988, casino gaming has risen 636% (Thalheimer & Ali, 2008). It is estimated that 1-2% of the population has a gambling problem that can be deemed pathological. The Diagnostic and Statistical Manual for Mental Disorders, 4th Edition Text Revision (DSM-IV-TR: American Psychiatric Association, 2000) has identified pathological gambling as a disorder of its own and defines it as:

A) Persistent and recurrent maladaptive gambling behavior as indicated by five or more of the following: 1) is preoccupied with gambling (e.g. preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble), 2) needs to gamble with increasing amounts of money in order to achieve the desired excitement, 3) has repeated unsuccessful efforts to control, cut back, or stop gambling, 4) gambles as a way of escaping from problems, or of relieving of a dysphonic mood (e.g. feelings of helplessness, guilt, anxiety, depression), 5) after losing money gambling, often returns another day to get even (“chasing

> one's losses"), 6) lies to family members, therapist, or others to conceal the extent of involvement with gambling, 7) has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling, 8) has jeopardized or lost a significant relationship, job, or education or career opportunity because of gambling, 9) relies on others to provide money to relieve a desperate financial situation caused by gambling. B) The gambling is not better accounted for by a Manic Episode. (p. 674)

With such a large increase in gambling in recent years, it is pertinent to note some of the benefits that commercial gambling can produce. The increase in gambling obviously adds to the availability of employment, both at the casinos and at equipment manufacturing sites. In 2011, casinos paid approximately $14 billion in wages and $5.7 billion in taxes to the government (American Gaming Association, 2011). Casinos also offer attractive tourist stops, which can spur economic growth.

Of course, with all these benefits, there are also staggering societal costs. Since the money made by casinos is acquired by its patrons and this shows a loss of over $31.25 billion in 2010 (American Gaming Association, 2011). The cost of gambling has risen to be approximately $54 billion each year and includes the lesser-known costs such as gambling related crime, bankruptcies, lost work time, and home foreclosures. Instead, society is shown a positive, win-win situation when talking about gambling. Pathological gambling has inherent costs to individuals and their immediate family and friends. Past studies have shown that persons with a gambling disorder often have higher rates of family dysfunction such as child or spousal abuse as well as co-morbid disorders such as alcohol and drug abuse (Jacobs, 1989). Other individual side effects

include suicide or suicidal ideations and an individual's cost if they seek treatment for their pathology.

Since the ease of access and grand acceptance of casinos, there is also the idea that pathological gamblers are easier to produce. Past studies have supported this hypothesis. In states where gambling has been legal for less than a decade, the pathological gamblers were much less (approximately 0.5%) than those who live in states where gambling has been legalized for over 20 years (approximately 1.5%) (Volberg,1994). With overwhelming data to show that costs to the patrons outweigh current benefits, it is pertinent that practitioners study and utilize effective treatment for pathological gamblers.

Demographics

Past research has shown that specific demographics are associated with a higher prevalence of pathological gambling. There is evidence to show that, for ethnicity, non-white minorities gamble at a higher rate than that of Caucasians. An earlier onset of gambling has been shown to be a predicting factor to whether pathology may develop. In addition, lower socio-economic status and divorce has also been shown to be a factor associated with pathological gambling (Welte, Barnes, Wieczorek, Tidwell, and Parker, 2001).

Characteristics of the Slot Machine

There are many ways that novice and experienced gamblers can enjoy casino activity. Patrons can play roulette, craps, poker, sports betting, blackjack, as well as dog/horse racing. However, slot machines are the ranked as the favorite. This preference is with both typical and pathological gamblers. In a survey of 11 states, over

90% of the casino revenue is incurred through slot machine play (American Gaming Association, 2011). Initially, gamblers of all levels could walk into a casino and be greeted with an array of 3-reel slot machines. It is hypothesized that gamblers enjoyed the lights and sounds of the slot machine for various reasons. One being that the slot machine is relatively easy to play. A patron can simply sit in front of the machine, place their bet, spin the wheel, and wait to see the outcome. It is one of the least difficult forms of gambling when compared to roulette or craps. Secondly, the intervals are much shorter than that of other games such as poker or hose races. A person can play a slot machine every 5 to 10 seconds. Other games may require that the gambler wait up to two minutes between placing a bet. The rate of reinforcement has the ability to be much higher and quickly obtained by playing slot machines. Third, slots can be seen as relatively “cheap” ways to gamble. Often, one can find nickel or quarter slots at a casino. This can blind a gambler into thinking that the habit is not costing them too much, since a turn at the slot machine can be simple pocket change. With these reasons, it is obvious that overuse of the favored slot machine can occur and lead to pathology.

Since its birth over 100 years ago, the slot machine has evolved in large ways. At its inception, the typical slot machine had only three reels and accepted wooden coins for bets. If one walks into a casino today, they will see many kinds of slot machines, some that allow wagers on as many as 100 lines per spin. If one is not near a casino, they can still gamble if they have Internet access. From 2002 to 2003, revenue from Internet gambling increased by 42%. Since Internet gambling is easily accessible and

laws against it are difficult to enforce, Internet gambling may be viewed as a public reality that is far from being punished by law.

In the last decade, many ploys have been used to allure their patrons. Instead of the simple-to-read 3-reel machine, patrons are now faced with a multitude of lights, sounds, and lines. Betting on multiple lines is similar to playing multiple games at one time (Dixon, Harrigan, Sandhu, Collins, and Fugelsang, 2010). No longer are the simple machines available for play; patrons now have attractive computerized slot machines to play with, as well. These electronic gaming machines present sounds, lights, and may even have a button to give the patron the ability to attempt to "stop" the reels at certain times in specific locations. This may give the gambler a larger sense of control.

Dixon, Harrigan, Sandhu, Collins, & Fugelsang (2010), studied the concept of losses disguised as wins (LDWs). A loss disguised as a win occurs when the amount bet during a trial is actually *more* than the amount won. Thus, the patron actually lost money but the machine acts as if the patron won by displaying lights and giving off reinforcing sounds. In slot machine games, the majority of "wins" are actually less than the spin wager. The gambler is reinforced as if he actually won—with flashing lights and a myriad of sounds—when, in actuality, his winnings are less than his bet amount. Instead, this should be viewed as a loss, because the patron has not gained any monetary reward. When the gambler "loses," the machine goes into a state of quiet. It is easy to see how the gambler can pair the LDWs and actual wins together, since the flashing lights and sounds are played during wins and LDWs. Dixon, et al sought to assess if losses disguised as wins on a slot machine could be as arousing as actual wins. The investigators measured skin conductance response (SCR) amplitudes as well

as heart rate changes in 40 novice gamblers during wins, LDWs, and losses. The findings showed that LDWs produced similar responses as actual wins did. Both wins and LDWs triggered higher SCR amplitudes and heart rates than losses did. These results are significant in that novice players easily showed a marked difference in their SCR and heart rate, despite the fact that the players actually lost money during LDWs. Heightened arousal by novice slot machine players could have major implications for the study and development of treatment for pathological gamblers because it has been shown that arousal itself can be a strong reinforcer for gambling behavior.

With the array of lines to wager on, patrons may think that wagering on multiple lines gives them a better chance at winning. This is simply not true. In fact, if a player wagered on 15 lines for 10,000 trials, an average of 67.4% of spins result in losses, 18.4% are LDWs, and a mere 14.2% are actual wins (Dixon, et al, 2010). However, by playing more lines, patrons may feel as if they are being reinforced more often. Harrigan, Dixon, McClarin, Collins, & Fugelsang (2011) analyzed 10,000 spins on a slot machine and found that a slot machine has a higher rate of reinforcement through the “mini-max” strategy. They expand by explaining that when players use the “mini-max” strategy, they will place the minimum bet on the maximum number of lines available for play. The results also show that the payback percentage is not increased when using this strategy, however, reinforcement rate is significantly increased via the losses disguised as wins. The authors suggest that the higher reinforcement rate that is gained when playing multiple lines can account for why players utilize this strategy, and why slot machines can become so addicting. In addition, Harrigan, et al suggests theories as to why gamblers may believe that the mini-max strategy is beneficial. It is hypothesized

that the patrons enjoy the more frequent reinforcement rate when using the mini-max strategy, and may think that they have larger control over their wins if they bet on more lines. It may also seem that they have more control over the reinforcement schedule as a whole, or that they have optimized their winnings by attempting to avoid missing out on any chance of a winning sequence. They may think that they have discovered a gambling strategy and cannot wait for the pay off benefits. It is obvious that gamblers prefer to be reinforced (win or LDW) than not (loss) and when a player is able to manipulate the number of pay lines they wager on, it seems that this may be viewed as an operant link from gambler to their reinforcement. Over time, the differentiation between real wins and LDWs may become unclear and the reinforcing sounds and lights are now the operant link. The illusion of control, irrational beliefs, and increased arousal from using the mini-max strategy has an obvious way of increasing one's future gambling behavior. In spite of this, if gamblers only place bets on a single pay line, it is understandable that they will likely see wins show up on other pay lines and they may begin to feel some sort of regret for not playing other lines or multiple lines. This can, in turn, increase the use of the mini-max strategy in an attempt to increase their coverage of possible winning outcomes. However, the results from Harrigan, et al. tell a different story. If patrons decide to play the minimum number of credits on the maximum number of lines as a gambling strategy, they are thinking poorly if their goal is to keep from losing money.

Many people believe that slot machines are on a variable ratio schedule of reinforcement. Using this idea, they see successive losses as being indicative of an upcoming win. They may think that the machine will payout soon based on previous

strings of losses. This belief is simply not true. Slot machines operate on a random ratio schedule. Some gamblers may know this but still may internalize flawed thoughts when it comes to predicting future wins. The allure of the slot machine itself is enough to keep them coming back to wager more money.

Gamblers may also become attached to slot machines based on the concept of a "near-miss." The term "near miss," can be conceptualized as a losing spin that was close to a win. An example on a slot machine would be a spin landing on two cherry symbols but the third symbol lands one picture away from the cherry. Thus the term a "near" miss is coined. Dixon and Schreiber (2004) examined how response times and win estimations were affected by near-miss trials with slot machine players. In this experiment, participants played 100 total trials on a three-reel slot machine that consisted of 22 symbols. Participants' response latency between trials or spins was analyzed as well as the win estimate as perceived by the participant. The win estimate was a rating that participants would give to losing spins. Using a scale from 1 to 10 they would estimate the degree to which a losing spin was close to a winning spin, one being far away from a win and ten being as close to a win as possible. Results showed that all 12 participants rated near miss trials closer to a win (i.e. closer to 10) than they did for non near miss trials or total loss trials. The authors even went as far as separating all near miss trials into three subcategories to rule out topographical factors. The near miss trials were divided as follows: (a) trials that had two winning symbols on the left middle positions (left), (b) trials with two winning symbols located in the left and right positions (split), and (c) trials with two winning symbols located in the middle and right positions (right). For 11 of the 12 participants, higher estimates were given for a near miss that

occurred as a left or right than as a split. This may be due to the two winning symbols being close together rather than “split.” The other participant rated all near miss trials equally. Response latency showed that 8 of the 12 participants showed longer response latencies following winning trials than following losing trials. For the other four participants, longer response latencies were recorded after losing trials than after winning trials. However, a paired *t* test showed no significant difference between the trial types. When analyzed further, a significant difference in response latency was discovered in the original 8 out of 12 participants after all types of losing trials, not just a near miss trial. The other four participants exhibited a much greater response latency following near miss trials as opposed to total loss trials. These results suggest that participants may have approximated a winning as “soon to come” if they had a near miss trial. This thought process is completely flawed because all losses are equal and the random ratio of reinforcement from the slot machine means that the following trial will be the same whether the preceding one was a loss or a win. The data in this study also suggest that patrons may prefer a slot machine that has near miss trials more than one that does not, which could explain how easily a gambling pathology can develop for those who frequent slot machines.

Cognitive psychologists have sought to explain a slot machine gambler’s persistence by reasoning that they may not fully realize the random ratio schedule that slots are programmed on (Kassinove & Schare, 2001). It is thought that the constant feedback (wins, loss, or near miss) aids in a person continuing to play even though they are actually losing. They continue the old adage “practice makes perfect” and keep playing until they win, which can be detrimental for reasons mentioned previously.

Kassinove and Schare (2001) studied the gambling behavior of 180 undergraduate students that played on slot machines that were programmed with 15%, 30%, or 45% near miss trials. The participants were randomly assigned to one of the three groups and asked to play at least 50 trials. Any additional trials were the participants' choice and were part of an extinction phase. The researchers found that the 30% near miss condition produced the most consistent play following the required 50 trials when compared to the 15% and 45% groups. Although the cognitive view may make sense, it does not explain the inverted *U* shape that occurs when persistence of play was measured for the three groups in this study. The group with 45% of trials labeled as a near miss may have been too much for some to continue, and the participants may have begun to realize it as a total loss. Another way to view this study is to account for it in more behavioral perspectives. A win produces money, which can be used to purchase goods and services. One can then view the near miss as a conditioned stimulus, after pairing them with wins. From an operant standpoint, the win and the near miss are simply maintaining consequences that make pressing the "spin" button more likely in the future.

In addition to near miss trials, another way that gamblers may feel as if their wagers are well spent are the "bonus games" that occur during the slot machine play. Oftentimes, these side games may pop up if a player has reached a certain number of credits during slot machine play. If one is playing on a video slot machine today, it is most likely that it will have some sort of bonus game, or "side game," built into it. A bonus game may appear on various machines when certain combinations of symbols appear on the payout lines. These interactive games make the slot machine even more

interesting and fun to play, as it breaks up the repetitive acts that go on during slot machine play.

Structural characteristics of slot machine play may help practitioners explain and understand pathology. Since both pathological and non-pathological gamblers have reported that slot machines are a favorite game, it is useful to find out what makes them a preferred choice. Many slot machines seen today feature side games or bonus games that allow the gambler to engage in other enticing to win money.

Based on previous research, it has been shown that the payout percentage is not the overall controlling variable for slot machine gamblers. Weatherly, Thompson, Hodney, & Meier (2009) looked at the gambling behavior of seven women who were given the option of playing on two concurrently available slot machines. Each slot was programmed at a different payout percentage varying between 87%-97%. The investigators wanted to assess whether the participants could demonstrate sensitivity to reinforcement and choose to play on the higher paying machines. The data suggests that programmed payback percentage did not impact their slot machine choices. Consistent with other research (e.g., Zlomke & Dixon, 2006) and emergent theories of gambling, the verbal responses given during the participant's debriefing session suggest that there were supplementary controlling variables other than payback percentage that emerged when the women gambled (i.e. machine preference, arousal). This could provide evidence for many other theories as to why pathological gamblers continue to gamble.

Most gamblers enter a casino knowing that the odds are not in their favor. However casinos often will advertise "loose" slot machines or ones with a high payback

percentage of 95%. This means that for every $100 a patron plays at a slot machine, their winnings will only total $95. That being said, it is seen as a punisher and violates the definition of punishment which states, in part, that a behavior that produces an undesired effect will be less likely to occur in the future. However, gamblers may continue to return to the slots because of an unpredictable schedule of reinforcement (Skinner 1958). The odds and thought processes used during slot machine play are different than those used during poker or roulette. As previously mentioned, slot machines are set up on a random-ratio schedule of reinforcement and the intervals are much quicker than those of other casino games.

The central questions addressed in this paper were whether the participants would respond to losses disguised as wins differently that they respond to losses, how many trials each group played, the response latencies between trials. Overall, gambling literature should expand its research in the area of “losses disguised as wins.” It is of great benefit to study this phenomenon because of the lasting effects it can leave on even the most novice of gamblers. A slot machine acts as if the participant has won during losses disguised as wins and this, in part, has potential to lead the gambler that they have actually won when, in actuality, they have not. The lights and sounds that accompany a LDW have been shown to be just as arousing as actual wins, which can help investigators understand how a gambling pathology can develop.

CHAPTER 2

METHOD

Participants

Thirty-one adults over the age of 21 served as participants for this study. The participants were recruited through email solicitation in graduate level classes at a Midwestern university. Compensation for participation was offered in the form of extra course credit offered by the instructor. All methods were approved by Southern Illinois University at Carbondale's Office of Sponsored Projects Administration.

At the onset, the participants were provided with an informed consent. Upon providing their consent, they filled out a brief questionnaire asking about gender, income, education, and history of drug, alcohol, or gambling treatment. The participants then completed the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) as well as the Gambling Functional Assessment (GFA; Dixon & Johnson, 2007) prior to playing on the slot machine. The GFA is a demographic questionnaire that will ask for participant's age, sex, race, marital status, and annual income. This questionnaire is helpful in that it this demographic information is related to known risk factors for pathological gambling. The SOGS is a 20 item self-report questionnaire that was designed to assess a person's gambling history. It is widely used to determine if a gambling disorder is present (Petry, 2005). If a person scores 5 or more, the presence of pathology is possible. The GFA is a 20 item self-report questionnaire that was designed to help identify factors that maintain a person's gambling behavior. The possible factors, or consequences, are "sensory experience," "escape," "attention," and

“tangible rewards.” In any category a person can score up to a 30. The highest score is indicative of the primary reinforcing consequence.

Setting, Apparatus and Reliability

The sessions took place in a convenient place for the participants. However, all sessions were in a quiet environment (for example, a library or the participant’s home). All sessions were conducted on personal computers. The entire experiment was programmed on Microsoft Visual Basic 2008 Professional Edition and included a data collection system, which measured response latency, post reinforcement pauses, and the number of trials played. The participants played on a simulated slot machine. The program displayed a simulated slot machine with typical stimuli, a “Spin” button, an “End” button, and boxes that will show the amount that the person has bet as well as the amount won for every spin. At the conclusion of the session, the data was then emailed to the experimenter for data analysis.

Experimental Design and Procedure

The design will be a within-subjects group design. The participants were randomly assigned to one of three groups. The altering of LDWs on the slot machines served as the primary manipulation for this study. The entire experiment was programmed in Microsoft Visual Basic 2008 Professional Edition and will include a data collection system. There will be an instruction screen for the participants to read prior to beginning the experiment so that the participants could gain experience with the layout of the slot machines and imagine playing. In addition, the participants will be asked to rate each spin result on a scale from 1-10. A “1” means that the spin result was “far from a win” and a “10” means that the spin result was a “win.”

The first group played on a slot machine programmed to have a low amount of losses disguised as wins (16%), another group had a medium amount of losses disguised as wins (30%), and the last group had the highest amount of losses disguised as wins (46%). The participants bet two credits during each spin and a LDW occurred when the participant "won" less than their initial bet. In this case, the winning amount was "1." After each trial, the participant then rated the spin on a data sheet created by the primary investigator.

Slot Machine Play

The participants were asked to play on the slot machine for at least 50 trials. They could continue playing as long as they wanted after the 50 trials have been completed. Once the participant downloaded the program onto their computer, they opened it and read the following instructions before beginning experiment:

> "You will now be asked to play on a slot machine presented on the computer screen. When you are ready to start, click the "Begin" button at the bottom of the screen. A slot machine will appear. To place a spin, click the "Spin" button. After each trial, please rate how close your spin was to a "win." Using a scale from 1 to 10 with 1 being far from a win and 10 being a win. Please play for at least 50 spins. When you are finished, you will be able to click the "End" button, which will be in the bottom center of the screen. Thank you for your participation."

After the first 50 trials were completed, the participants were free to click the "end" button at any time to finish the experiment. At the conclusion of their play, the data was sent to the primary experimenter's email and the participants will be thanked for their time, as well as given contact information of the experimenter for any questions they may have via email.

CHAPTER 3

RESULTS

A total of 31 participants partook in this experiment. All met the age requirement of 21. Table 1 includes the screening information for the 31 participants. Group 1 and group 2 consisted of 10 participants and group 3 consisted of 11 participants. Before a participant began the experiment, they completed the SOGS. Results show an average score of 1.11. The three groups averaged 1.0, 1.0, and 1.181, respectively. An Analysis of Variance showed no difference between the three groups on this measure.

The results of the Gambling Functional Assessment showed that “attention” was the maintaining factor for 19 of the 31 participants. “Escape” and “tangible rewards” were scored as the highest maintaining functions for 7 and 3 participants, respectively. “Sensory” was scored highest for only one participant. Participant 100 scored a 27 in the “attention” function on the GFA. This participant also scored the highest on the South Oaks Gambling Screening, with a 5. The other participants scored between 5 and 19 on the GFA and 0 and 3 on the SOGS. See Table 1 for scoring information of the South Oaks Gambling Screen and the Gambling Functional Assessment.

Figure 1 shows the average rating that each participant in group 1 rated their winning spins, losing spins, and LDW spins. Group 1 rated losing spins an average of 2.18 and losses disguised as wins an average of 5.53. Their average rating for winning spins was 9.4. Figure 2 shows the average rating that each participant in group 2 rated their losing spins , LDW spins, and winning spins. Losing spins averaged a score of 3.03 and LDW spins averaged a score of 5.81. Winning spins averaged a rating of 9.5. Figure 3 shows the averages for group 3. The average losing spin rating for group 3 is 2.53, LDW spins averaged a rating of 4.96, and winning spins averaged 9.4.

Figure 4 shows the average rating for each trial type for all participants. Losses were rated at an average of 2.45, losses disguised as wins were rated at an average of 5.86 and losses rated at an average of 9.42. A one-way ANOVA was used to compare the spin ratings across trial types for all participants and showed a significant difference, $F(2, 90)=427.675$, $p=.000$. A Tukey HSD post hoc test showed that a significant difference between the loss disguised as wins ratings in that the participants rated them higher than a loss, but lower than a win.

Figure 5 shows the average number of spins played for each group. For group 1, the average number of spins played was 57.8 spins (R=50-80). Group 2 had an average of 58.68 spins (R=51-70), and group 3 had an average of 59.45 spins (R= 50-72). A one-way ANOVA was used to analyze the average number of spins between groups and showed no statistical significance between groups, $F(2, 28)=.932$, $p=.406$.

Figure 6 shows the average latency between spins divided into the spin types. The average for winning trials was 2.133 seconds. Losses disguised as wins had an average latency of 3.183, and losing spins averaged 3.645 Latency was measured following each trial and were analyzed across different outcome types. Each spin was categorized as a “win,” “loss,” or “loss disguised as a win” and the latencies for each participant were averaged. A one-way ANOVA was used to test for differences between spin ratings for each spin type. The results did not show a significant rating difference across trials, $F(2, 28)=.962$, $p=.394$.

CHAPTER 4

Discussion

The current study sought to extend the research on losses disguised as wins during slot machine play. In this study, the participants rated losses disguised as wins higher than total losses but lower than winning spins. However, the participants had a tendency to rate losses disguised as wins closer to a winning spin. The ratings showed that the participants, most of whom did not score in a pathological range on the SOGS, could be obscuring losses and were responding to them in ways that mimic a winning spin response, even though they did not even win back the initial bet amount. These results mirror those of Dixon and Schreiber (2004) where near miss trials were measured and participants showed higher ratings of near miss trials over total loss trials. Perhaps losses disguised as wins can be studied in a similar way as near miss trials, in that a gambler's response to them can be skewed and approached as a winning spin. The results of the current study provide initial evidence that losing trials—losses disguised as wins—were rated higher than losses.

Although the participants in the current study were not in actual casinos or using real slot machines, future research could reduce the confounding variables. There is a chance that some participants were simply pressing the "spin" button as quickly as they could to get trials finished, which would provide a hypothesis as to why some participants simply quit after trial fifty.

While this study contained a convenience sample, future studies could acquire a larger sample group from a random sampling. These participants were easily accessible and, most likely did not have many potential pathological gamblers. One participant scored as a potential pathological gambler (participant 100) and the others were all

below those levels. Inclusion criteria for future studies could include a minimum SOGS score (ex: 4) and could utilize the variables within this study.

For ethical reasons the participants in this study were not using their own money or in an actual casino. This can be seen as a limitation. However, the participants did show different ratings between wins, losses, and losses disguised as wins. The data suggests that, although losses disguised as wins are actual losses, the “positive reinforcement” that accompanies them through small monetary gains (less than the bet amount) serve as a controlling variable and mimic actual winning spin results. Participants showed a clear difference in ratings for losses disguised as wins. For all but two participants, LDWs were rated more closely to a win rather than what they really are: a loss.

The implications of these results serve as an indicator that LDWs could be maintaining the gambling paradigm similarly to near miss effects, as described above. Casinos can easily make their money while still allowing for the gamblers to experience their positive reinforcement through the LDWs. If they can get the patrons to believe that they are winning when they are actually losing, the gaming industry will continue to thrive very easily.

Another limitation of the current study is that it did not take place in a gambling context. Conducting an experiment such as this in a casino has potential to more accurately portray realistic gambling behavior and higher magnitudes of risk—continuing to play on the slot machine even though one may be losing. In addition, there was only one type of slot machine for the participants to utilize. It is unknown whether the participants may have a preference for specific types of slot machines (ex: side

games, more reels, higher bets) prior to partaking in this study. In addition, the sample size was small and this could have contributed to low significance between the groups.

Future research should embody larger groups and consider including potential pathological gamblers. It would also be beneficial to see if types of slot machines influence the amount of spins played or response latency. Slot machine choices may hold a significant variable in regards to maintaining play.

The current study aimed to examine the effects that varying degrees of losses disguised as wins had on gambling behavior including number of trials played, latency, and spin ratings. Continuing research in the realm of gambling may enhance the treatment process and help develop beneficial, data-backed treatments.

Table 1

Scores on the South Oaks Gambling Screen and Gambling Functional Assessment for participants in the study

Participant	Score on the SOGS	GFA Function	Highest GFA Score
Group 1			
101	5	Attention	27
102	0	Attention	6
103	1	Attention	10
104	1	Escape	6
105	0	Sensory	5
106	2	Attention	12
107	0	Attention	8
108	1	Escape	18
109	0	Tangible	6
Group 2			
110	2	Attention	19
111	2	Attention	11
112	1	Escape	5
113	0	Attention	10
114	2	Attention	13
115	1	Attention	15
116	0	Escape	6
117	0	Attention	18
118	1	Tangible	7
119	1	Escape	10
Group 3			
120	1	Attention	12
121	0	Attention	14
122	1	Attention	11
123	3	Escape	9
124	1	Attention	12
125	1	Attention	7
126	1	Escape	9
127	1	Tangible	10
128	0	Attention	6
129	1	Attention	13
130	3	Attention	12

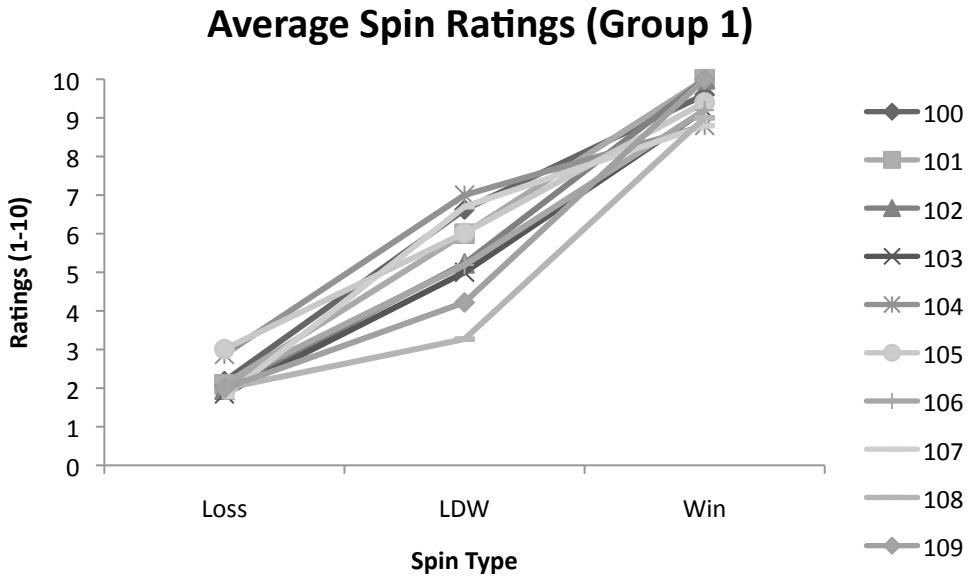

Figure 1. Average loss ratings, losses disguised as wins ratings, and win ratings for group 1.

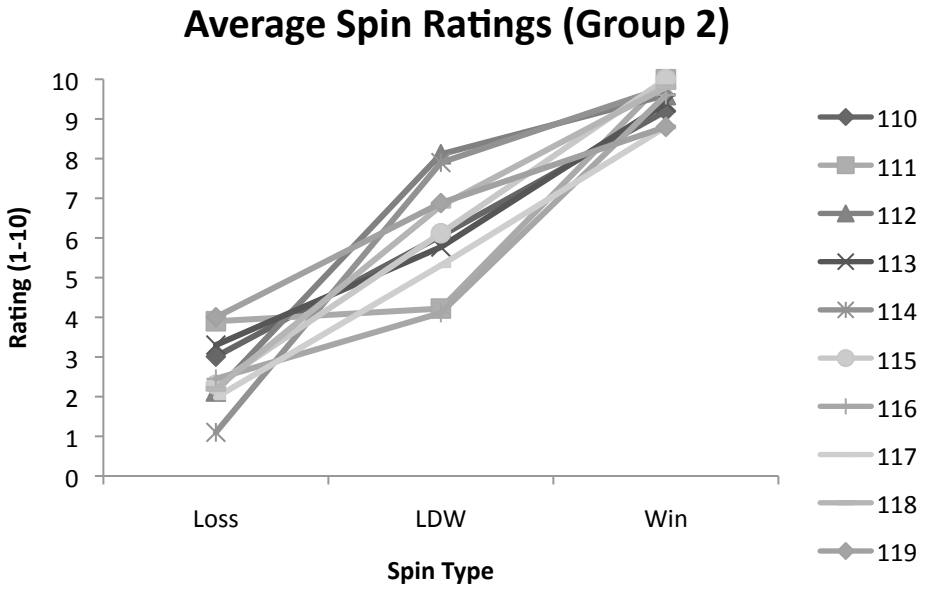

Figure 2. Average loss ratings, losses disguised as wins ratings, and win ratings for group 2.

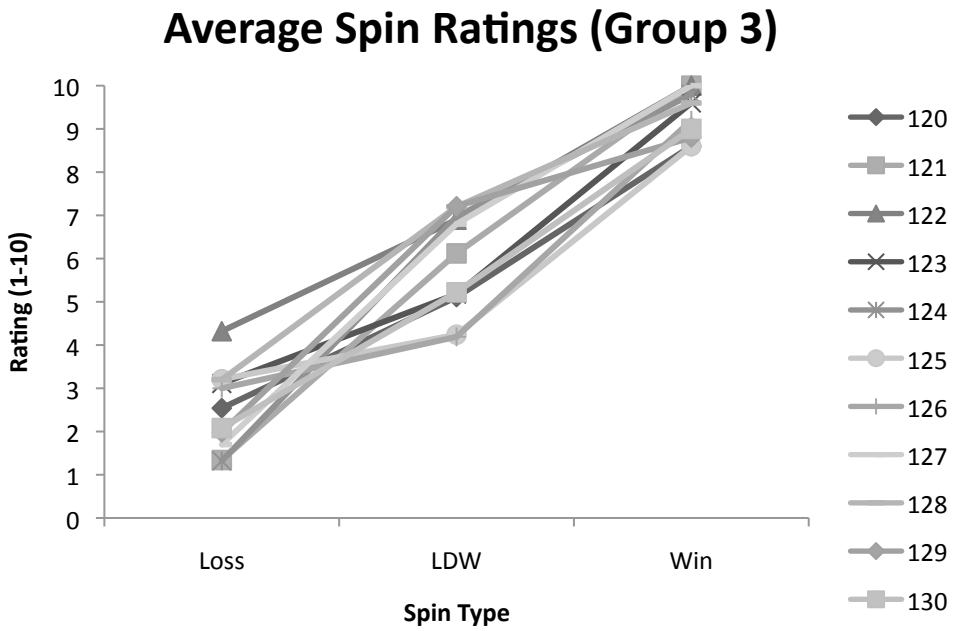

Figure 3. Average loss ratings, losses disguised as wins ratings, and win ratings for group 3.

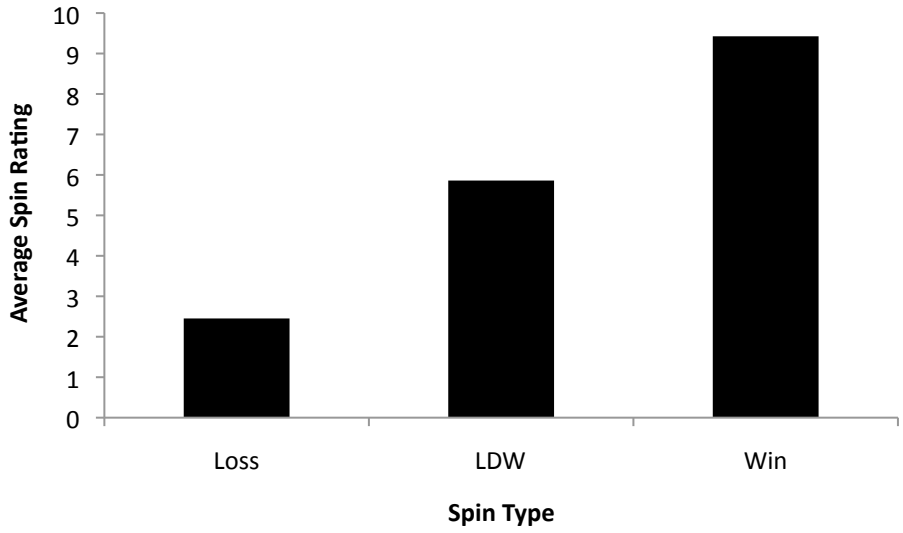

Figure 4. Average spin rating for each trial type.

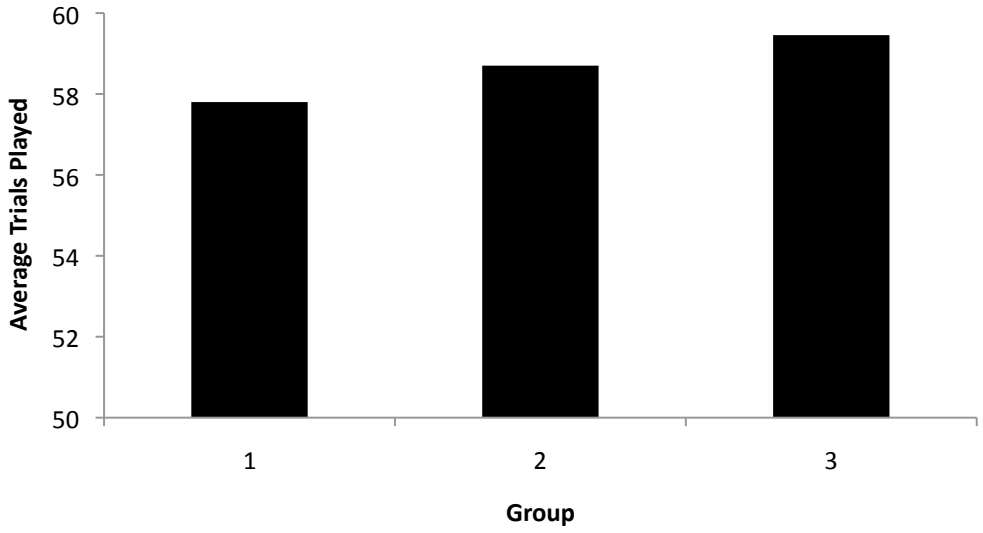

Figure 5. Average number of trials played by each group.

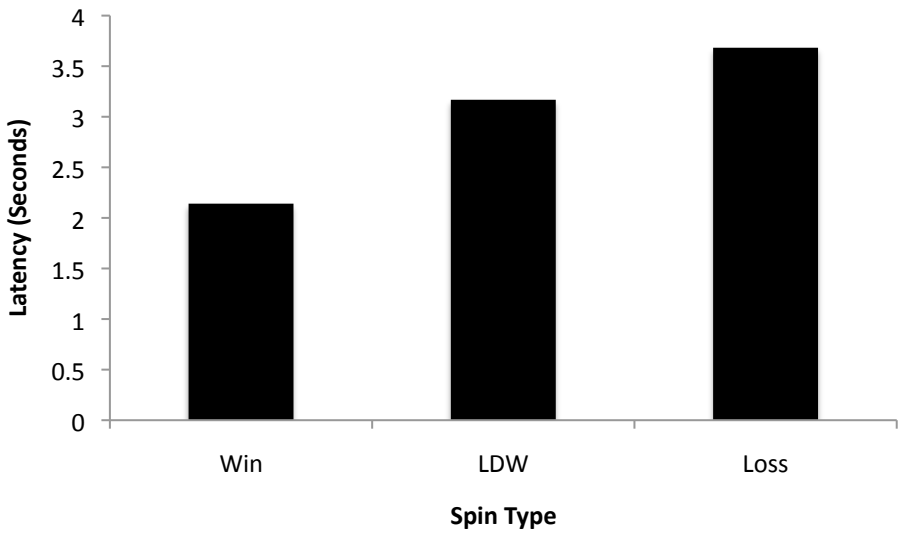

Figure 6. Shows the average latency for each trial type for all participants.

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