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Stopping when you're ahead: Win limits and responsible gambling

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Abstract

In this paper, we review our recent publication on a simple and potentially useful strategy for responsible gambling (RG). Researchers have tested RG strategies that include setting monetary loss limits and time limits on gambling. Our paper developed a simulation of slot machine play in which the players use a simple, one-line slot machine with an expected payout of 95%. We tested different "stopping rules" including a loss limit, time limit, and win limit. Our results showed that using a monetary win limit in addition to a loss limit improves the player's outcome from gambling. This suggests that win limits may be promising as a RG or "positive play" strategy and that they warrant further research.

Keywords Win limits, Responsible gambling, Loss limits, Harm reduction, Positive play

Introduction

Two of the key elements of a responsible gambling (RG) strategy are monetary loss limits and time limits, as such limits help curtail the monetary losses that are imminent to casino patrons playing house-banked games.[1] The effectiveness of such pre-commitment strategies has received increased attention recently, yet there has been no prior research on "win limits" as a RG tool. In our recent *Journal of Gambling Studies* paper, we analyzed the results of a slot machine simulation to explain how using self-imposed win limits would affect a slot machine player's monetary outcome and time played (Walker, Litvin, Sobel, & St-Pierre, in press). We were invited by the *RGR* Editors to write a short article on win limits for this journal, highlighting the key elements of our *JGS* paper. We hope that this review will spur readers of *RGR* to consider, and further study, the potential effectiveness of win limits as a RG tool.

Background

Most readers of *RGR* should be familiar with loss limits and time limits on gambling. A win limit is similar; it is a self-imposed pre-commitment that a player will stop gambling and leave the casino when they have accumulated net wins of a certain amount during that outing.[2] Since casino games all have a negative expected value, the common element of loss, time, and win limits that helps mitigate gambling losses is that they *reduce the time played*, relative to a player who sets no limits.

"Stopping when you're ahead" seems like it would be an obvious strategy for players to limit their losses and perhaps avoid developing gambling-related harms.[3] Yet, win limits have not been analyzed in the literature.[4] One study on the "Blue Gum" slot machine examines a related issue. This machine has a "bank meter" that allows players to "set aside a proportion of wins [...] preventing winnings from

[1] Of course, non-house-banked games such as poker will have some winners and losers, determined to some extent by the relative skill levels of the various players.

[2] For example, suppose a person walks into a casino to gamble with $200. If the person sets a win limit of $300, then they would leave the casino after winning $300, or when their total cash balance is $500.

[3] Even gamblers who are chasing losses could benefit from adhering to win limits. In games with independent events (such as slot machines and craps), adherence to win limits would certainly improve the player's financial standing, on average, since such casino games always have a negative expected value. In a game such as poker, in contrast, it may be to the player's advantage (statistically) to continue playing beyond a win limit.

[4] Several recent papers have focused on loss limits and time limits, including Wohl, Kim, and Sztainert (2014), Kim, Wohl, Stewart, Sztainert, and Gainsbury (2014), Stewart and Wohl (2013), and Auer, Malischnig, and Griffiths (2014). Much of this research suggests that self-imposing betting limits may indeed be useful as RG tools. The study by Rockloff, Donaldson, and Browne (2014) examines another interesting pre-commitment in which the machine player is shown a message indicating that the machine's jackpot has expired. The study showed that betting speed slowed significantly after a message about how the jackpot had expired, resulting in lower player losses.

being re-gambled" (Blaszczynski, Gainsbury, & Karlov, 2014, p. 699).[5] But segregating a portion of winnings is not the same thing as a win limit, where a player leaves the casino once the limit is reached.

Other than our paper, we have found only one study that addresses win limits. The purpose of the survey study by Nelson et al. (2013) was to "establish a baseline estimate of gambling behaviors and health" in Massachusetts prior to the introduction of commercial casinos in the state (Nelson, Kleschinsky, LaPlante, Gray, & Shaffer, 2013). As a part of their 2012 survey, Nelson et al. asked respondents whether they usually set loss and win limits before gambling. The results for the respondents who had gambled during the past twelve months (274 of the 511 survey respondents) are presented in Table 1. As shown in the table, 83.2% of players indicated they usually set a loss limit, but only 24.5% of players usually set win limits. Among those who set loss limits, almost 20% admitted to continue gambling after they reached their limit, at least some of the time. Slightly over 40% of players who set a win limit indicated that they continued gambling after reaching the limit, at least some of the time.

Table 1. Massachusetts survey results, past 12 month responsible gambling strategies

survey responses	**% of respondents (N=274)**
% usually setting a loss limit	**83.2%**
Frequency of continued gambling after reaching loss limit (among those setting a limit)	
All of the time	2.2%
Most of the time	2.6%
Some of the time	14.9%
Never	66.7%
Never reached limit	13.6%
% usually setting a win limit	**24.5%**
Frequency of continued gambling after reaching win limit (among those setting a win limit)	
All of the time	1.5%
Most of the time	3.0%
Some of the time	35.8%
Never	40.3%
Never reached limit	17.9%

Source: Nelson et al. (2013), p. 19, Table 3

[5] The Blue Gum machine's bank feature was not used by many players. About 60% did not even notice the bank feature. A modest 13% of players reported using the bank meter feature to lock away money, and only 12% used it to lock winnings. Of those who used the feature on the Blue Gum machine, only 26.5% used it to collect their money and leave the machine. (Blaszczynski et al., 2014, p. 707)

Although researchers may not have examined win limits in the past, apparently they are used – though not as often as loss limits – at least by a minority of past-year gamblers in the Bay State. This fact, combined with the potential usefulness of win limits as a RG strategy, suggests that win limits deserve more attention by researchers.

Slot machine simulation: Loss limits, time limits, and win limits

In this section we review the computer simulation we performed for our *JGS* paper in order to demonstrate how a win limit can mitigate losses from gambling. Since we do not use human subjects, we do not need to take into account the motivations players may have when choosing among the different bet limiting strategies. Our simulation replicates a simple, single-line, three-reel slot machine game for which the "payout rate" (i.e., average percentage of each $1 bet that is paid back to players in prizes) is 95%.[6] The simulation used a random number generator to generate a number for each play or "spin." The net payoffs (inclusive of the $1 bet) with their corresponding frequencies were: -$1 (75%); $0 (15%); $1 (7%); $20 (2.897%); $45 (0.1%); and $160 (0.003%).

We wanted to simulate enough plays so that the results are near the expected value of the machine (i.e., we wanted the payout rate to be 95% on average). We use 900 simulated slot machine players, each of whom may make 5,000 spins. Each spin is assumed to take six seconds, thus each simulated player could gamble up to 8.33 hours.[7] If no other limits are set, then we have a total of 4.5 million simulated slot machine plays. Obviously, if we impose loss limits, win limits, or time limits, the number of plays will decrease.

In Table 2, we report the results of five different simulations. In each simulation, we assumed all 900 players adhere to the same betting rule. The results in row 1 are from a simulation where all 900 players make 5,000 spins, regardless of their financial results (i.e., no monetary limits are set, but there is an implicit time limit of 8.33 hours). The first column indicates that only 17.6% of the players (159 of the 900) ended up winning money. The average result, as shown in the second column, was a loss of $251 – almost exactly the expected hold percentage of the machines.[8] Continuing to the right along row 1, the third column indicates that the worst result was a loss of $843, while the best outcome was a $419 win (fourth column). Since there were no other limits, each player makes 5,000 spins, or plays

[6] This corresponds to a "house advantage" of 5%. (Alternatively, the player's expected value is -5%.) In most U.S. states, the minimum payout rate is set by law, and can vary. Our simulated machine represents a "typical" machine (Eadington, 1999, p. 179), or one that might be found in a relatively competitive market, such as Las Vegas. The payout rate in our simulation could be changed by simply changing the net payoff values.

[7] Arguably, the typical three-reel slot machine player takes less than six seconds per spin. In any case, 5,000 spins appears to yield the expected value of a 95% payout rate across the 900 simulated players.

[8] If 5,000 plays are made at $1 each, 5% of the amount bet is $5,000 x 0.05, or $250.

for 8.33 hours. The results summarized in row 1 approximate the "long run" results from the simulated slot machine.

We next tested four different betting limits: a 1-hour time limit (row 2), a $100 loss limit (row 3), a $100 win limit (row 4), and a $100 loss limit coupled with a $100 win limit (row 5), so that the player stops when he or she is either $100 ahead or $100 behind – whichever happens first.[9] Following are a few of the more interesting results. First, compare the results of the $100 loss limit rule (row 3) with simulation 1. The loss limit resulted in a smaller average loss (-$76) compared to no limit. Interestingly, the number of players that won money under a loss limit was only 7.3% (or 66 of the 900 players). This is a striking result: under one of the most commonly suggested RG strategies, the percentage of people losing money at the simulated casino *rose* from 82.4% in the unlimited scenario, to 92.7% under the $100 loss limit.

It is worth contemplating why the loss limit results in more people leaving the casino as monetary losers. Over the course of several hours playing a slot machine, a person's cash balance will likely swing into both positive and negative territory. If a player reaches a self-imposed loss limit, they stop gambling and leave the casino. Thus, compliance with the loss limit ensures that the player leaves the casino as a monetary loser. In the absence of the loss limit, some of these losers would have kept playing and may have seen their cash balance rise back above zero before they quit gambling. This result also helps to explain why a win limit can be expected to cause a *decrease* in the number of people who lose money at the casino. The win limit causes the patron to leave the casino while they are winning.

Table 2. Simulation results (900 players, up to 5,000 plays each)

	simulation / limit(s) imposed	# winners (% chance of winning)	average $ result	minimum $ result	maximum $ result	average time played (# plays [a])	minimum time played (# plays [a])	maximum time played (# plays [a])
1	No win or loss limits (5,000 spins; 8.33 hrs. of play [a])	159 (17.6%)	– $251	– $843	$419	8.33 hrs. (5,000)	8.33 hrs. (5,000)	8.33 hrs. (5,000)
2	Time limit of 1 hr.[a]	315 (35.0%)	– $ 30	– $220	$233	1.0 hr. (600)	1.0 hr. (600)	1.0 hr. (600)
3	$100 loss limit	66 (7.3%)	– $ 76	– $100	$382	2.38 hrs. (1,429)	0.25 hr. (147)	8.33 hrs. (5,000)
4	$100 win limit	435 (48.3%)	– $153	– $858	$186	5.23 hrs. (3,135)	0.26 hr. (81)	7.46 hrs. (5,000)
5	$100 loss limit; $100 win limit	275 (30.6%)	– $ 35	– $100	$162	1.13 hrs. (677)	0.13 hr. (78)	4.33 hrs. (2,595)

Note: a This assumes each spin/play takes 6 seconds.
Source: Adapted from Walker et al. (2014)

[9] Several other scenarios were also tested; these were reported in the original paper. The choices of a 1-hour time limit and loss/win limits of $100 were arbitrary. A longer time limit or larger loss/win limits would return results closer to that of the first simulation.

This intuition bears out in the win limit simulation. In row 4 of Table 2, we show the results when a win limit of $100 was imposed. Interestingly, this betting rule results in the largest number of winning players (435, or 48.3%). Unfortunately, it also results in the largest loss (of $858). However, it enables the players to gamble for a relatively long period of time, 5.2 hours on average.

Lastly, Table 2 illustrates the results when a $100 win limit is coupled with a $100 loss limit (row 5). We compare those results to the use of a loss limit alone (simulation 3). The addition of the win limit to the loss limit resulted in an increase in the percentage of winning players from 7.3% to 30.6%. The average loss fell by about half, from $76 to $35. The worst result remained a $100 loss. To the players' detriment, however, the win limit curtailed the maximum result from a $382 win using only a loss limit, to $162 with both a win and loss limit.[10] The addition of the win limit also reduced the average time played from 2.4 hours to 1.1 hours.

Examining the aggregate simulation results, we find that players have an 80% chance of doing better than a $500 loss after 8.33 hours of play. Using a 1-hour time limit, players have roughly an 80% chance of doing better than a $100 loss. Thus, under a 1-hour time limit, $100 loss limit, or $100 loss/$100 win limit, players are clearly financially better off than having no limit. However, under all scenarios – limit or not – fewer than 10% of slot machine players will win much more than $100, and almost no one will win more than $500.[11]

Discussion

While the concept of win limits has many potentially interesting applications, there are a variety of practical issues that have yet to be addressed. Gambling responsibly means making a commitment to oneself – before gambling – to stop playing at some point. RG is not about choosing the best gambling or betting strategy. Nevertheless, our simulation shows that using win limits can help reduce the average player's losses and improve the probability a person leaves the casino as a money winner. But how does one choose an appropriate win limit? RG guidelines usually suggest setting loss limits at an amount that the person can afford to lose. In our simulation we arbitrarily chose $100 betting limits. Perhaps an appropriate win limit would be one that is symmetric with the loss limit, or is at least enough to be "meaningful" to the person. In our simulation, a win limit of $10 is likely meaningless, but $1 million is unattainable.

Our simulation results illustrate that there are indeed both benefits and costs to players who self-impose betting limits. From a consumer benefits perspective,

[10] The reason a person could have a maximum result over $100, despite adhering to a $100 win limit is that the player could have won a jackpot that pushed them over $100. They would stop gambling immediately after winning that jackpot.

[11] These results are based on a cumulative distribution function from our simulations. See Walker et al. (2014), Figure 4 and related discussion, for a fuller explanation.

players who do not experience problem gambling presumably *enjoy* the activity. Therefore, from the player's perspective, the benefits of betting limits include a lower average loss and a higher chance of winning (except in the loss limit simulation, which had the lowest percentage of winners). However, the limits also reduce the average time played. If the person enjoys the activity of gambling, then reduced time played is a cost of the betting limit. The "best" betting limit strategy, from the player's perspective, will depend on how much the person enjoys gambling.[12]

If we take the perspective of a clinician, our interest in betting limits might be to minimize the chance that a person loses more than a certain amount of money during each gambling session. Alternatively, we might want to suggest that a person set both loss and win limits simultaneously in order to minimize loss-chasing behavior. In contrast, a casino executive may be interested in promoting responsible gambling practices, but might prefer one that cuts into profits as little as possible. Thus, which betting limit is "best" depends on one's goal. Given our simulation results, the different betting limits could be ranked, depending on the goal of limit setting.

Economists have long recognized that a large majority of players do not experience gambling problems; they enjoy the activity of gambling.[13] The new literature on "positive play" suggests that psychology researchers are beginning to focus on the behavior of players who do not exhibit gambling problems (e.g., Wood & Griffiths, in press). Thus, win limits might also be considered a characteristic of positive play since our results indicate that the use of a win limit reduces the average gambling loss and improves the chance a given player will leave the casino as a winner. Both results would presumably make the gambling experience more enjoyable. Thus, win limits could be promoted as something that helps promote positive play.

Another issue for consideration is how best to promote or explain win limits. Players without a strong background in probability and statistics may not understand how a limit on winning can actually reduce their losses. If they do not understand why it works, they may be less likely to set and adhere to a win limit. However, if the win limit is presented as a way to create a more enjoyable gambling experience (i.e., positive play), casino patrons may be more likely to use it.

Another issue that has been raised is that the term "win limit" may have a negative connotation to players. Who wants to limit their winnings, after all? A more positive term such as "prize target" or "prize cash-out point" might be preferable to raise interest from players.

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[12] We address this issue in more detail in our original paper (Walker et al., 2014). If we put a monetary value on the enjoyment from gambling, then we can rank the different betting rules based on expected outcome (in enjoyment plus winnings or losses). Interestingly, the $100 loss limit (alone) is *never* the best strategy when expressing outcomes in monetary terms. A full discussion of this issue is technical, and is beyond the scope of this paper.

[13] See Ignatin and Smith (1976), ACIL Consulting (1999), Eadington (1999), and Walker (2001). A more recent and detailed discussion appears Walker (2013).

Loss limits and time limits have been key elements of RG campaigns. Our simulation indicates that win limits also merit attention. We have shown that win limits would improve the average player's financial outcome and result in more winners than if they do not use win limits. Thus, the use of win limits may be an effective means of harm reduction, with respect to financial stress.

Survey evidence indicates that a minority of players use win limits (Nelson et al., 2013). Researchers have begun to examine the efficacy of loss limits and time limits, which seem promising. We believe win limits may be at least equally promising as a RG strategy, and should be examined in more depth. Based on our simulation results, it appears that more casino game players should consider "stopping when they're ahead."

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