QUITTING WHILE YOU'RE AHEAD: EVIDENCE FOR INDIVIDUAL GAMBLING THRESHOLDS FROM A SURVEY OF MASSACHUSETTS GAMBLERS

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ABSTRACT

Although key stakeholders have discussed responsible gambling tools and protective behavioral strategies for years, evaluations of their effectiveness are still limited. Among protective behavioral strategies are individual gambling thresholds, typically on monetary losses or time spent gambling, after which a person stops gambling. A novel, counterintuitive alternative, a monetary win threshold, also might hold value. Simulations have shown that, like monetary loss or time thresholds, win thresholds reduce the amount of time spent gambling and therefore also limit average expected gambling losses. Yet, little is known about gamblers' use of gambling thresholds. In this paper, we examine data from an Internet panel survey of past-year gamblers in Massachusetts to better understand the characteristics of those individuals who are more likely to use and adhere to loss and win thresholds. We observed that individuals who had engaged in recreational drug use were less likely to adopt gambling thresholds. Individuals who had previously received a positive screen for depression, and who traveled to out-of-state casinos were more likely to use gambling thresholds. In analyzing the adherence to gambling thresholds, we found that individuals who adhered to their loss thresholds were less likely to use ATMs during gambling sessions. Finally, individuals who engaged in hazardous drinking were less likely to adhere to their own win thresholds. This study adds to the literature by providing evidence related to the characteristics of gambling threshold users and contributes some of the only evidence in the literature on the actual use of monetary win thresholds.

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Many observers believe that government, industry, and individuals share the responsibility for providing a "safe environment" for gamblers (Blaszczynski et al., 2011, p. 566). People experiencing gambling-related problems are more likely to suggest that the responsibility should be distributed, including the gambling industry and other stakeholders (Gray et al., 2021; Gray et al., 2022). This perception is important, and therefore it is imperative that the industry provides adequate tools and resources to facilitate safer gambling conditions for all consumers. Many states with commercial casinos require these establishments to provide signage or brochures about responsible gambling (RG) (American Gaming Association, 2016). In addition, many casinos' websites also provide such information.[1] Aside from information on RG, a growing number of casinos in the United States offer tools aimed at helping gamblers reduce the potential harms from gambling.

A growing body of research examines various RG tools provided by casinos, such as "smart cards," as well as tools within electronic gaming machines (EGMs), such as pop-up messages or pre-commitment/bet-limiting software (e.g., Edson et al., 2021). If such tools are effective, they would ideally reduce impulsive behavior and ultimately reduce a player's gambling to the amount of time and/or money that they can comfortably or safely afford to spend. Since people with gambling problems often experience financial difficulties, limiting the time or money spent gambling can obviously reduce the harms associated with excessive gambling.

Aside from whatever RG tools are provided by gaming venues or within the EGMs themselves, many gamblers use a variety of "self-help" strategies to gamble in moderation. Among such strategies is planning in advance (e.g., budgeting) how much time and money to spend gambling. In this paper we analyze survey data from past-year Massachusetts gamblers to better understand the characteristics of those who plan in advance and set personal monetary loss and win thresholds on their gambling and stop gambling once they reach those thresholds. Ours is the first study to examine the use and adherence to win thresholds, which may be effective strategies for reducing gambling-related harms.

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[1] For example, see Caesars (https://www.caesars.com/corporate/corporate-social-responsibility/play/responsible-gaming), MGM (https://www.mgmresorts.com/en/gamesense.html), or Las Vegas Sands' properties' websites (e.g., https://www.venetian.com/casino/responsible-gaming.html).

BACKGROUND

This study examines two strategies gamblers may implement, among others, to limit the amount of money they lose gambling. In their recent paper, Rodda et al. (2019, pp. 491–492) make an important distinction between RG, "which are venue-initiated strategies taking a top-down approach to harm minimization" and "protective behavioral strategies" (PBS), which are "strategies initiated by the gambler which are more of a bottom-up approach to avoid or reduce gambling-related harm." We briefly review the relevant literature using these RG and PBS categories.

Among the most popular RG tools is software that enables gamblers to pre-commit to limiting time spent gambling or monetary losses. Research is somewhat mixed as to who uses these tools. For example, Bernhard et al. (2006) found that people with gambling-related problems were more likely than others to use limiting features on EGMs. However, Nower and Blaszczynski (2010) found that non-problem gamblers were more likely to set specific money limits using a "smart card" and adhere to those limits, compared to moderate-risk or problem gamblers (PG). Kim et al. (2014) found that gamblers presented with an on-screen pop-up message prompting them to set a gambling time limit at the beginning of a gambling session were more likely to set a time limit, and spent less time gambling than individuals who were not offered the option to set a time limit. However, research suggests that voluntary engagement with these features is low. Blaszczynski et al. (2014) examined a variety of machine features, including messaging, demo play prior to gambling, a bank meter, and an alarm clock, that gamblers may choose to use to monitor their gambling. They found that, although many players noticed the RG features, few actually used them. Similarly, a recent study of the PlayMyWay play management system found that users often react negatively to, and did not heed, notifications they received (Edson et al., 2021). Overall, evidence suggests that participation in voluntary limit-setting machine features is fairly low, with one preliminary study reporting under 10% participation among casino patrons (Tom et al., 2017).[2]

PBS include budgeting, such as setting a spending limit for oneself, mental accounting, such as "two-pocket" money management during gambling sessions, "consumption control" through scheduling activities other than gambling, and planning strategies, such as leaving ATM and credit cards at home when visiting a casino (Hing et al., 2011; Rodda et al., 2018; Thaler, 2015). For example, Hing et al. (2011) found that among a sample of 242 gamblers, respondents reported finding self-help strategies such as

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[2] Reviews of the RG literature are provided by Ladouceur et al. (2012), Ladouceur et al. (2017), and Delfabbro and King (2021). Other studies that address RG tools include Auer and Griffiths (2019), Auer et al. (2014), Auer et al. (2020), Broda et al. (2008), Forsström (2017), Ginley et al. (2017), Moore et al. (2012), and Wohl et al. (2013).

budgeting and limiting money for gambling as most helpful, and the majority of gamblers preferred self-help measures such as these prior to seeking professional help for gambling problems. Moore et al. (2012) also assessed a variety of self-regulation measures that fell within five categories: cognitive approaches, direct action, social experience, avoidance, and limit setting. They found that most people who gamble adopt several strategies to manage their gambling and that PGs use twice as many strategies as non-problem gamblers. In their study of "change strategies," Rodda et al. (2018) examined fifteen different categories of self-help strategies commonly used. They found that the most common strategies include gamblers reminding themselves of the negative consequences of gambling and thinking about how money could be better spent. Rodda et al. (2019) found that 90% of gamblers in their sample follow two strategies when gambling: gamble only with the money they bring to the gambling venue, and play low-denomination machines (e.g., penny slots). Almost 80% of their sample indicated that they cashed-out winnings and did not subsequently bet them, whereas more than half separated their winnings by putting that money in a different pocket or back in their purse. Laland and Ladouceur (2011) focused their analysis on individuals who set gambling budgets, finding PGs usually set higher limits than non-problem gamblers, and were also more likely to gamble beyond the limits they set for themselves.

Overall, the available evidence suggests that limit setting – either using machine features (RG) or self-help (PBS) – may be an effective strategy for managing gambling losses. In this paper, we examine PBS limit setting, specifically two types of "individual gambling threshold" (IGT). An individual loss threshold (ILT) is an amount of money lost, chosen in advance of gambling, at which a person decides they will stop gambling. An individual win threshold (IWT) is an amount of money won, chosen in advance of gambling, at which a person decides they will stop gambling.[3] Although ILTs have been studied in the literature, IWTs have received little attention.

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[3] Previously in the literature these have been referred to as "loss limits" and "win limits" (e.g., Nelson et al., 2013; Walker et al., 2015). However, some readers of earlier drafts of this paper inferred "limits" to be imposed by the casino or EGM, rather than being a decision by the individual gambler to cease gambling, which led us to this revised language.

The term "threshold" has been used in some studies to refer to a point at which a person decides to stop gambling once they lose a particular amount of money (e.g., Currie et al., 2006; Louderback et al., 2021). We use "individual gambling threshold" rather than "limit" to make clear we are referring to an individual's decision to stop gambling because they have either lost or won a particular amount of money, not to an RG tool imposed by a casino or gambling machine.

INDIVIDUAL WIN THRESHOLDS

Limiting time spent gambling and using a monetary loss limit both reduce a gambler's average losses over time. This is important because many of the harms associated with gambling disorder (GD) relate to financial losses. However, the idea of setting an IWT, or "stopping while you're ahead," is counterintuitive, and seemingly counterproductive for reducing harms from gambling. This may explain why IWTs have not been studied by researchers. In contrast to an ILT, which results in a player leaving the casino having lost money, an IWT results in the player ceasing gambling while winning.

When considered as a component of a longer-term PBS, using an IWT will reduce a player's average monetary loss over time.[4] Walker et al. (2015) demonstrated this using a gambling simulation in which 900 simulated players use a $1 single-line slot machine with a 5% hold.[5] In Table 1, we show some of the simulation results from Walker et al. (2015). Keep in mind that what they called "loss limit" and "win limit" are what we have referred to as ILT and IWT. (See footnote 3 for an explanation of our terminology.)

In this example, the simulated players can make up to 5,000 slot machine spins. The average loss is $251, almost exactly the expected value for the simulated machine,[6] and only 17.6% of players ended up winning after 5,000 plays. When the simulated gamblers adopt an ILT of $100, so that gamblers play up to 5,000 spins, but stop once they accumulate a $100 loss, the average or expected loss is $76. While this result is better than when no ILT is used, a gambler using an ILT has a *lower* chance of leaving the casino as a winner (7.3%) than if no IGT is used (17.6%). When a $100 IWT is used in addition to the $100 ILT – so that gamblers stop once they are up or down by $100, the average result is a loss of only $35. And since some gamblers will now stop while they are ahead, the chance of leaving the casino as a winner rises to 30.6%. Using just a $100 IWT, without an ILT, increases the chance of leaving the casino as a winner even more, to 48.3%, but average loss also increases. These results confirm that, on average, the use of both an ILT and an IWT would significantly reduce a gambler's average losses compared to the use of ILTs alone, or not using IGTs at all.[7]

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[4] An IWT would also reduce the magnitude of winnings over time, but the expected value of casino games is negative for players. Therefore, we do not address this possibility in depth.

[5] This means the machine is programmed to keep (on average) 5 cents of each dollar bet.

[6] 5,000 x $1 x 0.05 = $250.

[7] As background for this study, we re-ran the simulation done by Walker et al. (2015). Our results were similar to theirs (Table 3, p. 976), but for the sake of brevity are omitted here.

Table 1. Results from simulated slot machine with player-set betting limits, 900 players

Simulation		# Winners (% Chance of Winning)	Mean $ Result[b]	Worst $ Result	Best $ Result	Average Time Played (# Plays[a])
1	No win or loss limits (5,000 spins; 8.33 hours play[a])	159 (17.6%)	−$251	−$843	$419	8.33 hrs. (5,000)
2	Time limit of 1 hour[a]	315 (35.0%)	−$30	−$220	$233	1.0 hr. (600)
3	$100 loss limit	66 (7.3%)	−$76	−$100	$382	2.38 hrs. (1,429)
4	$100 win limit	435 (48.3%)	−$153	−$848	$186	5.23 hrs. (3,135)
5	$100 loss limit and $100 win limit	275 (30.6%)	−$35	−$100	$162	1.13 hrs. (677)

Notes: [a] This assumes each spin/play takes 6 seconds. [b] Results are rounded to the nearest dollar.

Source: Walker et al. (2015, Table 3).

One can find references to "stopping while you're ahead" in popular press "how to gamble" books. For example, Schneider (2004, pp. 214–215) writes:

> Setting limits on your winnings is just as important as setting limits on your losses, and for the same reason. Many a player has found himself up a huge amount at the table or slot machine, only to go home empty-handed because he continued to play well past the point where he should have quit. Remember, the longer you play any game at the casino, the more the odds swing in the casino's favor.

This strategy of ending a gambling session ahead, rather than losing, is clearly a motivation for using some EGM bank features, such as those discussed in Blaszczynski et al. (2014),[8] as well as the use of two-pocket accounting (Thaler, 2015, p. 82), one commercial version of which includes a small lock-box into which a person can insert and preserve their cash winnings.[9]

Interestingly, the only study to ask gamblers about their actual use of IWTs revealed that 25% of past-year gamblers usually do use this strategy (Nelson

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[8] These features allow gamblers to set-aside a part of their winnings (Blaszczynski et al., 2014; Broda et al., 2008), but these are not effectively the same as IWTs. One RG website (https://www.begambleaware.org/safer-gambling) hints at the idea of IWTs, but only as a possible, unintended outcome of an "alarm" to prompt one to stop gambling.

[9] One example is the "Winners Bank200" locking metal wallet.

et al., 2013). Despite these examples and the fact that many gamblers apparently use IWTs, the topic has been largely ignored by researchers.

As the Nelson et al. (2013) survey and Walker et al. (2015) simulation suggest, IWTs may be a legitimate protective behavioral strategy, in terms of helping to reduce average gambling losses. Our goal in this paper is to provide evidence on the characteristics of those who set and adhere to individual gambling thresholds. We contribute new evidence on the use of individual loss thresholds, and the first analysis in the literature of the characteristics of gamblers who use individual win thresholds. A better understanding of who uses IGTs is important for better understanding PBS and RG generally.

METHOD

PARTICIPANTS AND PROCEDURE

Nelson et al. (2013) reported on a 2012 survey of Massachusetts residents, designed to be a benchmark for studying changes in behavior, opinions, and attitudes after casinos opened in Massachusetts.[10] The survey was completed online by 511 respondents who were part of an online "Knowledge Panel." These panels are random household samples recruited from the general population.

Nelson et al. (2013, p. 6) explain that the survey respondents reflect the overall demographics of Massachusetts. For example, geographic distribution of survey respondents roughly corresponded to the population distribution across the state: 71% were from the Boston area; 17% were from the southeastern part of the state; and 12% were from western Massachusetts. Marital status, education, and household income were also close to estimates from the 2010 Massachusetts Census. The sample included 64% female respondents and 87% were non-Hispanic whites.[11] Among the 511 survey respondents, 274 had gambled within the past 12 months.[12]

MATERIALS

The Nelson et al. (2013) survey, whose data is used in this study, includes a wide variety of questions, including standard demographics such as race, sex, household income, and level of education. Questions address a person's

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[10] Plainridge Park, 35 miles southwest of Boston, was the first casino to open in Massachusetts, in June 2015.

[11] The U.S. Census Bureau estimates these to be 51% and 71%, respectively, as of July 1, 2019 (www.census.gov/quickfacts/MA).

[12] For a detailed discussion of the survey participants, sample characteristics, procedure, etc., see Nelson et al. (2013, pp. 6–7). While the data are from 2012, their age is not particularly important for our research question. Moreover, the Nelson et al. survey data are the only known data that address the use of win thresholds.

frequency of gambling, total losses, games played, and gambling venues visited within the last 12 months, as well as *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria for gambling disorder (GD) experienced during the past year. The survey also asks about perceptions of the economic impacts of gambling and casinos, the degree to which "luck" can affect gambling outcomes, as well as respondent drug and alcohol use and symptoms of anxiety and depression. Most important for our study, past-year gamblers were asked a series of four questions about their use of IGTs (Nelson et al., 2013, questions 13–16)[13]:

(1) *Thinking about your gambling in the past 12 months: when you gambled, did you usually set a loss limit for yourself (in other words, a limit of how much you were willing to lose during a gambling session before you would stop gambling)?*
(2) *[If Yes to (1)] In the past 12 months, how often did you continue to gamble after reaching your loss limit?*
(3) *Thinking about your gambling in the past 12 months: when you gambled, did you usually set a win limit for yourself (in other words, an amount which, after you won that much, you would stop gambling)?*
(4) *[If Yes to (3)] In the past 12 months, how often have you continued to gamble after reaching your win limit?*

These questions are the focus of our analysis of how those who set IGTs differ from those who do not. One individual refused to answer questions about IGTs, so 273 respondents answered the four questions above.

ANALYSIS

We first report descriptive information about survey responses to the IGT-related questions. We then provide summary statistics for other variables related to demographics, gambling behavior, gambling problems, alcohol and drug use, and symptoms of anxiety and depression, broken out by whether respondents reported setting IGTs. Finally, we use a set of logistic regressions to test what aspects of gambling behavior differentiate those who set loss and win thresholds (i.e., ILTs and IWTs) from others and those who adhere to those thresholds from those who do not. Our choice of explanatory variables was limited to those that were included in the Nelson et al. (2013) study. Aside from basic demographics, we include measures of common comorbid conditions, as these might affect a person's betting strategies. More experienced gamblers may be more likely to use IGTs. We therefore include a series of variables on past-year gambling. Because individuals more prone to problematic gambling may be less likely to

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[13] The entire survey can be found in the appendix to Nelson et al. (2013). In Table 3 of this paper, we provide the descriptive statistics for many of the survey questions.

set or adhere to IGTs, we also included variables measuring such risk. Overall, the empirical model is designed to provide a general picture of the types of past-year gamblers who are more likely to set and adhere to IGTs.

Specifically, we conducted hierarchical logistic regressions, entering potential predictors in five steps. In the first step, we entered demographic variables measuring age, gender, and household income. In the second step, we entered variables measuring comorbid mental health and substance use issues, including depression, anxiety, and hazardous drinking screens, as well as a measure of illegal drug use. In the third step, we added variables measuring the type of past-year gambling in which individuals participated, including whether they engaged in any gambling other than the lottery, whether they played slot machines, and whether they gambled at the two major casinos south of Massachusetts (i.e., at Mohegan Sun and/or Foxwoods, in Connecticut). In the fourth step, we added variables measuring the individuals' level of past-year gambling involvement, including maximum amount lost on a single game type, maximum frequency of play on a single game type, maximum number of hours played in a single session, and number of different game types played. In the fifth and last step, we entered measures of risk for problematic gambling, including age first gambled, whether the individual endorsed any criteria of GD, and whether the individual reported going to an ATM to get additional money in the middle of a gambling session.

We ran this logistic regression on four separate outcomes. First, we compared past-year gamblers who used either an ILT or IWT to those who did not. Second, we compared past-year users of IGTs who set IWTs to those who only set ILTs. Finally, for individuals who set ILTs and for individuals who set IWTs, we compared those who reported adhering to those thresholds to those who did not.

RESULTS

USE OF INDIVIDUAL WIN AND LOSS THRESHOLDS

Among the 273 past-year gamblers who responded to the survey, about 84% (n = 228) reported usually setting an ILT, although close to 20% (n = 45) of those respondents also reported not adhering to the threshold at least some of the time. Only 25% (67 of 273 respondents) reported setting an IWT, and about 40% of those (n = 27) reported gambling even after their threshold was reached. Table 2 provides additional data on setting and adhering to gambling thresholds.

One interesting statistic not reflected in Table 2 is that 62 of the 67 respondents who set an IWT also set an ILT. Among the 273 past-year gambler respondents, 166 usually set an ILT but no IWT, and 40 usually set no IGTs.

In Table 3 we present summary statistics for the variables we analyzed. We divided past-year gamblers into three categories: "Did not usually set an IGT"

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Table 2. Massachusetts survey results, past-year gamblers' PBS strategies

Survey Responses	% of Respondents (N = 273)
% usually setting a loss limit	**83.5**
Frequency of continued gambling after reaching loss limit (among those setting a loss 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, Table 3, p. 19)

(n = 40), "usually set an ILT but no IWT" (n = 166), and "usually set an IWT" (n = 67). As shown in Table 3, the majority of past-year gamblers reported their greatest past-year loss on any particular game at "$100 or less." In addition, most of the respondents reported the past-year maximum time spent on one game type at two hours or less. Among the respondents who were past-year gamblers, 13.1% (36 of 273) endorsed at least one DSM-IV GD criterion. Almost half (45%) of those who usually did not set an IGT played lottery games exclusively. Almost half of the respondents who set an ILT or IWT played slot machines during the past year.

LOGISTIC REGRESSIONS

We report the results for all the variables included in the final step of each hierarchical logistic regression. We begin by testing which characteristics help predict the use of either loss or win thresholds among past-year gamblers. The results of this most general model are shown in column A of Table 4. Individuals who did not engage in recreational drug use ($p < 0.05$) were found to be more likely than others to use IGTs. At the same time, people who had a past-year positive screen for depression ($p < 0.05$) were found to be more likely than others to use IGTs. In examining the steps of the regression, only the addition of variables measuring type of play (i.e., Step 3: engaged in any gambling other

Table 3. Past-year gambler characteristics of those who do and do not set individual gambling thresholds (N = 273)

	PY Gambler: Did Not Usually Set an IGT (n = 40)	PY Gambler: Usually Set an ILT But No IWT (n = 166)	PY Gambler: Usually Set an IWT (n = 67)
	Mean (SD) or %		
% Female	50.0%	44.0%	31.3%
Age	47.9 (16.5)	51.1 (16.7)	50.6 (16.7)
Household Income, before Taxes			
Less Than $20,000	7.5%	9.6%	7.5%
Between $20,000 and $50,000	30.0%	23.5%	32.8%
Between $50,000 and $100,000	32.5%	39.8%	32.8%
More Than $100,000	30.0%	27.1%	26.9%
PY Greatest Loss Amount on One Game Type			
Broke Even or Won	23.1%	12.3%	7.5%
$100 or Less	53.8%	63.2%	59.7%
Between $100 and $1,000	15.4%	21.5%	22.6%
More Than $1,000	7.7%	3.1%	9.7%
PY Max. Time Spent on One Game Type*			
Up to 2 Hours	92.1%	69.0%	65.6%
Between 2 and 7 Hours	7.9%	27.8%	27.9%
More Than 7 Hours	0.0%	3.2%	6.6%
PY Max. Play Frequency on One Game Type			
Less Than Once a Month	45.0%	47.6%	34.8%
Between Once a Month and Weekly	42.5%	44.6%	48.5%
More Than Once a Week	12.5%	13.9%	16.7%
PY % Engaged Only in Lottery Play**	45.0%	19.9%	16.4%
PY % Played Slot Machines***	7.5%	50.0%	41.8%
PY % Gambled at Neighboring Casino***	5%	38.0%	62.7%
PY # of Game Types Played**	2.2 (2.1)	3.6 (2.7)	3.6 (2.7)
Age First Gambled**	20.1 (9.9)	19.9 (7.0)	23.6 (11.1)
PY % Needed to Get More $ during Gambling	5.0%	6.0%	11.9%
PY # of DSM-IV GD Criteria Endorsed	0.25 (0.63)	0.17 (0.74)	0.42 (1.02)
PY % Endorsing Any DSM-IV GD Criteria	17.5%	9.6%	19.4%
PY Recreational Drug Use	22.5%	9.7%	14.9%
PY Hazardous Drinking	42.5%	42.2%	34.3%
PY Anxiety Problems	5.0%	3.0%	7.5%
PY Depression	2.5%	9.0%	9.0%

Notes: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

IGT = individual gambling threshold; ILT = individual loss threshold; IWT = individual win threshold; PY = past year; Max. = Maximum; $ = money; GD = gambling disorder.

than the lottery, playing slot machines, and gambling at the two major casinos bordering Massachusetts) significantly improved the model [Step $\chi^2(3)$ = 39.8, p < 0.001].

The next model analyzes the characteristics of those who set win thresholds, among the 229 survey respondents who set either loss or win thresholds. The results in column B of Table 4 indicate that those who gambled outside of Massachusetts, such as in Connecticut, were more likely than others to use IWTs while gambling (p < 0.01). In examining the steps of the regression, both the addition of variables measuring type of play (i.e., Step 3) and the addition of variables measuring risk for problematic gambling (i.e., Step 5: age first gambled, endorsing any criteria of gambling disorder, and going to an ATM to get extra money in the middle of a gambling session) significantly improved the model [Step $\chi^2(3)$ = 13.9, p < 0.01 and Step $\chi^2(3)$ = 11.1, p < 0.05, respectively].

In the next two models we test which characteristics help explain the adherence to ILTs and IWTs. Column C of Table 4 shows that, among past-year gamblers who used ILTs, *not* needing to get more money in the middle of a gambling session predicted always adhering to a loss threshold (p < 0.01). In examining the steps of the regression, both the addition of variables measuring type of play (i.e., Step 3) and the addition of variables measuring risk for problematic gambling (i.e., Step 5) significantly improved the model [Step $\chi^2(3)$ = 22.2, p < 0.001 and Step $\chi^2(3)$ = 15.8, p < 0.01, respectively].

Finally, as column D of Table 4 shows, among past-year gamblers who set an IWT, *not* drinking at hazardous levels predicted always adhering to their win thresholds (p < 0.05). In examining the steps of the regression, only the addition of variables measuring mental health and substance use (i.e., Step 2: depression, hazardous drinking, and illegal drug use) significantly improved the model [Step $\chi^2(3)$ = 10.0, p < 0.05].

DISCUSSION

Overall, our results suggest that many gamblers do employ IGTs, but as expected, fewer use IWTs than ILTs. And among those who do set IGTs, gamblers appear to be less likely to adhere to IWTs than ILTs. Analyses to determine characteristics of gamblers who use and adhere to IGTs were not consistent across models. Models predicting IGT use, IWT use, and ILT and IWT adherence yielded different individual predictors. This may in part be due to the correlation between predictors. However, investigation of the steps of each regression yields a clearer picture.

The regression step in which measures of gambling involvement were entered did not improve prediction in any of the models, possibly because those relationships were better captured by type of play or problematic play variables, described below.

Table 4. Logistic regressions predicting individual gambling threshold (IGT) use and adherence

	Outcome															
	A Used an IWT or ILT (among PY gamblers, n = 269)				**B** Used an IWT (among PY gamblers who used an IWT or ILT, n = 229)				**C** Always Adhered to ILT (among PY gamblers who used an ILT, n = 224)				**D** Always Adhered to IWT (among PY gamblers who used an IWT, n = 64)			
	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio
Gender[a]	−0.20	0.44	0.20	0.82	−0.40	0.36	1.22	0.67	0.07	0.44	0.03	1.07	1.02	0.81	1.57	2.77
Age	0.01	0.01	0.77	1.01	−0.02	0.01	1.41	0.99	0.01	0.02	0.23	1.01	−0.03	0.03	0.92	0.97
Household Income[b]	−0.03	0.05	0.43	0.97	0.02	0.04	0.22	1.02	0.04	0.05	0.60	1.04	−0.13	0.13	0.97	0.88
PY Recreational Drug Use[c]	−1.26	0.58	4.68^	0.28	0.68	0.52	1.72	1.97	0.35	0.68	0.26	1.41	1.14	0.97	1.39	3.14
PY Hazardous Drinking[c]	−0.20	0.44	0.21	0.82	−0.29	0.38	0.57	0.75	−0.07	0.45	0.03	0.93	−1.94	0.97	4.05^	0.14
PY Anxiety Problems[c, g]	−0.30	1.13	0.07	0.74	1.94	1.26	2.38	6.98	0.03	1.58	0.00	1.03	–	–	–	–
PY Depression[c]	2.33	1.18	3.89^	10.29	−1.44	1.16	1.56	0.24	0.59	1.15	0.26	1.78	−1.65	1.67	0.98	0.19
PY Gambled on Games Other than Lottery[c]	0.17	0.49	0.12	1.19	−0.00	0.54	0.00	1.00	−0.33	0.89	0.14	0.72	0.37	1.42	0.07	1.44
PY Played Slot Machines[c]	1.65	0.94	3.08~	5.20	−0.91	0.59	2.42	0.40	0.26	0.62	0.17	1.29	−2.94	1.58	3.44~	0.05
PY Gambled at Neighboring Casino[c]	1.87	1.02	3.40~	6.51	1.92	0.61	9.89*	6.81	−1.01	0.58	3.03~	0.37	2.35	1.79	1.72	10.44
PY Greatest Loss Amount on One Game Type[d]	0.00	0.16	0.00	1.00	0.15	0.12	1.56	1.16	−0.12	0.14	0.70	0.89	−0.09	0.24	0.15	0.91
PY Max. Time Spent on One Game Type[e]	0.57	0.32	3.12~	1.76	−0.18	0.19	0.92	0.84	−0.20	0.21	0.88	0.82	0.04	0.36	0.02	1.05

(Continued)

Table 4. (*Continued*)

Outcome	A Used an IWT or ILT (among PY gamblers, n = 269)				B Used an IWT (among PY gamblers who used an IWT or ILT, n = 229)				C Always Adhered to ILT (among PY gamblers who used an ILT, n = 224)				D Always Adhered to IWT (among PY gamblers who used an IWT, n = 64)			
	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio	B	SE	Wald	Odds Ratio
PY Max. Play Frequency on One Game Type[f]	0.07	0.13	0.30	1.07	0.02	0.10	0.05	1.02	0.04	0.12	0.11	1.04	−0.22	0.21	1.04	0.81
PY # of Game Types Played	−0.01	0.16	0.00	0.99	−0.11	0.09	1.50	0.90	−0.12	0.09	1.81	0.89	−0.37	0.28	1.68	0.69
Age First Gambled	−0.01	0.03	0.21	0.99	0.05	0.02	6.46	1.06	0.00	0.03	0.01	1.00	0.07	0.04	2.54	1.07
PY Needed to Get More $ during Gambling Sess.[c]	−1.89	1.27	2.19	0.15	0.23	0.65	0.13	1.26	−2.81	0.82	11.88*	0.06	0.10	1.07	0.01	1.11
PY 1+ DSM-IV GD Criteria Endorsed[c]	−1.41	0.73	3.73~	0.25	1.05	0.54	3.80~	2.86	0.37	0.66	0.32	1.45	0.97	1.19	0.67	2.64

Notes: ~p < 0.10; ^p < 0.05; *p < 0.01.

Max = maximum. $ = money. Sess = session. GD = gambling disorder.

[a] 0 = female; 1 = male.

[b] Integer range 1–19: 1 = <$5K; 10 = $35K–$39,999; 19 = $175K.

[c] Dichotomous = 0 = no; 1 = yes.

[d] Integer range 1–10: 1 = won $1+; 2 = broke even; 3 = lost $1–$50; 5 = lost $101–$500; 10 = lost $20,001+.

[e] Integer range 1–6: 1 = none; 3 = 1–2 hours; 6 = 7+ hours.

[f] Integer range 1–8: 1 = not at all; 3 = < once a month; 6 = weekly; 8 = daily+.

[g] Anxiety removed from the win limit adherence model due to reduced degrees of freedom.

16

TYPE OF PLAY AND IGTS

Adding variables related to type of play (i.e., gambling on the lottery, gambling on slot machines, and gambling at casinos) improved prediction of setting an IGT, setting an IWT, and adhering to an ILT. It appears that casino gambling drove this effect, with those gambling at neighboring-state casinos, and to a lesser effect, those specifically playing slot machines, being more likely to set IGTs generally, and those gambling at casinos being significantly more likely to set IWTs specifically. Because there were no casinos within Massachusetts at the time of the survey, gambling at a casino required a certain level of involvement in gambling, as well as time and monetary resources. Thus, this variable might have been serving as a proxy for gambling involvement more generally. Additionally, these gamblers incur potentially significant monetary and time costs to visit casinos, so this finding may indicate these individuals sought to offset some of these costs through winnings they receive gambling.

Type of play's association with adhering to an ILT is in the opposite direction – among those who set ILTs, respondents engaged in gambling at a neighboring casino were somewhat less likely to adhere to their ILT. This might relate to the immersive experience of casino gambling and the distance traveled to reach such a gambling destination. It might be difficult to leave a casino upon reaching an IGT, especially if that happens early in the day during a planned multi-hour trip, whereas adhering to an ILT for other games like lottery or scratch cards might be as straightforward as not purchasing any more in a given day or week if the gambler incurred losses.

PROBLEMATIC PLAY AND IGTS

Adding variables related to problematic play (i.e., age first gambled, whether the individual endorsed any criteria of GD, and whether the individual reported going to an ATM to get additional money in the middle of a gambling session) improved prediction of setting an IWT and adhering to an ILT. Risk for problematic play appears to increase likelihood of setting an IWT, but decrease adherence to ILTs. There are a couple of reasons risk for problematic play might be associated with setting an IWT. These variables signal not only potential for problematic play, but also high gambling involvement more generally. We should expect that individuals who are highly involved with gambling are more likely to know about strategies such as setting ILTs or IWTs. Since IWTs are less common, they are likely even more strongly associated with high levels of gambling than ILTs, which are more commonly known and used. Additionally, individuals who are aware that they are beginning to experience problems are likely to attempt self-help strategies, such as setting IGTs, to facilitate safer play. This negative association between risk for problematic play and adherence to ILTs is, not surprisingly, strongly driven by visiting an ATM in the middle of a session. If a gambler does not adhere to their threshold, they may be more likely to use an

ATM to get additional funds during a gambling session. Alternatively, ease of access to additional money may make it more difficult for some gamblers to adhere to a loss threshold. It may follow that leaving the ATM card at home, or removing ATMs from casino floors, may be helpful with respect to minimizing losses and other harms from gambling (Hing et al., 2017; Rodda et al., 2019; Thomas et al., 2013).

COMORBID MENTAL HEALTH SYMPTOMS/SUBSTANCE USE AND IGTS

Finally, variables related to comorbid mental health and substance use issues improved prediction of adherence to an IWT in particular, with hazardous drinking driving this effect. Respondents who indicated past-year hazardous drinking were found to be less likely to adhere to win thresholds than others. This may be an indication of impaired decision-making, or simply lower inhibitions, associated with alcohol use. Gamblers may be satisfied when winning, but drinking may lead them to make riskier decisions, including ignoring gambling thresholds they had set for themselves, exacerbating the "house money effect" (Thaler and Johnson, 1990) of increased risk-seeking while ahead. Interestingly, this finding on hazardous drinking is consistent with the idea that it may be to the casinos' benefit to provide free alcohol to patrons who are gambling, since it may lead winning customers to play longer, ultimately giving back their winnings to the casino. This practice should be examined within this context.

Two variables related to comorbid mental health symptoms and substance use were individually predictive of setting any IGT, even though this step of the regression did not improve the model predicting using an ILT or IWT. Recreational drug use and recent experience of depression symptoms both predicted setting an IGT, but in opposite directions. Recreational drug users were less likely and individuals experiencing symptoms of depression were more likely to adopt IGTs. The finding that recreational drug users are less likely to adopt IGTs perhaps reflects that these individuals are greater risk-takers and more impulsive in multiple facets of their lives, including gambling (Leeman and Potenza, 2012; Verdejo-Garcia and Albein-Urios, 2021). As a result, they may be less likely to begin a gambling session with a particular threshold for stopping. Individuals with depression are more likely than others to also experience gambling problems, and many in this category use gambling as a way to regulate mood and escape negative emotions (Vaughan and Flack, 2021). Therefore, it is possible that these individuals are more likely to use IGTs as a deliberate attempt to interrupt this escape cycle. Individuals experiencing depression are also more likely to seek treatment than individuals experiencing gambling or substance use problems (Kessler et al., 1999; Slutske, 2006; Wang et al., 2005). While we do not know how many in our sample sought treatment, a person who has sought professional

counseling is perhaps more likely to adopt specific strategies for limiting gambling, including using IGTs (Hing et al., 2017; Rodda et al., 2019; Thomas et al., 2013).

LIMITATIONS

The analysis in this paper relies upon secondary data from the Nelson et al. (2013) survey, who note some of the limitations of the data. First, the survey data were self-reported in an online survey, and such data have well-known issues. The data were collected in 2012–2013, making the age of the data a potential issue. Also, Nelson et al. (2013) note that the recruitment rate for their sample was 16.3%, which is somewhat low, although common among household surveys. Finally, since our analysis utilizes secondary data, we were obviously limited on the variables we could include in our model.

CONCLUSION

Although previous research has examined the use of loss thresholds and machine features such as pop-up messages and machine betting limits, there has been no research on the use of win thresholds. To our knowledge, the survey by Nelson et al. (2013) is still the only data available which considers win thresholds among actual gamblers. Given that 25% of gamblers have indicated they set win thresholds for themselves, a better understanding of this behavior is needed.

Further, casino gambling is well established in countries around the world. Video games, which often contain elements of gambling, such as loot boxes (Abarbanel, 2018; Derevensky and Griffiths, 2019; King et al., 2015), are growing more popular, particularly with children and adolescents. More recently, technological advances have made the monetization of new types of entertainment inevitable (e.g., Abarbanel and Johnson, 2020). These developments all point to the importance of developing innovative tips and tools for reducing the potential harms from gambling, many of which are the result of monetary losses. The win threshold is one potential tool to consider.

Future research in this area should seek to utilize actual gambling records in addition to self-reported data. Randomized controlled trials that assign gamblers to win and loss thresholds, time limits, or a combination of them, could provide valuable additional evidence on characteristics that predict setting and adhering to gambling thresholds. Such evidence will be valuable in better understanding their potential efficacy as protective behavioral strategies.

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During this project Walker was also a visiting professor at the Division on Addiction (2014), a Visiting Distinguished Research Fellow in Gambling Economics at the International Gaming Institute at the University of Nevada, Las Vegas (2021–22), and a Senior Research Fellow at the Center for Public Choice & Market Process at the College of Charleston (2021–22). Walker received funding for this project from the Center for Public Choice & Market Process, School of Business, College of Charleston.

During the past five years, Douglas M. Walker has received funding/honoraria/travel reimbursements for research and/or presentations from the Center for Research in Economics at the University of Central Arkansas; City of Yokohama, Japan; the Federalist Society; International Center for Responsible Gaming, International Gaming Institute at the University of Nevada, Las Vegas; and the Responsible Gambling Council. He has also worked as a consultant on projects for the New York State Gaming Commission (with Spectrum Gaming Group); Aristocrat Technologies, Inc., and the City of Portsmouth, VA (with Meister Economic Consulting).

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