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Push Outcomes Bias Perceptions of Scratch Card Games

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All data reported in this manuscript can be accessed via the following link: <https://osf.io/q59yr/>

Supplementary Information

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Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Waterloo Office of Research Ethics and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest

MS has received travel and/or accommodation for speaking engagements from the Responsible Gambling Council (Canada) and the British Columbia Lottery Corporation (Canada). She has received consulting fees from Gambling Research Exchange Ontario (Canada) and was the 2020 recipient of the Responsible Gambling Council's Tibor I. Barsony Student Bursary (Canada). These declarations are unrelated to the research presented in this manuscript. The authors declare that they have no additional conflicts of interest.

Abstract

In the domain of scratch card gambling, “pushes” refer to outcomes in which a prize is won that is equal to the cost of a scratch card game. Despite resulting in no net monetary gain, these outcomes are categorized as wins by lottery operators, effectively inflating published scratch card information (e.g., posted odds of winning). Additionally, the experience of obtaining a push shares similarities (e.g., the revealing of matching symbols) with the experience of obtaining a win and thus may be experienced similarly to wins by gamblers. Across four studies ($N = 1502$), we examined the impact of push outcomes on participants’ perceptions of scratch card games. In Studies 1 and 2, participants reported feeling more likely to win, more excitement to play, and a stronger urge to gamble when presented with a scratch card that categorized push outcomes as wins compared to when presented a scratch card that did not categorize these outcomes as wins. In Study 3, participants experiencing a push outcome prior to a loss reported feeling more likely to win compared to those not experiencing a push outcome yet experiencing the same net monetary loss. In Study 4, push outcomes were found to elicit more excitement and a stronger urge to gamble compared to losses but less excitement and a weaker urge to gamble compared to wins. Overall, the present investigation suggests that push outcomes, a prevalent feature of scratch card games, can bias gambling-related judgments and increase the appeal of scratch card games.

Keywords: scratch cards, gambling, push outcomes, problem gambling, bias

Push Outcomes Bias Perceptions of Scratch Card Games

Gambling behaviour can be impacted by factors other than one's chances of winning when playing a gambling game, with certain features of these games motivating gambling behaviour. Past work has revealed the characteristics of gambling games that promote gambling behaviour and bias gambling-related judgments, with these characteristics helping to explain some peoples' willingness to continually participate in gambles offering unfavourable odds. For example, near-miss outcomes, in which a gambler is one symbol away from a jackpot prize (Reid, 1986), are a feature of both slot machines and scratch card games. While objectively equivalent to regular losses, near-miss outcomes increase gamblers' psychophysiological arousal (Stange et al., 2016) and motivation to continue gambling (Cote et al., 2003; Stange, Grau et al., 2017; Stange, Graydon et al., 2017). Functional Magnetic Resonance Imaging studies show how near-miss outcomes activate dopamine-related reward processing brain areas in a manner similar to wins (Clark et al., 2009), presumably by activating the "wanting" component of dopaminergic reward processing areas (Berridge, 2007). Given that near-miss outcomes can increase peoples' proclivity to gamble while experiencing monetary losses, it is perhaps not surprising that these outcomes are exceedingly prevalent within scratch card games (Stange, Brown et al., 2017).

"Losses disguised as wins" (LDWs) are a feature of multiline slot machines in which players distribute their bets across a number of slot machine lines and "win back" less than their total spin wager. Nevertheless, slot machines celebrate these outcomes with reinforcing feedback (Dixon et al., 2010). As such, LDWs represent another characteristic of gambling games that promote gambling behaviour despite representing monetary losses (Graydon et al., 2019). That is, despite the fact that LDWs represent losing outcomes, people overwhelmingly prefer slot machines containing these outcomes (Dixon et al., 2014). Notably, LDWs have been shown to

elicit similar levels of arousal as true wins (Dixon et al., 2010). They also trigger post-reinforcement pauses (a measure of hedonic enjoyment) that are equivalent in size to actual small wins (Dixon et al., 2014). Indeed, a significant proportion of gambling novices fail to realize that they have lost money on these spins, with even experienced gamblers often overestimating the number of true wins in a slot machine session likely because they conflate true wins and LDWs in memory based on the similarity of their arousal signatures.

In the domain of scratch cards, “pushes” refer to outcomes in which a prize is won that is *equal* to the cost of a scratch card game, resulting in a net gain/loss of \$0. Similar to LDWs, push outcomes are unique in that, despite sharing some similarities with wins (e.g., the revealing of matching symbols), these outcomes can be differentiated from wins on the basis that they do not result in a net monetary gain. Nevertheless, push outcomes are commonly categorized as wins by lottery operators, for example in the routinely calculated (and publicized) odds of winning.¹ Furthermore, like near-misses, pushes are a frequent outcome when playing many scratch card games. For example, in the most recent iteration of a popular scratch card in Ontario, Canada (“Cash for Life”; OLG, 2021c), 37.4% of all available “prizes” are pushes, which result in no net monetary gain for gamblers.

It is reasonable to assume, given their ubiquity, that the frequent occurrence of push outcomes helps sell scratch card games. The present research provides an initial investigation into how push outcomes impact peoples’ perceptions of scratch cards. We consider two related mechanisms by which push outcomes may make the prospect of playing a scratch card appear more attractive. First, as push outcomes are commonly categorized as wins by lottery operators,

¹ For example, in a scratch card game available at the time of writing (“\$5,000 In A Flash”; OLG, 2021b) the overall odds of winning a prize on this \$10 card were 1 in 4.76 (total tickets/total number of prizes = 1,428,000/299,768 = 4.76), where the total number of “prizes” includes push outcomes which do not result in net monetary gain.

their inclusion inflates publicly available scratch card game information (e.g., the calculated odds of winning), potentially increasing the appeal of scratch card games. Second, the experience of obtaining a push outcome shares similarities with obtaining a win, resulting in these outcomes potentially being experienced similarly by gamblers. As such, the frequent occurrence of push outcomes may make the experience of playing a scratch card feel more rewarding to gamblers.

The categorization of push outcomes as wins impacts readily available scratch card game information. For instance, categorizing push outcomes as wins effectively inflates calculations of a gambler's odds of winning. To demonstrate this, we can examine the odds of winning presented to potential gamblers for the aforementioned "Cash for Life" scratch card (OLG, 2021c). The odds of winning advertised to gamblers for this scratch card are 1 in 3.45, however, if push outcomes are not categorized as wins, these odds are reduced to a less appealing 1 in 5.52. Therefore, one manner in which push outcomes may encourage over-optimistic perceptions of scratch card games is through their influence on scratch card game information.² That is, the categorization of push outcomes as wins results in lottery operators being able to post and publicize more favourable odds of winning, with gamblers potentially failing to realize that a large portion of these "wins" represent neutral monetary outcomes.

While a discerning and motivated gambler can use the information presented by lottery operators to generate accurate perceptions of scratch card games, past work suggests that people often fail to properly utilize such information (Horn et al., 2021; Muda et al., 2020; Stange et al., 2021; Walker et al., 2018, 2019). For example, the presentation of unclaimed prize information (i.e., the number of prizes still available to be won) has been shown to guide scratch card

² The inclusion of push outcomes also impacts the payback percentages of scratch card games. For example, the inclusion of push outcomes in the scratch card mentioned above results in a payback percentage of 67.72% compared to 59.15% without pushes.

preferences (Muda et al., 2020; Walker et al., 2018, 2019) and increase the appeal of scratch card games (Stange et al., 2021). Notably, this influence occurs despite such information being uninformative to gamblers aiming to maximize their chances of monetary gain. That is, when presented without an updated count of the number of cards in circulation (not provided by lottery operators), unclaimed prize information is non-diagnostic³ of a scratch card's true expected value (i.e., payback percentage). Furthermore, peoples' reliance on unclaimed prize information persists in contexts in which this information is put in direct competition with information that *is* diagnostic (i.e., payback percentage information), resulting in observed preferences for scratch cards with less chance of producing monetary gains (Walker et al., 2018; 2019).

Failures to properly utilize gambling-related information may result from a general cognitive bias wherein people often fail to allocate sufficient attention and cognitive resources to key diagnostic information while formulating judgments, relying instead on their intuitions. For example, when judging the likelihood of certain events, people often fail to adequately make use of base-rate information (Pennycook et al., 2015). Further, when asked to judge the logical validity of statements, people often rely on their personal beliefs at the expense of the logical structure of statements (Newstead et al., 1992). These results have been broadly interpreted in terms of dual process theories of reasoning, which, in general, posit that the mind is capable of two fundamentally different types of processes: Type 1 processes that are fast and intuitive, and Type 2 processes that are more analytic and reflective (Evans & Stanovich, 2013). Here, successful reasoning, and the allocation of sufficient attention to diagnostic information, is often thought to rely on the successful engagement of Type 2 thinking.

³ However, it is worth noting that unclaimed prize information may help gamblers avoid playing scratch cards that no longer offer the possibility of a specific desired prize.

Consistent with the claim that gamblers often rely on intuitive Type 1 processes when making gambling judgments, presenting diagnostic scratch card game information in an intuitive graphical format has been found to increase peoples' reliance on this information, improving scratch card preferences and reducing the appeal of negative expected value scratch card games (Walker et al., 2019, 2022). Overall, past work suggests that gamblers are susceptible to having their perceptions of a gambling game be informed by the most intuitive available cues, regardless of whether these cues are diagnostic of a game's true value. As such, it appears unlikely that the majority of gamblers account for the categorization of push outcomes as wins (specifically this categorization's impact on scratch card game information) when forming impressions of scratch cards on the basis of available game information.

Research on scratch cards reveals that the monetary value of certain outcomes does not necessarily align with how they are experienced by gamblers. For example, LDWs and near-miss outcomes result in monetary losses, but nevertheless increase peoples' motivation to continue gambling in a manner similar to wins (Graydon et al., 2019; Stange, Grau et al., 2017; Stange, Graydon et al., 2017). Therefore, it is not necessarily the case that push outcomes are experienced by gamblers as neutral. Despite the lack of monetary gain, push outcomes share similarities with wins (e.g., the revealing of matching symbols) and may thus be experienced similarly to wins by gamblers. If this is the case, the frequency of push outcomes may work to increase the appeal of scratch card games by increasing the frequency with which gamblers feel as if they have *experienced* a win, despite the absence of net winnings.

The Present Research

Whether it be through experience or the alteration of scratch card game information, push outcomes have the potential to make scratch card games appear more attractive to gamblers.

Despite this potential, no research (to our knowledge) has examined the influence of push outcomes on peoples' perceptions of scratch card games. In the present manuscript, we investigate the influence of push outcomes on a host of gambling-related judgments (e.g., perceived likelihood of winning, excitement, urge to gamble, and card purchasing). In Studies 1 and 2, we assess the influence of categorizing push outcomes as wins, presenting participants with two equivalent scratch cards that differ only in their categorization of these outcomes. In Studies 3 and 4, we examine the impact of experiencing a push outcome during a simulated gambling task. Specifically, in Study 3, we assess whether experiencing a push outcome prior to a loss biases participants' gambling-related judgments, despite having no effect on participants' net monetary outcome. In Study 4, we compare participants' self-reported excitement and urge to gamble following losing, winning, and push outcomes. Lastly, across multiple studies, we examine participants' categorization of push outcomes as well as their agreement with various mental accounts of the outcomes they experienced (e.g., "I feel like I lost \$5").

Study 1

Method

Participants

A sample of 399 participants was recruited from Amazon Mechanical Turk. Participants received \$0.75 USD upon completion of a 6-minute online questionnaire in which they were required to be residents of the United States, possess a Mechanical Turk HIT approval rate greater than or equal to 99%, and correctly respond to two pre-survey bot detection items. We excluded data from nine participants who reported responding randomly at some point during this questionnaire.⁴ Thus, our final sample consisted of 390 participants (42% Female; $M_{\text{age}} =$

⁴ Specifically, these participants responded "yes" to the question "Is there any reason that we should not use your data (e.g., did you randomly select responses at any point during the survey)?"

42.12, $SD_{age} = 12.63$). For all studies, we collected our full sample prior to data analyses and report all data exclusions, all manipulations, and all measures used. All studies received prior approval by a University of Waterloo Research Ethics Committee.

Materials⁵

Scratch Card Game and Information

An image of a scratch card game (100X Multiplier) was selected from the Ontario Lottery and Gaming Corporation's website (OLG, 2021a). We removed information detailing the number of top prizes and odds of winning a prize from the card image as to not conflict with information presented in the current study. Furthermore, we created two versions of this scratch card (Blue and Red) by changing the background colour of the card image. Participants were presented with both 100X Multiplier scratch cards, one at a time, with these cards differing only with regards to whether they categorized push outcomes (i.e., \$5 wins) as prizes (see Figure 1). Both scratch card games were presented alongside equivalent information about the cost to play (\$5), total number of tickets in circulation (4,000,000), and payback percentage (66.46%). Additionally, each game was presented with a prize table that detailed, for each prize, the odds of winning and number of prizes available. This prize table differed between "Push" and "No Push" scratch cards, with push outcomes exclusively appearing in the prize table of Push scratch cards. Information regarding the overall odds of winning was presented and differed between Push and No Push scratch cards as a result of push outcomes being categorized as wins for Push (but not No Push) scratch cards. Notably, participants were provided instructions informing them as to whether push outcomes were included as wins in the calculation of each scratch card's overall odds of winning. Despite differences in some aspects of the presented scratch card game

⁵ All materials and measures used in Studies 1-4 can be viewed in the Supplementary Materials (Parts A and B).

information, both Push and No Push scratch cards featured identical prize structures and payback percentages.

Push Scratch Card

Instructions: Below we present information about the scratch card "100X Multiplier (Red)." Included in this information is the cost to play (\$5), payback percentage (66.46%), and the overall odds of winning (1 in 4.00).

Additionally, the overall odds of winning each prize ("Odds of Winning") as well as the number of each prize ("Number of Winners") that could be won is listed below.

Study 1 Note that for this version of 100X Multiplier the "Overall odds of Winning" refers to the odds of purchasing a scratch card in which a prize is won. Furthermore, "Payback Percentage" refers to the percentage of money spent purchasing a scratch card that is paid out in prize (on average).

Study 2 Note that for this version of 100X Multiplier the "Overall odds of Winning" refers to the odds of purchasing a scratch card in which a prize is won (including prizes equal to the \$5 cost of play). Therefore, **included in this calculation** (and the prize table presented below) is the 1 in 5 chance of purchasing a scratch card in which a \$5 prize is won, offsetting the \$5 cost of the card (but no actual winnings beyond that).

No Push Scratch Card

Instructions: Below we present information about the scratch card "100X Multiplier (Blue)." Included in this information is the cost to play (\$5), payback percentage (66.46%), and the overall odds of winning (1 in 9.66).

Additionally, the overall odds of winning each prize ("Odds of Winning") as well as the number of each prize ("Number of Winners") that could be won is listed below.

Study 1 Note that for this version of 100X Multiplier the "Overall odds of Winning" refers to the odds of purchasing a scratch card in which a prize is won that is greater than the \$5 cost to play. Furthermore, "Payback Percentage" refers to the percentage of money spent purchasing a scratch card that is paid out in prize (on average).

Study 2 Note that for this version of 100X Multiplier the "Overall odds of Winning" refers to the odds of purchasing a scratch card in which a prize is won that is **greater than the \$5 cost to play**. Therefore, **not included in this calculation** (or the prize table presented below) is the 1 in 5 chance of purchasing a scratch card in which a \$5 prize is won, offsetting the \$5 cost of the card (but no actual winnings beyond that).



100X Multiplier (Red)
 Cost: \$5
 Total Number of Tickets: 4,000,000
 Payback Percentage: 66.46%
 Overall odds of Winning: 1 in 4.00

Prizes	Odds of Winning: 1 in	Number of Winners
\$100,000	400,000	10
\$5,000	13,793	290
\$250	400	10,000
\$25	24	169,700
\$5	5	820,000



100X Multiplier (Blue)
 Cost: \$5
 Total Number of Tickets: 4,000,000
 Payback Percentage: 66.46%
 Overall odds of Winning: 1 in 9.66

Prizes	Odds of Winning: 1 in	Number of Winners
\$100,000	400,000	10
\$5,000	13,793	290
\$250	400	10,000
\$25	24	169,700

Figure 1. Materials presented to participants for Push and No Push scratch cards in Studies 1 and 2. Note that the version (Blue or Red) assigned to Push and No Push scratch cards was counterbalanced across participants within both studies.

Measures

Likelihood of Winning

We assessed participants' perceived likelihood of winning a prize while playing each 100X Multiplier scratch card with the item: "How likely do you think you are to win a prize

while playing 100X Multiplier (Colour⁶)?” Responses to this item were provided on a 7-point scale that ranged from 1 (*Extremely unlikely*) to 7 (*Extremely likely*).

Excitement

Participants reported their excitement to play each 100X Multiplier scratch card by responding to the question “How excited would you be to play 100X Multiplier (Colour)?” Responses to this item were provided on a 7-point scale that ranged from 1 (*Not at all excited*) to 7 (*Extremely excited*).

Urge to Gamble

We measured participants’ urge to gamble with the item: “Please indicate your urge to gamble on 100X Multiplier (Colour).” Participants responded to this item using a 7-point scale that ranged from 1 (*No urge to gamble*) to 7 (*Strong urge to gamble*).

Card Purchasing

We measured participants’ hypothetical card purchasing behaviour by presenting them with the following scenario: “Say you had the opportunity to purchase 100X Multiplier (Colour) scratch cards. Each card costs \$5. Hypothetically speaking, how many cards would you like to purchase?” Following this scenario, participants indicated how many 100X Multiplier (Colour) scratch cards they would like to purchase (up to a maximum of ten) using a free-entry text box.

Problem Gambling Severity Index

The Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) is a subscale of the Canadian Problem Gambling Index and provides a reliable and valid measure of problem gambling symptomatology. Participants completed nine items addressing gambling-related harms on a scale from 0 (*Never*) to 3 (*Almost always*). Responses provided to individual items

⁶ The word “Colour” in this and all other question examples was replaced with either the word “Blue” or “Red” during Studies 1 and 2 to indicate the specific scratch card version that participants were being asked to evaluate.

were summed to create a PGSI score for each participant. Scores of 0 on the PGSI indicate non-problem gambling, scores between 1 and 4 indicate low-risk gambling, scores between 5 and 7 indicate moderate-risk gambling, and scores of 8 and above are considered indicative of problem gambling (Currie et al., 2013).

Cognitive Reflection Test

The Cognitive Reflection Test (CRT; Frederick, 2005) was designed to evaluate individuals' ability to suppress an intuitive incorrect response in favour of a deliberative correct answer. Participants were presented with four CRT items taken from Toplak and colleagues (2014) and Primi and colleagues (2016). We calculated the number of correct responses provided by each participant, resulting in a CRT score for each participant that ranged from zero to four.

Design and Procedure

Study 1 featured a within-subjects design in which participants were presented with and evaluated a Push and No Push scratch card game. The order in which these games were presented was counterbalanced as was the colour of these scratch cards (i.e., Blue or Red). Following the presentation of each scratch card game, participants were asked to provide four gambling-related judgments (i.e., likelihood of winning, excitement, urge to gamble, and card purchasing). Participants concluded Study 1 by responding to four CRT, nine PGSI, and three demographic (i.e., age, sex, and scratch card gambling frequency) items.

Results and Discussion

The results of Study 1 can be viewed in Figure 2. We compared participants' judgments of Push and No Push scratch cards using paired-samples *t*-tests. These analyses demonstrated that participants felt more likely to win a prize playing a scratch card that categorized push outcomes as wins ($M = 3.78$, $SD = 1.53$) compared to a scratch card that did not categorize these

outcomes as wins ($M = 2.86$, $SD = 1.36$), $t(389) = 15.92$, $p < .001$, $d = 0.64$. Additionally, participants reported more excitement to play the Push scratch card ($M = 4.26$, $SD = 1.76$) than the No Push scratch card ($M = 3.70$, $SD = 1.82$), $t(389) = 9.06$, $p < .001$, $d = 0.31$. Participants also reported a stronger urge to gamble on the Push scratch card ($M = 3.58$, $SD = 1.86$) compared to the No Push scratch card ($M = 2.99$, $SD = 1.73$), $t(389) = 10.87$, $p < .001$, $d = 0.33$. Finally, participants elected to hypothetically purchase more Push scratch cards ($M = 2.60$, $SD = 2.50$) than No Push scratch cards ($M = 1.92$, $SD = 2.14$), $t(389) = 8.05$, $p < .001$, $d = 0.29$. In summary, categorizing push outcomes as wins was found to increase the appeal of a scratch card game, with participants judging a Push scratch card more favourably relative to an identical scratch card that did not categorize push outcomes as wins.

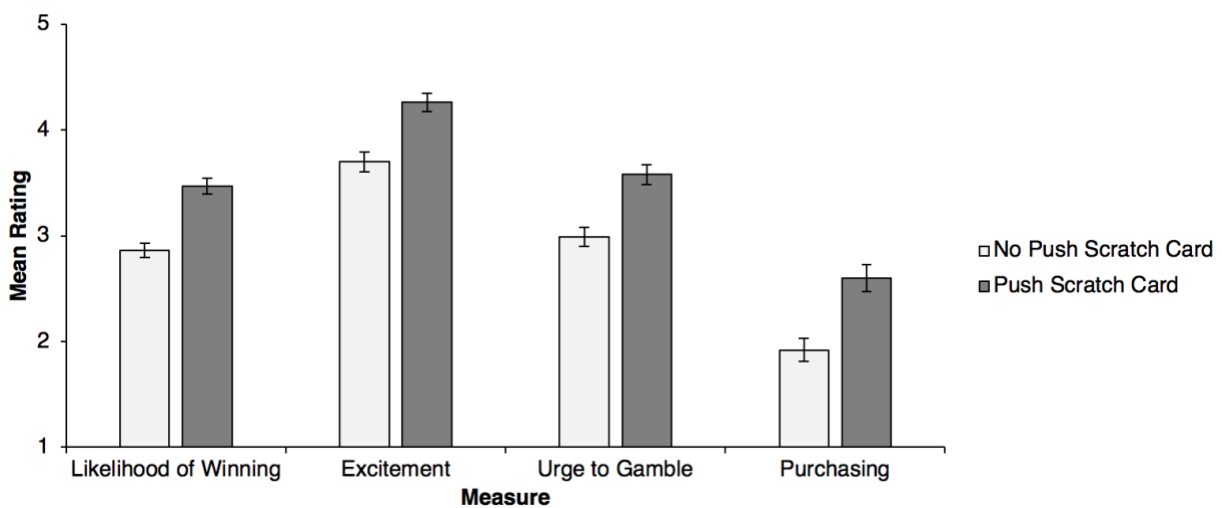


Figure 2. Mean ratings provided to Push and No Push scratch cards for each of the four gambling-related judgments assessed in Study 1. All error bars represent ± 1 SEM.

Exploratory Analyses⁷

Mixed Factorial ANOVAs with Card Type, CRT, and PGSI

⁷ Further exploratory analyses detailing the zero-order correlations between certain variables of interest (i.e., CRT scores, PGSI scores, scratch card gambling frequency, win/loss category judgment) for Studies 1-4 can be viewed in the Supplementary Materials (Part C).

It is possible that the increased appeal of Push scratch cards is especially pronounced for individuals demonstrating a tendency to engage in intuitive—as opposed to reflective—thinking as these individuals are often found to be more susceptible to cognitive biases (Frederick, 2005; Koehler & James, 2010; Oechssler et al., 2009; Toplak et al., 2011) and erroneous beliefs (Pennycook et al., 2012; Pennycook & Rand, 2019). Relatedly, an intuitive thinking style has been linked with problem gambling behaviour and erroneous gambling beliefs (Armstrong et al., 2020; Emond & Marmurek, 2010) as well as the tendency to more favourably judge and more frequently play negative expected value scratch card games (Stange et al., 2018; Walker et al., 2022). Additionally, it is possible that the increased appeal of Push scratch cards is particularly pronounced for those experiencing greater gambling-related harms. Consistent with this prediction, past work finds that individuals who report experiencing more gambling-related harm indicate a greater willingness-to-pay for undiagnostic gambling information (i.e., unclaimed prize information; Stange et al., 2018).

To examine these possibilities, we categorized our sample on the basis of their CRT (Low CRT [CRT score < 3], High CRT [CRT Score = 3 or 4]) and PGSI scores (No Gambling Harm [PGSI score = 0], Some Gambling Harm [PGSI score > 0]). Next, we conducted exploratory mixed factorial ANOVAs for each gambling-related judgment with Card Type (Push, No Push) as a repeated measures factor and CRT (Low CRT, High CRT) and PGSI (No Gambling Harm, Some Gambling Harm) as between-subjects factors. These analyses revealed main effects of CRT, $F(1, 386) > 8.49, p < .004, \eta_p^2 > .021$, and PGSI, $F(1, 386) > 10.94, p < .002, \eta_p^2 > .027$,⁸ for each gambling-related judgment such that low CRT participants and those

⁸ Note that the statistics reported here represent the results of four mixed factorial ANOVAs (one for each gambling-related judgment) with the values reported reflecting the smallest effect observed.

self-reporting some gambling harm judged the presented scratch card games as more likely to win, indicated more excitement to play, a greater urge to gamble, and elected to hypothetically purchase more scratch cards compared to high CRT participants and those reporting no gambling harm. Furthermore, we observed a Card Type by PGSI interaction for urge to gamble, $F(1, 386) = 4.19, p = .041, \eta_p^2 = .011$, and card purchasing judgments, $F(1, 386) = 3.88, p = .050, \eta_p^2 = .010$, suggesting that the increased appeal of Push scratch cards was most prominent among participants experiencing some gambling-related harms. All other interactions did not reach statistical significance (all p 's > .166).

First Trial Comparisons

We assessed the extent to which the increased appeal of the presented Push scratch card was dependent on participants being able to make a comparison with a No Push scratch card. That is, it could be that the impact of categorizing push outcomes as wins is reduced when Push and No Push scratch cards are encountered independently and cannot be compared. As such, we conducted exploratory independent-samples t -tests exclusively analyzing participants' judgments made to the first scratch card presented (either a Push or No Push scratch card). While participants' judgments of likelihood of winning, excitement, and urge to gamble remained more favourable for the Push scratch card, the observed differences were small and failed to reach statistical significance, $t(388) < 0.97, p > .331, d < 0.10$. Therefore, these analyses suggest that the increased appeal of the presented Push scratch card was at least somewhat dependent on participants comparing Push and No Push scratch cards on subsequent trials.⁹

⁹ A reviewer suggested that this finding might indicate a demand effect: After participants have seen both a Push and No Push scratch card, they infer that the experimenter expects them to respond differently to the two card types and then comply with that implied demand. We cannot fully rule out a demand-effect interpretation but note that participants' judgments can be more responsive to variables that are manipulated within- rather than between-subjects for reasons that have nothing to do with demand effects. Hsee and colleagues (Hsee, 1996; Hsee & Zhang, 2010) have shown, for example, in an extensive line of research, that judgments are more likely to respond to

Study 2

Participants in Study 1 displayed a preference for a Push scratch card, such that a scratch card game that categorized push outcomes as wins was judged more favourably than an identical scratch card that did not categorize these outcomes as wins. While differences between the presented Push and No Push scratch cards resulted only from their different categorization of push outcomes, this fact may not have been salient to participants. That is, despite featuring identical payback percentages, participants may have interpreted differences between the calculated odds of winning and prize tables of Push and No Push scratch cards as reflecting true differences between the prize structures of each scratch card game. In Study 2, we sought to replicate the observed preference for Push scratch cards while making more salient the fact that differences between Push and No Push scratch cards were a result of distinct categorizations of push outcomes as opposed to reflecting true differences in the underlying prize structures of these games. Consistent with Study 1, we hypothesized that the categorization of push outcomes as wins would result in more favourable judgments of Push compared to No Push scratch cards. Study 2 also allowed us to assess participants' own categorization of push outcomes, specifically the extent to which they considered these outcomes as wins or losses.

Method

Participants

Three hundred and one US residents were recruited from Amazon Mechanical Turk using the same eligibility criteria as Study 1. Those who participated in Study 1 were restricted from participating in Study 2. We excluded data from five participants who reported responding

variation in attributes that are low in “evaluability” when they are made in joint evaluation (when comparing two targets of judgment that differ on the attribute) than in separate evaluation (when judging a single target on its own). In Hsee’s terminology, the difference between a Push and No Push scratch card might be considered low in evaluability and, as such, most likely to have an impact in a comparative context.

randomly at some point during Study 2, leaving data from 296 participants (48% Female; $M_{\text{age}} = 39.31$, $SD_{\text{age}} = 11.62$) to be analyzed.

Materials

As in Study 1, participants were presented with and made gambling-related judgments about Push and No Push scratch cards. The presentation of these scratch cards and the scratch card information accompanying them was unchanged from Study 1. However, instructions informing participants that the overall odds of winning did (or did not) include push outcomes as “wins” were modified to make the details of these calculations more salient (see Figure 1).

Measures

The measures used in Study 2 were identical to those used in Study 1, with the exception that Study 2 added two items assessing participants’ own categorization of push outcomes.

Category Judgments

Participants were asked to imagine that they paid \$5 for a scratch card and won \$5 playing that scratch card (resulting in a net gain/loss of \$0). They were then asked, in two separate items, to what extent they considered this outcome a win or a loss. Participants indicated how much they considered this outcome a win using a 100-point slider featuring the labels 0 (*Not at all a win*) and 100 (*Very much a win*). Similarly, participants indicated how much they considered this outcome a loss using a 100-point slider featuring the labels 0 (*Not at all a loss*) and 100 (*Very much a loss*). For both items, the slider was initially anchored at the midpoint of the 100-point scale.

Design and Procedure

Study 2 featured the same within-subjects design as Study 1. The procedure of Study 2 also mirrored that of Study 1 with the exception that participants responded to two category judgment items following judgments of a Push and No Push scratch card.

Results and Discussion

The results of Study 2 are displayed in Figure 3. We once again compared participants' judgments of Push and No Push scratch cards using paired-samples *t*-tests. Consistent with the results of Study 1, participants felt more likely to win a prize playing a Push scratch card ($M = 3.72$, $SD = 1.47$) compared to a No Push scratch card ($M = 2.94$, $SD = 1.40$), $t(295) = 10.47$, $p < .001$, $d = 0.54$. Similarly, participants reported more excitement to play the Push scratch card ($M = 4.20$, $SD = 1.65$) than the No Push scratch card ($M = 3.81$, $SD = 1.70$), $t(295) = 5.42$, $p < .001$, $d = 0.23$, and reported a stronger urge to gamble on the Push scratch card ($M = 3.49$, $SD = 1.77$) compared to the No Push scratch card ($M = 3.10$, $SD = 1.69$), $t(295) = 5.62$, $p < .001$, $d = 0.23$. Additionally, participants elected to hypothetically purchase a greater number of Push scratch cards ($M = 2.58$, $SD = 2.41$) than No Push scratch cards ($M = 2.04$, $SD = 2.29$), $t(295) = 4.98$, $p < .001$, $d = 0.23$. Therefore, replicating the results of Study 1, scratch card games were judged more favourably when push outcomes were categorized as wins compared to when these outcomes were not categorized as wins.

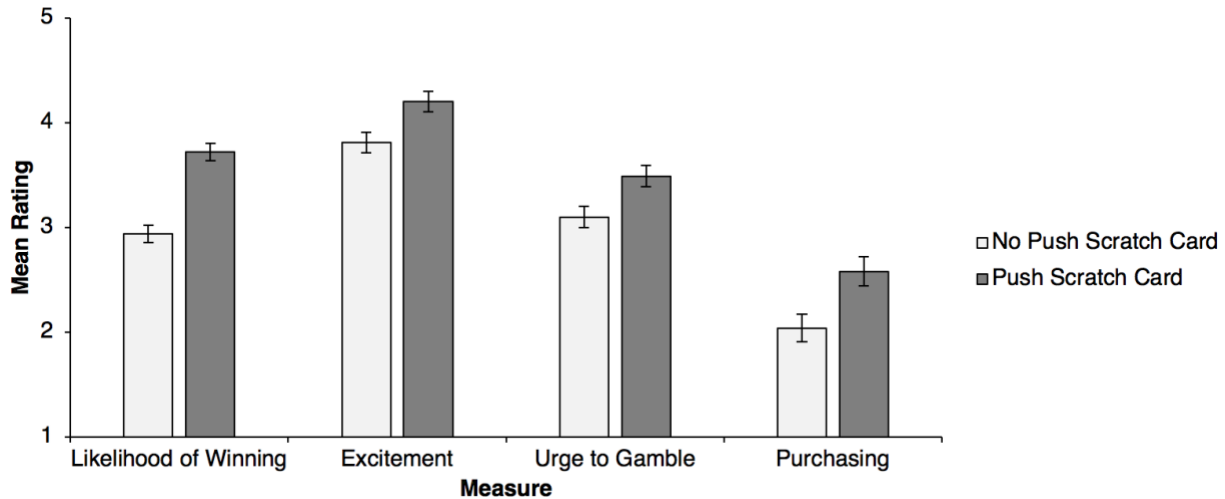


Figure 3. Mean ratings provided to Push and No Push scratch cards for each of the four gambling-related judgments assessed in Study 2. All error bars represent ± 1 SEM.

Study 2 also provided the opportunity to directly assess participants' categorization of push outcomes with two category judgment items. Responses to these items demonstrated that participants categorized push outcomes as more win-like ($M = 40.10$, $SD = 32.71$) than loss-like ($M = 16.26$, $SD = 23.78$), $t(295) = 10.21$, $p < .001$, $d = 0.83$. Nevertheless, participants' responses distinguished push outcomes from wins (and even more so from losses), with one-sample t -tests demonstrating that both category judgments fell significantly below the mid-point value (50) of the presented scale (Win: $t(295) = 5.21$, $p < .001$, $d = 0.30$; Loss: $t(295) = 24.40$, $p < .001$, $d = 1.42$).

Exploratory Analyses

Mixed Factorial ANOVAs with Card Type, CRT, and PGSI

We once again assessed whether participants demonstrating less reflective thinking or self-reporting more gambling-related harms more prominently showed a preference for the presented Push scratch card. As in Study 1, we conducted an exploratory mixed factorial ANOVA for each gambling-related judgment with Card Type (Push, No Push) as a repeated measures factor and CRT (Low CRT, High CRT) and PGSI (No Gambling Harm, Some

Gambling Harm) as between-subjects factors. Consistent with Study 1, we observed main effects of CRT, $F(1, 292) > 9.27, p < .003, \eta_p^2 > .030$, and PGSI, $F(1, 292) > 18.60, p < .001, \eta_p^2 > .059$, for all gambling-related judgments. Specifically, participants scoring lower on the CRT or self-reporting some gambling harm judged scratch cards more favourably than high CRT participants or those reporting no gambling harm. Additionally, we observed a Card Type by PGSI interaction for judgments of excitement, $F(1, 292) = 4.85, p = .028, \eta_p^2 = .016$, such that the preference for Push scratch cards was strongest among participants experiencing some gambling harms. No other interactions were observed (all p 's $> .092$).

First Trial Comparisons

As in Study 1, we conducted independent samples t -tests examining whether a preference for Push scratch cards was observed when exclusively analyzing participants' judgments made to the first scratch card presented. In doing so, we assessed whether Push scratch cards were judged more favourably than No Push scratch cards when both cards were evaluated without knowledge of the remaining scratch card game. These analyses revealed some evidence that Push scratch cards ($M = 3.46, SD = 1.38$) were judged to be more likely to win compared to No Push scratch cards ($M = 3.17, SD = 1.47$), $t(294) = 1.78, p = .076, d = 0.20$, however this result was marginal and the effect size small. Furthermore, while participants' first trial judgments indicated more excitement, urge to gamble, and card purchasing for Push scratch cards, these differences were small and not statistically significant, $t(294) < 0.48, p > .633, d < 0.06$. Thus, consistent with Study 1, the results of Study 2 suggest that the increased appeal of the presented Push scratch card was at least somewhat dependent on participants being exposed to Push and No Push scratch cards across subsequent trials.

Study 3

Studies 1 and 2 had participants judge Push and No Push scratch cards after being provided with information about both games. In Study 3, we altered our methodology to include a simulated gambling task in which participants revealed the outcome of either a single scratch card, or a pair of scratch cards. Specifically, using a between-subjects design, we assessed participants' judgments of a scratch card game after experiencing either a single losing outcome (Loss Condition) or a push outcome followed by a losing outcome (Push Condition). Importantly, in both conditions, participants experienced the same net loss of \$5 and were presented with identical scratch card game information. Thus, Study 3 allowed us to assess whether participants judge scratch cards more favourably when experiencing a push outcome prior to a loss (despite this push outcome failing to impact participants' net monetary outcome). We hypothesized that participants experiencing a push outcome prior to a loss would provide more favourable judgments of the presented scratch card game (e.g., report a stronger urge to gamble).

Method

Participants

Four hundred US residents were recruited from Amazon Mechanical Turk using the same eligibility criteria as Studies 1 and 2. Participants received \$1.00 USD upon completion of an 8-minute online questionnaire. Those who participated in Studies 1 or 2 were restricted from participating in Study 3. We excluded data from six participants who reported responding randomly at some point during Study 3, leaving data from 394 participants (47% Female; $M_{\text{age}} = 41.39$, $SD_{\text{age}} = 13.35$) to be analyzed.

Materials

Scratch Card Game and Information

The scratch card game featured in Study 3 (Cash for a Month) was modeled after a popular scratch card available for sale in our home jurisdiction of Ontario, Canada (see Stange et al., 2016) and differed from that presented in Studies 1 and 2 (100X Multiplier). This change was made in order to accommodate the simulated gambling task used in Study 3, as the “Cash for a Month” scratch card featured a simplified gameplay area (relative to 100X Multiplier). Specifically, the Cash for a Month scratch card featured a matrix of six obscured symbols, which participants sequentially uncovered by progressing through Study 3 (see Figure 4).



Figure 4. Scratch card game and outcomes presented to participants in the Push and Loss conditions of Study 3.

Participants were instructed that to win a prize playing Cash for a Month they must uncover three matching prize symbols (in which they would win the stated prize amount). They were also given information about this fictional scratch card game, including the cost to play (\$5), top prize (\$100), overall odds of winning (1 in 4), and payback percentage (66.46%). These

instructions (and consequently, scratch card game information) did not differ between Push and Loss conditions. However, these conditions did differ with regards to which scratch card outcomes participants experienced (see Figure 4). Study 3 featured two distinct outcomes: a loss (consisting of six non-matching symbols) and a push (consisting of three non-matching symbols and three matching \$5.00 symbols). While loss outcomes resulted in a net loss of \$5, push outcomes produced a \$5 gain equal to the \$5 cost of play resulting in a net gain/loss of \$0.

Measures

The measures used in Study 3 were identical to those used in Study 2, with the exception that Study 3 introduced a new measure of mental accounting as well as an additional category judgment item.

Mental Accounting

We assessed participants' mental accounting of the outcomes experienced during a simulated gambling task by having them indicate their agreement with the statement "I feel like I lost \$5" using a 7-point scale that ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).¹⁰

Category Judgments

Study 3 featured the same two category judgment items administered in Study 2. However, Study 3 also introduced a new category judgment item which asked participants to categorize a push outcome using a 100-point slider that ranged from either 0 (*Very much a loss*) to 100 (*Very much a win*) or 0 (*Very much a win*) to 100 (*Very much a loss*), depending on random assignment.

Design and Procedure

¹⁰ Participants in the Push condition were also presented with four additional mental accounting items that did not appear in the Loss condition (e.g., "I feel like I won \$5 and lost \$5"). These items were collected for reasons peripheral to the main focus of the manuscript and as such are not discussed further.

Study 3 utilized a between-subjects design in which participants were randomly assigned to either a Push or Loss condition which determined the outcomes they experienced during a simulated gambling task (see Figure 4). Specifically, participants in the Loss condition revealed the outcome of a single Cash for a Month scratch card which featured a losing outcome. Conversely, participants in the Push condition revealed the outcome of two Cash for a Month scratch cards, with the first game resulting in a push outcome (i.e., a \$5 win) and the second a loss outcome. Notably, due to the \$5 cost of Cash for a Month scratch cards, participants in both conditions completed the simulated gambling task with a net loss of \$5. Following this simulated gambling task, participants provided four gambling judgments (likelihood of winning, excitement, urge to gamble, and card purchasing) regarding the Cash for a Month scratch card game. Participants concluded Study 3 by completing mental accounting, category judgment, CRT, and PGSI items as well as responding to three demographic questions.

Results and Discussion

The results of Study 3 can be viewed in Figure 5. We compared judgments of the presented Cash for a Month scratch card between Push and Loss conditions using independent samples *t*-tests. Despite participants in both conditions playing the same scratch card game featuring equivalent statistical properties (i.e., payback percentage and odds of winning) and experiencing the same net loss (\$5), participants in the Push condition felt more likely to win a prize while playing Cash for a Month ($M = 3.50, SD = 1.47$) compared to those in the Loss condition ($M = 2.90, SD = 1.45$), $t(392) = 4.07, p < .001, d = 0.41$. Furthermore, participants in the Loss condition agreed more ($M = 5.57, SD = 1.60$) with the statement “I feel like I lost \$5” compared to those in the Push condition ($M = 4.83, SD = 1.90$), $t(392) = 4.17, p < .001, d = 0.42$.

Nevertheless, judgments of excitement, urge to gamble, and card purchasing did not differ between Push and Loss conditions (all p 's > .300, all d 's < 0.12).

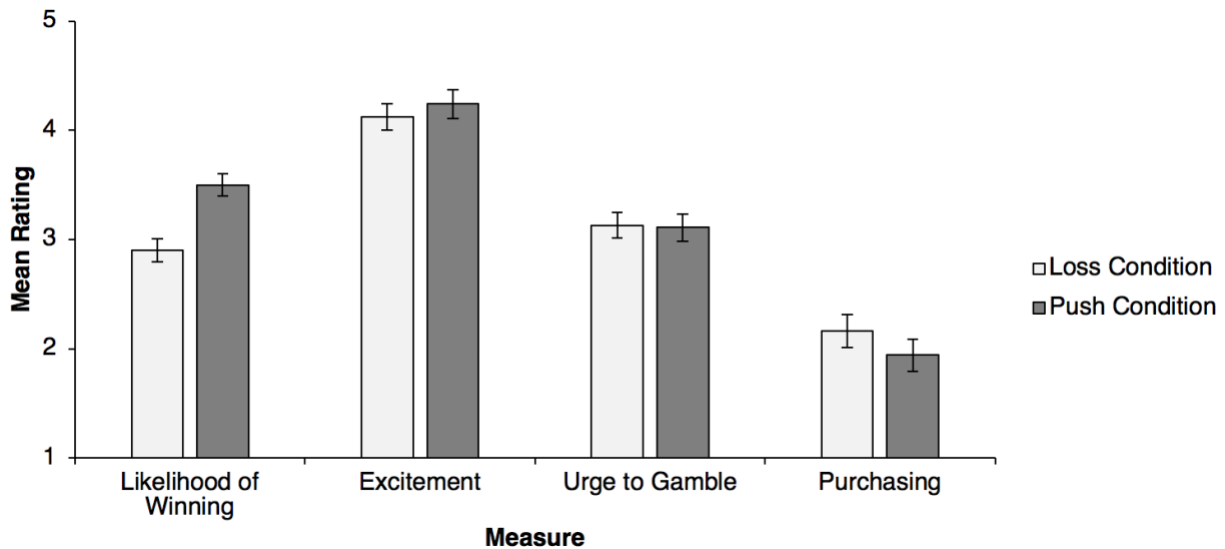


Figure 5. Mean ratings provided by participants in the Push and Loss conditions of Study 3. All error bars represent ± 1 SEM.

Replicating the results of Study 2, participants categorized push outcomes as more win-like ($M = 37.91$, $SD = 32.32$) than loss-like ($M = 23.79$, $SD = 28.88$), $t(393) = 6.19$ $p < .001$, $d = 0.46$. Responses to the win/loss category judgment item were consistent with this finding ($M = 55.29$, $SD = 20.75$), with the mean response categorizing push outcomes as closer to “Very much a win” than “Very much a loss.” The results of a one-sample t -test demonstrated that participants’ mean judgment reliably differed from the mid-point value (50) of this scale, $t(393) = 5.06$, $p < .001$, $d = 0.26$.

Exploratory Analyses

We conducted a 2 (Condition: Push, Loss) x 2 (CRT: Low CRT, High CRT) x 2 (PGSI: No Gambling Harm, Some Gambling Harm) between-subjects ANOVA for each of our main dependent variables (i.e., likelihood of winning, excitement, urge to gamble, and card purchasing). These analyses revealed a main effect of CRT, $F(1, 386) > 4.52$, $p < .035$, $\eta_p^2 >$

.011, for excitement and urge to gamble judgments, demonstrating that participants scoring lower on the CRT reported more excitement to play and a stronger urge to gamble on the presented scratch card game. We also observed a main effect of PGSI for all gambling-related judgments, $F(1, 386) > 8.86, p < .004, \eta_p^2 > .022$, such that participants who reported experiencing some gambling harms judged the presented scratch card game more favourably than those not experiencing these harms. No interactions were observed across any of our four dependent variables (all p 's $> .275$).

Study 4

Study 3 found mixed evidence regarding the impact of push outcomes on participants' gambling-related judgments. That is, while participants in Study 3 felt they were more likely to win a prize and agreed less with the statement "I feel like I lost \$5" when experiencing a push outcome prior to a loss (as opposed to only a loss), excitement, urge to gamble, and card purchasing judgments did not differ between conditions. However, it may be that peoples' subjective feelings (e.g., excitement to play) are primarily impacted at the level of individual outcomes, with the most recent outcome largely determining a gamblers' current excitement and urge to gamble. Given that participants were asked only to provide global evaluations of a scratch card game in Study 3,¹¹ it is unknown how the level of excitement and urge to gamble elicited by push outcomes compares to that of losing (and winning) outcomes. In Study 4, we assessed participants' excitement and urge to gamble following win, push, and loss outcomes within a simulated gambling task. Such an investigation is consistent with prior work examining outcome-based effects in scratch card games (Stange, Graydon et al., 2017; Stange, Grau et al., 2017; Stange & Dixon, 2020). Furthermore, given that recent scratch card outcomes may exert a

¹¹ It is worth noting that, regardless of condition, all scratch card judgments in Study 3 were made directly following a losing outcome.

particularly strong influence on participants' gambling-related judgments, it's possible that the order in which participants experience different outcomes may impact their global evaluations of a scratch card game. To this end, we examined participants' gambling-related judgments in the context of two different outcome sequences, assessing whether differences in the sequence of outcomes experienced (e.g., ending with a push instead of a loss) influences judgments of the presented scratch card game.

Method

Participants

A sample of 402 US residents was recruited from Amazon Mechanical Turk using the same eligibility criteria as Studies 1-3. Participants received \$1.25 USD upon completion of a 12-minute online questionnaire. Those who participated in Studies 1, 2, or 3 were restricted from participating in Study 4. We excluded data from 14 participants who reported responding randomly at some point during Study 4, leaving data from 388 participants (50% Female; $M_{\text{age}} = 41.81$, $SD_{\text{age}} = 12.85$) to be analyzed.

Materials

Study 4 featured the same fictional scratch card game (i.e., Cash for a Month) as Study 3. However, unlike Study 3, the simulated gambling task of Study 4 included a win outcome. For win outcomes, participants uncovered three non-matching symbols and three matching \$10.00 symbols, resulting in a \$10 prize and a net gain of \$5 (on account of the \$5 cost to play). Participants also experienced loss and push outcomes in Study 4, which mirrored those featured in Study 3.

Measures

The measures used in Study 4 mirrored those used in Study 3, with the exception that Study 3 introduced new mental accounting items.

Mental Accounting

Given that participants in the Push and Loss conditions now experienced the same outcomes (i.e., four losses, a win, and a push), we were able to administer more mental accounting items across conditions. Specifically, participants were presented with the following statements: “I feel like I lost \$15,” “I feel like I won \$15 and lost \$15,” “I feel like I won \$15 and lost \$30,” “I feel like I paid \$30 for six scratch cards and won \$15.” Participants were asked to indicate their agreement with each statement on a 7-point scale that ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Additionally, participants were asked “how many wins did you experience playing these six scratch card games?” and responded to this question using a free-entry text box.

Design and Procedure

Study 4 used a between-subjects design in which participants were randomly assigned to either a Push Last or Loss Last condition. In both conditions, participants played six Cash for a Month scratch cards during a simulated gambling task and experienced four losing, one push, and one winning outcome. The key manipulation between Push Last and Loss Last conditions was the order in which these outcomes were experienced. Participants in the Push Last condition experienced a push outcome in the final outcome position (outcome sequence: loss, \$10 win, loss, loss, loss, push) whereas those in the Loss Last condition experienced a loss outcome in this final position (outcome sequence: loss, \$10 win, loss, push, loss, loss). Nevertheless, participants in both conditions completed the simulated gambling task with a net loss of \$15. After revealing each Cash for a Month outcome, participants indicated their current level of excitement and urge

to gamble. After revealing all six scratch card outcomes, participants provided four gambling judgments (likelihood of winning, excitement, urge to gamble, and card purchasing) about the Cash for a Month scratch card game as a whole. As in Study 3, participants concluded Study 4 by responding to mental accounting, category judgment, CRT, PGSI, and demographic items.

Data Preparation

We excluded participants ($n = 51$) who failed to correctly respond to a comprehension check question asking them to correctly identify how a prize is won while playing Cash for a Month scratch cards. Notably, excluding these participants did not change the interpretation of any of the significance tests reported below. Furthermore, we averaged participants' responses for outcome-level judgments (i.e., excitement and urge to gamble) made following the four experienced loss outcomes and used these averages for all analyses featuring these judgments.

Results and Discussion

We conducted independent samples t -tests comparing participants' gambling judgments between Push Last and Loss Last conditions. These analyses revealed no reliable differences (all p 's $> .658$, all d 's < 0.06) for any of our four gambling judgments (likelihood of winning, excitement, urge to gamble, and card purchasing). Therefore, randomly assigning participants to experience different outcome sequences did not impact their judgments of the presented scratch card game. However, paired samples t -tests assessing participants' outcome-level judgments revealed that participants reported more excitement following a push outcome ($M = 3.80$, $SD = 1.69$) compared to loss outcomes ($M = 2.89$, $SD = 1.55$), $t(336) = 10.67$, $p < .001$, $d = 0.56$ (see Figure 6). Similarly, participants reported a stronger urge to gamble after experiencing a push outcome ($M = 3.19$, $SD = 1.71$) compared to loss outcomes ($M = 2.88$, $SD = 1.62$), $t(336) = 5.33$, $p < .001$, $d = 0.19$. Furthermore, participants reported more excitement following a win outcome

($M = 4.72$, $SD = 1.55$), than a push outcome, $t(336) = 14.52$, $p < .001$, $d = 0.57$, or loss outcomes, $t(336) = 21.04$, $p < .001$, $d = 1.18$. Relatedly, participants also reported a stronger urge to gamble following a win outcome ($M = 3.86$, $SD = 1.76$), compared to a push outcome, $t(336) = 11.93$, $p < .001$, $d = 0.39$, or loss outcomes, $t(336) = 15.07$, $p < .001$, $d = 0.58$.

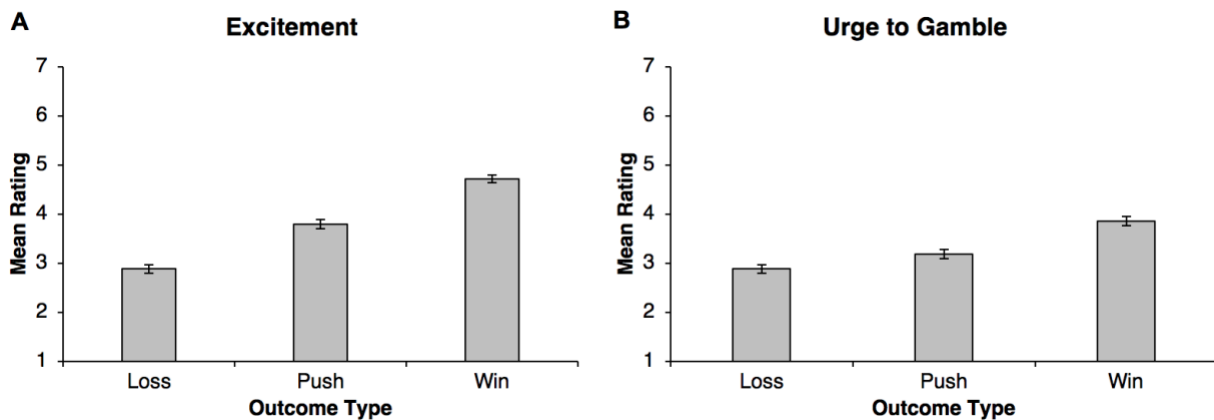


Figure 6. Mean excitement (Panel A) and urge to gamble (Panel B) ratings provided by participants following loss, push, and win outcomes in Study 4. All error bars represent ± 1 SEM.

Participants in the Push Last condition agreed more ($M = 4.96$, $SD = 1.97$) with the statement “I feel like I paid \$30 for six scratch cards and won \$15” compared to those in the Loss Last condition ($M = 4.50$, $SD = 2.12$), $t(335) = 2.05$, $p = .041$, $d = 0.23$. We observed no differences in agreement between Push Last and Loss Last conditions for all other mental accounting items (all p 's $> .078$ and all d 's < 0.20). Consistent with the results of Studies 2 and 3, participants categorized push outcomes as more win-like ($M = 37.05$, $SD = 31.99$) than loss-like ($M = 24.25$, $SD = 29.16$), $t(336) = 5.55$, $p < .001$, $d = 0.42$. Responses to the win/loss category judgment were consistent with this finding ($M = 53.84$, $SD = 19.68$), with the mean response categorizing push outcomes as closer to a win than a loss. The results of a one-sample t -test demonstrated that participants' mean judgment reliably differed from the mid-point value (50) of this scale, $t(336) = 3.58$, $p < .001$, $d = 0.20$.

Exploratory Analyses

As in Study 3, we conducted a 2 (Condition: Push Last, Loss Last) x 2 (CRT: Low CRT, High CRT) x 2 (PGSI: No Gambling Harm, Some Gambling Harm) between-subjects ANOVA for each gambling-related judgment (i.e., likelihood of winning, excitement, urge to gamble, and card purchasing). These analyses revealed a main effect of PGSI for excitement, urge to gamble, and card purchasing judgments, $F(1, 329) > 5.41, p < .021, \eta_p^2 > .016$. Thus, participants reporting some gambling harm felt more excited to play, a stronger urge to gamble, and elected to hypothetically purchase more Cash for a Month scratch cards than those reporting no gambling harm. Furthermore, we observed a Condition by PGSI interaction for card purchasing judgments, $F(1, 329) = 5.85, p = .016, \eta_p^2 = .017$, with participants reporting some gambling harm purchasing more scratch cards in the Loss Last condition than the Push Last condition, with the reverse being true of participants reporting no gambling harm. No main effects of CRT (all p 's $> .274$) or other interactions were observed (all p 's $> .113$).

General Discussion

Pushes represent a frequent scratch card outcome that is commonly categorized as a win by lottery operators (despite the fact that they do not result in net monetary gain). The present study assessed the impact of push outcomes (and their categorization as wins) on participants' judgments of scratch card games. In Studies 1 and 2, we find evidence that the categorization of push outcomes as wins increases the appeal of a scratch card game, at least when compared to a scratch card that does not categorize these outcomes as wins. Specifically, participants felt more likely to win, more excited to play, a stronger urge to gamble, and elected to hypothetically purchase a greater number of scratch cards when push outcomes were categorized as wins. Notably, this preference for "Push" scratch cards was observed despite both Push and No Push scratch cards featuring identical payback percentages and prize structures. In Studies 3 and 4, we

examined the influence of participants' *experience* of a push outcome on their judgments of a scratch card game. Here, we find that push outcomes elicit more excitement and urge to gamble than losses but less excitement and urge to gamble than wins (Study 4). Additionally, we find that participants felt more likely to win and agreed less with the statement "I feel like I lost \$5" when experiencing a push outcome prior to a loss (as opposed to only a loss; Study 3). However, reliable differences were not observed for judgments of excitement, urge to gamble, or card purchasing.

While lottery operators commonly categorize push outcomes as wins, it is unclear whether gamblers endorse a similar categorization. In Studies 2-4, we assessed participants' categorization of push outcomes by having them judge the extent to which a push outcome resembled a win and a loss. While participants categorized pushes as more win-like than loss-like, the average categorization of these outcomes was closer to "*Not at all a win*" than "*Very much a win*." Therefore, consistent with their neutral monetary status, participants classified push outcomes as somewhat distinct from both winning and losing outcomes.

The categorization of push outcomes as wins impacts scratch card game information, most notably inflating information detailing a gamblers' odds of winning. This information is commonly provided by lottery operators and thus may help guide gamblers' perceptions of scratch card games. To the extent that categorizing push outcomes as wins increases the presented odds of winning, this categorization may increase the appeal of scratch card games. Consistent with this possibility, participants judged a scratch card categorizing push outcomes as wins more favourably than an identical scratch card that did not categorize these outcomes as wins. Specifically, Push scratch cards were judged as more likely to win, more exciting to play, elicited a stronger urge to gamble, and were purchased more often in a hypothetical card

purchasing task. This preference was observed despite participants being informed as to whether the provided scratch card game information categorized push outcomes as wins or whether these outcomes were present yet not included as prizes. Therefore, Studies 1 and 2 suggest that the decision to categorize push outcomes as wins can bias peoples' judgments of a scratch card game, even when this categorization is made salient. This finding is consistent with previous work demonstrating peoples' non-optimal use of scratch card game information (Horn et al., 2021; Muda et al., 2020; Stange et al., 2021; Walker et al., 2018, 2019). Thus, despite lottery operators presenting information that allows gamblers to generate informed perceptions of scratch card games, gamblers may fail to properly utilize this information to form accurate impressions and preferences. In the case of push outcomes, the failure to consider the impact of push outcomes on readily available scratch card game information may lead gamblers to overestimate their odds of monetary gain, increasing the appeal of scratch cards.

Exploratory analyses exclusively assessing participants' first trial judgments show that, absent the comparison between scratch cards, judgments of Push and No Push scratch cards did not reliably differ. Therefore, the categorization of push outcomes as wins did not lead to more favourable judgments of a scratch card game when both Push and No Push scratch cards were judged without knowledge of the other scratch card. Future work should further investigate judgments of Push and No Push scratch cards using between-subjects designs. While no reliable between-subject differences were observed in Studies 1 and 2, Push scratch cards were nevertheless judged more favourably than No Push scratch cards for seven out of eight comparisons (i.e., all but card purchasing judgments in Study 1). Furthermore, it is possible that the use of fictitious scratch card games and the limited number of participants experiencing gambling-related harms or purchasing scratch cards frequently in our sample served to mitigate

between-subject differences. As such, future research should assess whether the categorization of push outcomes as wins increases the appeal of scratch card games in real-world gambling environments, perhaps specifically for scratch card gamblers who purchase these products frequently or who are experiencing gambling-related harms.

Past work has demonstrated that the monetary value of a gambling outcome does not always align with how an outcome is experienced (Graydon et al., 2019; Stange, Grau et al., 2017; Stange, Graydon et al., 2017). Nevertheless, commensurate with their monetary value, push outcomes elicited more excitement and urge to gamble than losses and less excitement and urge to gamble than wins. Therefore, the level of excitement and urge to gamble elicited by push outcomes can be distinguished from that elicited by winning and losing outcomes, at least in a simulated gambling task. Additionally, in Study 3, we find some evidence that experiencing a push outcome prior to a \$5 loss results in more favourable judgments of a scratch card game. Specifically, participants experiencing a push outcome felt more likely to win and agreed less with the statement “I feel like I lost \$5” compared to those only experiencing a loss. Therefore, independent of the impact on scratch card game information, the *experience* of a push outcome may lead gamblers to overestimate their odds of obtaining a winning outcome and underestimate their past monetary losses. An alternative explanation of these findings is that differences between Push and Loss conditions did not reflect different estimates of the likelihood of monetary gain but rather different estimates of the likelihood of obtaining a prize (for which push outcomes may have been considered). Likewise, although participants in the Push condition agreed less with the statement “I feel like I lost \$5,” it is unclear exactly what monetary outcome they perceived. Future work should assess whether the inclusion of push outcomes leads

gamblers to over-estimate their chances of future monetary gain and underestimate their previous monetary losses, as suggested here.

Limitations

A limitation of the present investigation is the hypothetical nature of the scratch card gambling scenarios used. For example, in Studies 3 and 4, participants were asked to judge a scratch card game that they “played” in a simulated gambling task. As such, the outcomes experienced during this task were of no financial consequence to participants. Additionally, the method of revealing the outcome of each scratch card (i.e., progressing through an online survey) may have felt artificial to participants compared to removing an opaque layer of a physical scratch card game. Future studies should investigate the influence of push outcomes, both with regards to their impact on scratch card information and the experience of obtaining these outcomes while playing a scratch card game, in real-world gambling scenarios featuring actual gains and losses.

From a harm reduction standpoint, the impact of push outcomes on the gambling judgments and behaviours of people experiencing gambling-related harms and engaging with scratch card games frequently is of primary importance. In the present study, we conducted exploratory analyses examining differences between the judgments of participants reporting no (PGSI score = 0) or some (PGSI score > 0) gambling-related harms. These analyses demonstrated that those self-reporting some gambling-related harms tended to judge the presented scratch cards more favourably and at times were more susceptible to the influence of push outcomes, whether this be through their impact on scratch card information or their inclusion in the outcome sequence of a simulated gambling task. However, while 36.72% of our total sample reported experiencing some gambling-related harms, only 5.11% of participants’

responses to PGSI items were indicative of problem gambling behaviour (based on Currie et al., 2013). Similarly, only 13.08% of our sample reported playing scratch card games more than 10 times in the past 12 months. Therefore, the present investigation is limited in terms of making strong conclusions about the impact of push outcomes from a harm reduction perspective. As such, future work should investigate the impact of push outcomes on the gambling judgments and behaviours of frequent scratch card gamblers, as well as those currently experiencing gambling-related harms.

Conclusion

Push outcomes represent neutral outcomes that are frequently experienced by scratch card gamblers. These outcomes are categorized by lottery operators as wins, despite the fact that they result in no net monetary gain for the gambler. This categorization has consequences for information presented alongside scratch card games. Most notably, the categorization of push outcomes as wins increases a scratch card's calculated odds of winning, potentially increasing the appeal of these games. Across four studies, we conducted an initial investigation of push outcomes as a characteristic of scratch cards that bias gamblers' perceptions of these games. To this end we found mixed evidence. For example, push outcomes were shown to elicit less excitement and urge to gamble compared to wins but more excitement and urge to gamble than losses. Furthermore, exploratory first trial comparisons failed to show reliable differences between judgments of Push and No Push scratch cards. Conversely, participants showed a clear preference for Push scratch cards when their judgments of both Push and No Push scratch cards were considered. Moreover, participants experiencing a push outcome prior to a loss felt more likely to win playing a scratch card game and provided less endorsement of a statement describing their true net loss. Overall, our findings demonstrate that push outcomes represent an

important (and frequently experienced) scratch card outcome that can have an appreciable impact on gamblers' experiences and behaviours.

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