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The Activation of Reward Versus Relief Gambling Outcome Expectancies in Regular Gamblers: Relations to Gambling Motives

Sunghwan Yi · Melissa Stewart · Pamela Collins · Sherry H. Stewart

Abstract Gambling outcome expectancies refer to the anticipated outcomes that gamblers expect will occur from gambling (i.e., learned memory associations between gambling cues, behavior, and outcomes). Unlike previous approaches to gambling outcome expectancies that have predominantly focused on the valence of outcome expectancies (positive vs. negative), the present study investigated two specific types of positive gambling outcome expectancies: reward and relief gambling outcome expectancies. Specifically, the primary purpose of the current research was to examine whether gambling prime exposure activates different types of positive gambling outcome expectancies in enhancement- versus coping-motivated gamblers. Fifty adult, community-recruited regular gamblers performed a reaction time (RT) task and completed a self-report expectancy scale, both designed to assess reward and relief gambling outcome expectancies. They also completed the Gambling Motives Questionnaire (Stewart and Zack in Addiction 103:1110–1117 2008) to assess their levels of coping and enhancement motives for gambling. As hypothesized, reward gambling outcome expectancies were more strongly activated by gambling prime exposure than relief outcome expectancies on the RT task for gamblers with high enhancement motives. On the self-report expectancy measure, high enhancement-motivated gamblers endorsed stronger reward gambling outcome expectancies than low enhancement-motivated gamblers, and high coping-motivated gamblers endorsed stronger relief gambling outcome expectancies than low coping-motivated gamblers. Results suggest that automatic activation of reward gambling outcome expectancies is particularly strong for high enhancement-motivated gamblers. Possible reasons

S. Yi (✉)
Department of Marketing and Consumer Studies, University of Guelph, Guelph, Canada
e-mail: syi@uoguelph.ca

M. Stewart · P. Collins
Department of Psychology, Dalhousie University, Halifax, Canada

S. H. Stewart
Department of Psychiatry and Psychology, Dalhousie University, Halifax, Canada

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for the failure to observe an association between coping gambling motives and automatic relief gambling outcome expectancies are discussed.

Keywords Gambling outcome expectancies · Gambling motives · Implicit measures · Response time

Introduction

Gambling outcome expectancies refer to the anticipated outcomes that gamblers expect will occur from gambling (Stewart and Wall 2005; Stewart et al. 2013). Previous research on gambling outcome expectancies has predominantly focused on the valence of expectancies (i.e., positive vs. negative). For example, Gillespie et al. (2007) developed a self-report measure of gambling outcome expectancies, which comprises three positive expectancy subscales (i.e., enjoyment/arousal, self-enhancement, and money) and two negative expectancy subscales [i.e., over-involvement and (negative) emotional impact]. Similarly, Wickwire et al. (2010) developed a self-report measure of youth gambling outcome expectancies, which consists of two positive expectancy subscales (i.e., positive self-evaluation and monetary gain) and three negative expectancy scales (i.e., negative affect, negative social consequences, and parental disapproval).

One drawback of focusing simply on the valence of gambling outcome expectancies is that it does not allow for an assessment of different types of positively valenced affective outcome expectancies that differ on other dimensions. In particular, although excitement and relaxation are both positively valenced affective outcome expectancies of gambling, they involve two very different types of reinforcement. Reward gambling expectancies refer to anticipation of the addition of desired mood states from gambling (positively reinforcing consequences such as enjoyment or pleasure) whereas relief gambling outcome expectancies refer to anticipation of the removal of undesirable mood states (negatively reinforcing consequences such as feeling less restless or less irritable).

Another construct that involves the distinction between affective positive and negative reinforcement is the gambling motives construct (i.e., reasons that people hold for gambling). In the gambling motives literature, the distinction has been made between affective gambling motives involving positive and negative reinforcement, which have been labelled enhancement and coping motives, respectively (Stewart and Zack 2008). Enhancement motives involve the motivation to increase positive emotions via gambling, whereas coping motives involve the motivation to reduce negative emotions via gambling. For example, some people primarily gamble in order to enhance pleasure (i.e., enhancement motives), whereas others primarily gamble in order to escape anxiety or sadness (i.e., coping motives). Given that enhancement motivated gamblers gamble to achieve positive affective states, theoretically, they should endorse strong beliefs that gambling can lead to the positively reinforcing outcome they desire. Therefore, reward Gambling outcome expectancies should be firmly endorsed by individuals with strong enhancement motives. Conversely, given that coping motivated gamblers gamble to alleviate or avoid negative affective states, theoretically, they should endorse strong beliefs that gambling can lead to the negatively reinforcing outcome they desire. Therefore, relief Gambling outcome expectancies should be firmly endorsed by individuals with strong coping motives.

In fact, these latter hypotheses concerning relations between gambling motives and Gambling outcome expectancies were tested by Stewart and Wall (2005), who also developed a self-report measure of reward and relief gambling outcome expectancies.

Stewart and Wall (2005) found that relief outcome expectancies were more strongly endorsed by a cluster of gamblers with high coping motives than by a cluster of individuals with high enhancement motives only and a cluster of those with low coping and low enhancement motives. Additionally, reward gambling outcome expectancies were more strongly endorsed by the clusters of gamblers with high enhancement motives than by the cluster with low coping and low enhancement motives. Furthermore, in a recent controlled lab experiment by Shead and Hodgins (2009), gamblers with high relief gambling outcome expectancies and low reward gambling outcome expectancies on Stewart and Wall's (2005) scale made a significantly greater number of bets after completing a challenging task designed to prime relief of negative affect than after completing a control task designed to prime augmentation of positive affect. Based on these findings, it is likely that relief gambling outcome expectancies are more strongly held by gamblers with high versus low coping motives. Similarly, it is likely that reward gambling outcome expectancies are more strongly held by gamblers with high versus low enhancement motives.

Another limitation of previous research on gambling outcome expectancies is an over-reliance on self-report measures. Although self-report measures offer a number of advantages, they are based on the assumption that respondents have conscious access to all their anticipated outcomes of gambling and that they are willing to report them truthfully and accurately to researchers. These limitations can be overcome by assessing gambling outcome expectancies using indirect measures (De Houwer 2006). As with alcohol outcome expectancies, gambling outcome expectancies are represented in the associative memory network (e.g., Goldman et al. 1999) and thus can be operationalized as the speed with which the concept of gambling facilitates the activation of the gambling outcome expectancies in memory. For example, individuals who have very strong reward gambling outcome expectancies should experience faster activation of positive reinforcement-related affective state concepts (e.g., enjoyment, excitement) when primed with gambling-related images than those with weak gambling outcome expectancies. The speed of activation of affective state concepts following brief exposure to gambling-related images can be measured with millisecond accuracy with response time (RT) technique-based computer software. Indirect measures based on RT techniques have been successfully utilized to assess selective attention to gambling stimuli (see Evans and Coventry 2006; Zack and Poulos 2006) although they have rarely been used to measure gambling outcome expectancies in the literature to date (for a notable exception, see Stewart et al. 2013).

Research Questions and Hypotheses

The primary purpose of the current study was to investigate the automatic activation of reward and relief gambling outcome expectancies in gamblers with strong enhancement and coping motives, respectively, using an RT-based indirect measure of gambling outcome expectancies. Facilitated activation of positive affective states involving positive (or negative) reinforcement following exposure to gambling primes can be used to index implicit reward (or relief) gambling outcome expectancies. Therefore, we hypothesized the following (see Table 1 for a summary of H1 and H2):

H1 High enhancement-motivated gamblers (but not low enhancement-motivated gamblers) would show strong implicit associations of gambling with reward outcomes as indexed by faster RTs to reward targets than relief targets when preceded by gambling (but not control) cues.

Table 1 Summary of hypotheses for the activation of RT-based reward and relief gambling outcome expectancies (i.e., H1 and H2)

Reward targets	Relief targets
(a) Prediction for individuals with high versus low enhancement motivation (EM) for gambling	
High EM gamblers	
Gambling prime	<
Non-gambling prime	=
Low EM gamblers	
Gambling prime	=
Non-gambling prime	=
(b) Prediction for individuals with high versus low coping motivation (CM) for gambling	
High CM gamblers	
Gambling prime	>
Non-gambling prime	=
Low CM gamblers	
Gambling prime	=
Non-gambling prime	=

H2 High coping motivated-gamblers (but not low coping-motivated gamblers) would show strong implicit associations of gambling with relief outcomes as indexed by faster RTs to relief targets than reward targets when preceded by gambling (but not control) cues.

An additional purpose of this study was to explore whether a comparable relationship holds between gambling motives and *self-reported* gambling outcome expectancies. Specifically, the current research aimed to investigate the extent to which individuals high in a particular gambling motive are able to consciously access their long-term memory and explicitly endorse the type of gambling outcome expectancies that is conceptually related to the motive more strongly than those gamblers with low levels of that gambling motive. Thus, we hypothesized the following (See Table 2 for a summary of H3 and H4):

H3 High enhancement-motivated gamblers would endorse stronger self-reported reward gambling outcome expectancies than low enhancement-motivated gamblers. In contrast, there would not be significant differences in the endorsement of self-reported relief gambling outcome expectancies between high versus low enhancement-motivated gamblers.

H4 High coping-motivated gamblers would endorse stronger self-reported relief gambling outcome expectancies than low coping-motivated gamblers. In contrast, there would not be significant differences in the endorsement of self-reported reward gambling outcome expectancies between high versus low coping-motivated gamblers.

Methods

Participants

Participants consisted of 50 adult gamblers (30 males and 20 females) who ranged in age from 19 to 59 years ($M = 31$, $SD = 11.9$). Participants were recruited through

Table 2 Summary of hypotheses for the endorsement of self-report reward and relief gambling outcome expectancies (i.e., H3 and H4)

High EM gamblers	Low EM gamblers
(a) Prediction for individuals with high versus low enhancement motivation (EM) for gambling	
Reward GOE	>
Relief GOE	=
High CM gamblers	**Low CM gamblers**
(b) Prediction for individuals with high versus low coping motivation (CM) for gambling	
Reward GOE	=
Relief GOE	>

advertisements posted on university bulletin boards, as well as in local newspapers and classified websites. Twenty-one participants were recruited from the Halifax Regional Municipality in Nova Scotia, Canada, while the remaining 29 participants were recruited from the greater Guelph area in Ontario, Canada. Upon leaving their contact information, potential participants were contacted by telephone and screened to determine eligibility.

In order to be eligible to participate, individuals had to have gambled at a casino or online at least three times over the past 2 months. As RT measures require extremely rapid responses to English words, only individuals whose native language was English were eligible to participate. Individuals were excluded if they were currently attempting to quit gambling or receiving treatment for problematic gambling given ethical concerns that exposure to gambling-related cues on the RT task could theoretically trigger a return to problem gambling. Participants were compensated $30 for their participation in the study.

Using the Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index (CPGI; Ferris and Wynne 2001), participants consisted of three non-problem gamblers, six low-risk gamblers, 32 moderate-risk gamblers, and nine high-risk/problem gamblers. Total scores on the PGSI ranged from 0 to 25 ($M = 5.80$; $SD = 4.82$). In terms of gambling behavior reported on the Gambling Timeline Followback (G-TLFB; Weinstock et al. 2004), participants reported spending between 3 and 240 h ($M = 42$, $SD = 52$) gambling over the 3 months prior to participating in the study. The amount of money participants risked over the 3 months prior to completing the study ranged from $46 to $10,230 ($M = \$1,277$, $SD = \$1,670$).

On the CPGI, participants reported engaging in a range of gambling activities during the 3 months prior to taking part in the study, including casino gambling (e.g., slots, blackjack, poker, roulette), video lottery terminal gambling, sports betting (e.g., Proline, hockey pools), online gambling, card games with friends, and raffle and lottery tickets.

Materials

Problem Gambling Severity

The nine-item PGSI scale of the CPGI (Ferris and Wynne 2001) was used to assess the presence and severity of participants' gambling problems for sample description purposes. The PGSI contains five items that assess problem gambling behaviour (e.g., "Have you bet

more than you could really afford to lose?") and four items addressing the negative consequences of gambling (e.g., "Has gambling caused you any health problems, including stress or anxiety?"). For each item, respondents indicated the frequency at which they have engaged in the behaviour or experienced the given consequence in the last 12 months using a four-point scale ranging from 0 (*never*) to 3 (*almost always*). Participants with a total score of 0 are classified as 'non-problem' gamblers, those with a total score ranging from 1 to 2 are classified as 'low-risk' gamblers, those with a total score ranging from 3 to 7 are classified as 'moderate-risk' gamblers, and those with a total score of 8 or more are classified as 'high-risk or problem' gamblers. Previous research (e.g., Ferris and Wynne 2001) indicates that the PGSI has good psychometric properties. The PGSI demonstrated good internal consistency in this study ($\alpha = .89$).

Gambling Motives

The Gambling Motives Questionnaire (GMQ: Stewart and Zack 2008) was used to assess enhancement and coping motives for gambling. The GMQ is a 15-item scale, designed to assess the frequency of gambling for enhancement, coping, and social reasons (5 items for each motive). Relative frequency of gambling for each indicated reason was rated using a four-point scale ranging from 1 (*almost never/never*) to four (*almost always*). The two subscales of interest in the present study (coping and enhancement) were calculated by summing ratings of the items pertaining to each subscale. The enhancement and coping motive subscales showed good internal consistencies in the present study (α's $= .88$ and .84, respectively) and were moderately inter-correlated ($r = .38$, $p < .01$).

Self-reported Reward and Relief Gambling Outcome Expectancies

Reward and relief gambling outcome expectancies were assessed using Stewart and Wall's (2005) 18-item Gambling Affect Expectancy Questionnaire (GAEQ)[1]. This scale was adapted for gambling from the reward and relief expectancy scales for alcohol used by Birch et al. (2004) which in turn were drawn from a longer measure developed by Singleton et al. (1995) in the alcohol area. Participants were asked the extent to which they agree or disagree with 18 statements that each outcome would occur if they gambled right now on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Reward gambling outcome expectancies were assessed with nine items focused on positive reinforcement or excitement associated with gambling (e.g., "Gambling would make things seem just perfect"), while relief gambling outcome expectancies were assessed with nine items focused on negative reinforcement or reduction of negative affect associated with gambling (e.g., "I would feel less irritable if I gambled now"). This scale showed good psychometric properties in the original Stewart and Wall (2005) study. The two subscales were created by summing ratings of the nine items pertaining to each subscale. The GAEQ subscales demonstrated excellent reliability ($\alpha = .90$ and .94, respectively) in the present study. The reward outcome expectancies subscale was strongly correlated with the relief outcome expectancies scale ($r = .72$, $p < .001$).

[1] The GAEQ scale was originally reported as the Gambling Expectancy Questionnaire (GEQ) in Stewart and Wall (2005) and in Shead and Hodgins (2009). We made this change of names to avoid confusion with Gillespie et al.'s (Gillespie et al. 2007) Gambling Expectancy Questionnaire (GEQ).

Reward Versus Relief Gambling Outcome Expectancy RT Task

Adapted from the classic affective priming task (Fazio et al. 1995), this author-constructed RT-based task was used to assess the activation of reward versus relief gambling outcome expectancies. The task was designed to measure how quickly individuals respond to reward and relief gambling outcome expectancy words (i.e., targets) immediately after being primed by gambling versus control category (i.e., track and field[2]) pictures. The task was implemented via Empirisoft Inc.'s DirectRT experimental psychology software (Jarvis 2010). The target word exemplars were selected based on a review of established self-report measures of GEQs (e.g., Gillespie et al. 2007; Stewart and Wall 2005), as well as synonyms of words from these measures. In total, there were ten reward outcome expectancy words and ten relief outcome expectancy words used as targets (see Table 3). In addition, ten gambling-related and ten non-gambling-related (i.e., track and field) pictures, which had been previously used in Stewart et al. (2013), were used as primes. The RT task began with one block of four practice trials, and two blocks with 20 test trials each (total number of trials = 44). The stimuli for practice trials were different than those presented during the test trials. Blocks were presented to participants as one continuous series. Each outcome expectancy target word was presented twice: once preceded by a gambling prime picture, and once preceded by a non-gambling prime picture. The order of primes and targets within each block was counterbalanced across participants. Overall, the RT task used in the study was the same as the one used in Stewart et al. (2013) except that the gambling outcome expectancy words used as targets represented reward and relief rather than positive and negative affect.

Each trial started with the presentation of a either a gambling-related or non-gambling-related (i.e., track and field) picture in the centre of the screen which lasted for 200 ms. This was followed by a blank screen (100 ms), then by the presentation of a target word (in the centre of the screen as well) that signified either reward expectancies (e.g., excitement) or relief expectancies (e.g., relaxed). Participants were asked to respond to words that had a relief connotation by clicking the "Z" key on the keyboard, and to respond to words that had a reward connotation by clicking the "/" key. The length of the inter-trial interval was 1,000 ms. Participants were told that they needed to pay attention to the pictures presented on the screen as their memory for the pictures might be tested later. Participants were also informed that the first four trials were practice.

Procedure[3]

Upon arrival at the laboratory, participants provided informed consent. Participants then engaged in the outcome expectancy RT task. Upon completion of this task, participants completed a series of self-report questionnaires, including Stewart and Wall's (2005) GAEQ and Stewart and Zack's (2008) GMQ. Participants were then debriefed and compensated $30 for their time and effort.

[2] We chose track and field as the control category because it is an activity that is similar to gambling in both size and complexity. Specifically, both gambling and track and field are broad categories that encompass a variety of different activities. It is also an activity that could theoretically be associated with both reward and relief outcomes.

[3] Only procedures relevant to the current paper are described in this section.

Table 3 Word (target) exemplars used in the gambling outcome expectancy RT task

Reward outcome expectancy words	Relief outcome expectancy words
Fun	Relaxed
Energized	Relieved
Excited	Reassured
Overjoyed	Calmed
Ecstatic	Soothed
Thrilled	Contentment
Pleasurable	Restful
Stimulated	Stress-free
Delighted	Comforted
Cheerful	At ease

For the practice trials, reward expectancy words consisted of: 'aroused' and 'exhilarated', whereas relief expectancy words consisted of 'tranquil' and 'quieted'

Design and Analytic Plan

For the RT measure, we used a 2 [gambling motives group: high or low enhancement (or coping)] by two [prime type: gambling vs. control (i.e., track and field) images] by 2 (target type: reward vs. relief outcome words) mixed factorial design. The gambling motives group variable was a between-subjects factor whereas the prime type and target type variables were within-subject factors. For the self-report expectancies measure, we used a 2 (gambling motives group) $\times$ 2 (GAEQ subscale: reward or relief) mixed factorial design. Again, the motives group variable was a between-subjects factor whereas the GAEQ subscale was a within-subjects factor.

As enhancement and coping motive scores were moderately inter-correlated and obtained from each participant, we controlled for the effect of coping motives when we analyzed the effect of enhancement motives group and vice versa in all analyses through the use of analyses of covariance (ANCOVAs). For all analyses involving enhancement motives group, the high versus low enhancement motive grouping was determined via a median split on the distribution of enhancement motives scores in our sample of gamblers ($n = 25$ per cell). Similarly, for all analyses involving coping motives group, the high versus low coping motive grouping was determined with a median split on the sample's coping motives scores ($n = 28$ vs. 22, for high vs. low groups, respectively).

Results

Reward Versus Relief Gambling Outcome Expectancy RT Task Performance

Following the recommended procedures to correct for extremely slow and fast responses in RT data (Greenwald et al. 1998), values below 300 ms were recoded to 300 ms and those above 3,000 ms were recoded to 3,000 ms. In order to reduce the characteristic positive skewness of RT latencies and normalize the distribution, a log transformation was performed on the RT data prior to averaging mean RT scores (see Fazio 1990; Greenwald et al. 1998). To aid in the interpretation of data, raw (untransformed) RTs are displayed for descriptive purposes only.

Results from the 2 × 2 × 2 (enhancement motives group × prime type × target type) mixed model ANCOVA on the RT data, using continuous coping motives scale scores as a covariate, revealed that the predicted three-way enhancement motive × prime × target interaction effect was significant [F (1, 47) = 5.74, p = .02]. Subsequent analyses of simple effects [see Table 4 for corresponding untransformed RT means (in milliseconds)] showed that response time to reward outcome expectancy words was significantly faster than response time to relief outcome expectancy words following exposure to gambling primes for participants with high enhancement motives [F (1, 47) = 15.16, p < .001, d = 1.14]. In contrast, the facilitation of reward versus relief outcome expectancy words was not significantly different following non-gambling primes for participants with high enhancement motives [F (1, 47) = .90, p = .34]. Furthermore, response times to reward versus relief outcome expectancy words following gambling [F (1, 47) = .50, p = .48] and non-gambling primes [F (1, 47) = .34, p = .56] were not significantly different for participants with low enhancement motives. Thus, H1 was supported.

Results from the 2 × 2 × 2 (coping motives group × prime type × target type) mixed model ANCOVA on the RT data, using continuous enhancement motives scale scores as a covariate showed that, contrary to prediction, the three-way coping motive × prime × target interaction was not significant [F (1, 47) = 3.27, p = .077]. Moreover, the pattern of means did not conform with expectation (see Table 5). Therefore, H2 was not supported.

Reward Versus Relief Self-Reported Gambling Outcome Expectancies

Results from the 2 × 2 (enhancement motives group × self-report expectancy domain) mixed model ANCOVA on the GAEQ subscale scores, using continuous coping motives scale scores as a covariate, revealed that the expected two-way enhancement motive × expectancy domain interaction effect was significant [F (1, 47) = 3.98, p = .05]. Subsequent simple effects tests [see means of GAEQ reward and relief expectancy subscales in Table 6 panel (a)] showed that self-reported reward outcome expectancies were significantly stronger for participants with high versus low enhancement motives [F (1, 47) = 12.94, p = .001, d = 1.05]. In contrast, high and low enhancement motives groups did not differ significantly in self-reported relief gambling outcome expectancies [F (1, 47) = 3.39, p = .07, d = .53]. Moreover, the magnitude of the difference between high and low enhancement motives groups was stronger for reward than for relief expectancies (d = 1.05 for reward expectancies, d = .53 for relief expectancies). Thus, H3 was supported.

Results from the 2 × 2 (coping motives group × self-report expectancy domain) mixed model ANCOVA on the GAEQ subscale scores, using continuous enhancement motives scale scores as a covariate, revealed that the expected two-way coping motive group × expectancy domain interaction was significant [F (1, 47) = 5.57, p = .02]. Subsequent simple effects tests [see means of GAEQ reward and relief expectancy subscales in Table 6 panel (b)] showed that self-reported relief outcome expectancies were significantly higher for participants with high versus low coping motives [F (1, 47) = 11.85, p = .001, d = 1.00]. In contrast, the difference in self-reported reward outcome expectancies between high versus low coping motive groups was not significant [F (1, 47) = 3.16, p = .08, d = .52)]. Moreover, the magnitude of the coping motives group difference was stronger for relief than for reward expectancies (d = 1.00 for relief expectancies, d = .52 for reward expectancies). Thus, H4 was supported.

Table 4 Means and SDs of RTs (in milliseconds) to reward versus relief outcome expectancy target words upon presentation of gambling and non-gambling primes for high versus low enhancement motive gamblers

	Reward OE target words		Relief OE target words	
	M	*SE*	*M*	*SE*
High enhancement motive gamblers				
Gambling primes	696.61_{a}	75.83	815.34_{b}	84.99
Non-gambling primes	833.38	85.47	793.29	77.14
Low enhancement motive gamblers				
Gambling primes	804.69	75.83	828.27	84.99
Non-gambling primes	901.20	85.47	868.93	77.14

Means that bear different alphabetic letters are significantly different from each other at $p \leq .001$. Means are covariate adjusted for scores on the coping motives scale of the GMQ (Stewart and Zack 2008)

Table 5 Means and SDs of RTs (in milliseconds) to reward versus relief outcome expectancy target words upon presentation of gambling and non-gambling primes for high versus low coping motive gamblers

	Reward OE target words		Relief OE target words	
	M	*SE*	*M*	*SE*
High coping motive gamblers				
Gambling primes	747.89	76.25	753.00	70.15
Non-gambling primes	782.54	87.10	855.26	80.13
Low coping motive gamblers				
Gambling primes	844.34	86.94	886.84	79.98
Non-gambling primes	836.48	78.13	826.54	71.88

Means are covariate adjusted for scores on the enhancement motives scale of the GMQ (Stewart and Zack 2008)

Table 6 Means and standard deviations of self-reported outcome expectancy scores

	High enhancement motive gamblers		Low enhancement motive gamblers	
	M	*SE*	*M*	*SE*
(a) Comparison of high and low enhancement motive gamblers				
Reward gambling outcome expectancy	37.62_{a}	2.02	27.06_{b}	2.02
Relief gambling outcome expectancy	27.23	2.09	21.65	2.09
	High coping motive gamblers		Low coping motive gamblers	
	M	*SE*	*M*	*SE*
(b) Comparison of high versus low coping motive gamblers				
Reward gambling outcome expectancy	34.98	1.98	30.09	1.82
Relief gambling outcome expectancy	30.26_{a}	2.26	19.49_{b}	2.08

Means that bear different subscript alphabetic letters are significantly different from each other at $p \leq .001$. Means are covariate adjusted for scores on the coping motives scale of the GMQ (Stewart and Zack 2008) in panel (a) and on the enhancement motives scale of the GMQ in panel (b)

Discussion

The present study investigated the activation of different types of positive gambling outcome expectancies, namely, reward and relief gambling outcome expectancies. We also examine whether the activation of reward versus relief gambling outcome expectancies would be moderated by the type of predominant gambling motives held by regular gamblers. Specifically, the current research aimed to investigate whether enhancement gambling motives would be associated with stronger automatic associations of gambling with reward outcomes and whether coping gambling motives would be associated with stronger automatic associations of gambling with relief outcomes. In addition, the present study sought to examine whether a comparable effect would be obtained with self-reported reward versus relief gambling outcome expectancies.

Implicit Activation of Reward Versus Relief Gambling Outcome Expectancies

Consistent with H1, results revealed that the activation of reward gambling outcome expectancies by gambling stimuli on the RT task was significantly faster than the activation of relief gambling outcome expectancies for participants with high enhancement gambling motives, whereas this effect did not significantly differ for participants with low enhancement gambling motives. Furthermore, as hypothesized, response time to reward versus relief expectancy words did not vary following control primes (i.e., track and field) for participants with either high and low enhancement gambling motives, demonstrating the specificity of the findings to gambling.

In contrast, and contrary to H2, the activation of relief gambling outcome expectancies was not found to be significantly faster than the activation of reward gambling outcome expectancies for participants with high coping gambling motives. This unexpected finding may be due to two possibilities. First, whereas coping motive items in the GMQ (Stewart and Zack 2008) refer to motivations related to the reduction of generic negative affect (e.g., "to cheer up when you are in a bad mood"), the relief target words used in the RT measure of outcome expectancies were more specific to relief from anxiety (see Table 3). In the alcohol research area, a measure of drinking motives that separately assesses depression-related coping and anxiety-related coping motives (Modified DMQ-R: Grant et al. 2007) has been developed and validated. Using this measure, participants with strong anxiety-related coping drinking motives were shown to display significantly stronger implicit attentional bias for alcohol targets versus non-alcohol targets when anxious mood was induced Grant et al. (2007). This finding suggests that separate assessment of motives of gambling to cope with anxiety versus depression may be necessary in order to observe significantly faster relief gambling outcome expectancies than reward expectancies for gamblers with strong coping motives, at least when the relief items pertain exclusively to relief from anxiety.

Another possible reason for the non-significant finding is that negative reinforcement associations may be more complex than positive reinforcement associations (see Birch et al. 2006). Wiers et al. (2006) note that the difference in complexity may explain why implicit negative reinforcement associations are rarely observed in the alcohol area in spite of much support for implicit positive reinforcement associations with alcohol (e.g., Birch et al. 2008). Specifically, there are two associations necessary in the case of coping-motivated gamblers (i.e., negative affect $<>$ gambling $<>$ relief) whereas only one in the case of enhancement-motivated gamblers (gambling $<>$ reward). In order to fully capture the more complex process of the activation of relief outcome expectancies, it may be

necessary to experimentally manipulate negative mood for coping-motivated gamblers (or drinkers) and then test automatic relief outcome associations.

Endorsement of Self-reported Measures of Gambling Outcome Expectancies

Consistent with H3, self-reported reward gambling outcome expectancies were significantly stronger for participants with high enhancement gambling motives than those with low enhancement motives. Similarly, consistent with H4, self-reported relief gambling outcome expectancies were significantly stronger for participants with high coping gambling motives than those with low coping motives. Furthermore, the effect sizes for the motive group effects on self-report expectancy scores showed evidence of the specificity of effects. That is, when comparing high versus low enhancement motives groups, the effect size for reward expectancies was stronger than that for relief expectancies and when comparing high versus low coping motives groups, the effect size for relief expectancies was stronger than that for reward expectancies. These findings are consistent with and extend those of Stewart and Wall (2005) who showed relations between gambling motivational subtype (as determined through cluster analyses of a gambling situations measure) and specific gambling outcome expectancies that were most strongly endorsed on the GAEQ.

It remains unclear as to why high coping-motivated gamblers showed stronger elevations on the self-report GAEQ than low coping-motivated gamblers and yet failed to show faster responses to the relief versus reward outcome words following gambling prime exposure on the RT task. Taken at face value, this seems to suggest that while high coping-motivated gamblers have conscious deliberative access to relief gambling outcome expectancies more so than low coping-motivated gamblers, these relief associations with gambling have not become highly automatized for high coping-motivated gamblers. Regardless of the underlying reasons, the fact that high coping motivated gamblers showed the expected pattern of results on the self-report measure but not on the RT measure is supportive of theoretical distinctions drawn between these two modes of assessment (e.g., Wiers and Stacy 2006).

Limitations and Future Research

Some limitations of the current research should be noted. First, the sample used in the present study consisted of a relatively small number of regular gamblers. Nonetheless, the majority of our hypotheses were supported, demonstrating the robustness of the effects reported. We also acknowledge that since the majority of our participants were moderate to high-risk gamblers, it is not possible to determine if our observed results generalize to low-risk gamblers. Furthermore, although track and field was deemed a reasonable control category in the current study for use in the RT task, it is necessary to replicate our findings with other activities as control categories in future studies.

In addition, we acknowledge that the relatively small sample did not allow us to examine possible sex differences. Given the relative importance of coping motives for women versus for men (Stewart and Zack 2008), the failure to observe associations between gambling and relief among high coping-motivated gamblers may be attributed to the possibility that the effect is further moderated by sex such that the effect is significant only for high coping-motivated women gamblers. This hypothesis awaits testing in a larger sample with sufficiently large numbers of male and female participants. Another limitation of the current study is that we did not assess the predictive utility of the RT-based indirect measure versus the self-report measure of gambling outcome expectancies. In other words, we did not investigate

what happens once reward gambling outcome expectancies are strongly activated in high enhancement-motivated gamblers. According to dual process theories of social behaviour, such as reflective-impulsive model (Strack and Deutsch 2004), when people's cognitive or self-regulatory resources are depleted in the situation, behavior is more dominantly influenced by automatic associations instantaneously activated from the associative memory network than by deliberative and reflective consideration. In contrast, it is proposed that when cognitive or self-regulatory resources are intact, the opposite is held. Applying this tenet to the current context, we predict that when people's cognitive resources are temporarily depleted by high cognitive load, the duration of gambling activities and amount gambled will be more strongly influenced by the activation of reward gambling outcome expectancies among high enhancement-motivated gamblers than by the endorsement of self-report reward gambling outcome expectancies. In contrast, the opposite is likely to be observed when cognitive load is low or not present. This hypothesis awaits future investigation.

Implications

Findings stemming from the current research have important clinical implications, particularly in relation to treatment for problem gambling. Specifically, results point to the importance of screening gamblers with the GMQ (Stewart and Zack 2008) in order to identify those with strong enhancement gambling motives and those with strong coping gambling motives prior to engaging in treatment. Once a problem gambler's primary motivation for gambling has been identified, he or she could be provided with a set of interventions that match their unique affective predispositions that motivate gambling. The findings of the present study, by illuminating some of the cognitive processes that may underlie gambling in high enhancement-motivated and high coping-motivated gamblers, provide clues as to the most useful targets for intervention in these two motives groups.

Our findings for high-enhancement motivated gamblers in the present study on both the self-report and RT measure (i.e., H1 and H3) indicate that this group holds strong automatic and strong consciously accessible associations between gambling and reward outcomes (e.g., excitement). Clinicians are advised to help such clients find alternative less risky activities that provide positive reinforcement in place of gambling. The aim of this intervention would be to help enhancement motivated develop strong reward outcome expectancies for less risky activities so that these associations short-circuit the activation of reward gambling outcome expectancies.

Another implication concerns our finding that self-reported relief outcome expectancies were significantly stronger among high versus low coping-motivated gamblers (i.e., H4). This finding suggests that it is important for coping-motivated gamblers to learn to better manage negative affective states, which would normally motivate them to reduce tension by gambling. Relaxation training and distress tolerance training may be considered in order to help coping-motivated gamblers better manage and handle negative affect. Given that both of these techniques have been shown to be effective in the treatment of those with substance use disorders (e.g., Bornovalova et al. 2012; Marlatt et al. 1984), they appear to be promising clinical intervention methods for better managing or handling negative affective states among coping-motivated gamblers.

The specific relations of coping motives with self-reported relief expectancies and of enhancement motives with self-reported reward expectancies suggest that expectancy challenge techniques (Darkes and Goldman 1993; Wiers and Kummeling 2004) may be particularly useful in interventions for both types of gamblers. While the technique may prove useful for both types of gamblers, the targets for challenge are distinct. For coping

motivated gamblers, for example, consistent with H4, it appears important to challenge their beliefs that gambling is an effective way to manage negative emotions. In addition to expectancy challenge techniques for explicit cognitions, recent research suggests promise for cognitive retraining methods designed to alter implicit associations. For example, Houben et al. (2010) have shown that, in the alcohol field, cognitive retraining procedures designed to alter implicit associations with alcohol from positive to negative are associated with reduced drinking. Given the promise of such emerging techniques in the alcohol area, the present results (i.e., H1) suggest that they might be usefully employed with enhancement-motivated gamblers to alter their implicit reward associations with gambling to more negative associations.

Conclusion

In conclusion, findings from the current study indicate that RT measures offer a useful and valid index of the implicit activation of reward and relief gambling outcome expectancies. Having the advantage of not relying on gamblers' effortful access to long-term memory related to gambling, which is known to be prone to systematic and non-systematic biases (Stacy and Wiers 2010), RT measures of reward and relief gambling outcome expectancies are promising both in terms of increasing our understanding of processes that motivate gambling, and in terms of contributing to innovations in problem gambling intervention.

Moreover, given the divergent results observed in the present study regarding associations between predominant gambling motive and specific gambling outcome expectancies depending on whether an RT association measure or a self-report measure was used to assess reward and relief gambling outcome expectancies, the present results suggest that RT-based measures should not replace the use of traditional self-report measures. Instead, both measures should be employed whenever possible to assess the contributions of both automatic and controlled processes to addictive behaviors like gambling.

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