IMPLICIT AND EXPLICIT GAMBLING OUTCOME EXPECTANCIES:
ACTIVATION BY GAMBLING CUE EXPOSURE AND UTILITY IN
PREDICTING GAMBLING OUTCOMES

by

Melissa Jane Stewart

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ABSTRACT

Outcome expectancies are mental "if...then" propositions that make connections between behaviour and anticipated consequences. Despite their theoretical significance in addictive behaviours, a paucity of research has investigated the role of outcome expectancies in gambling, and the little research conducted in this area has focused on explicit (i.e., self-reported) gambling outcome expectancies. To increase our understanding of the influence of both implicit and explicit outcome expectancies in gambling, my dissertation research aimed to: (1) investigate the role of exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies using both reaction time (RT) and self-report measures (Study 1 and 2), and (2) assess the utility of implicit and explicit gambling outcome expectancies in independently predicting gambling behaviour (i.e., time spent and money risked gambling) and gambling problems among regular gamblers (Study 3a and 3b). In Study 1, results revealed that exposure to a five-minute video of gambling scenes led to the activation of implicit and explicit positive (but not negative) gambling outcome expectancies among regular gamblers. In Study 2, findings showed that brief exposure (i.e., 30 seconds) to gambling advertisements while simultaneously engaged in another cognitive task activated implicit but not explicit positive gambling outcome expectancies in regular gamblers' memory networks. Consistent with Study 1 findings, gambling advertisement exposure did not activate implicit or explicit negative gambling outcome expectancies. In Study 3, it was found that both the RT task and self-report measure of positive gambling outcome expectancies significantly contributed unique as well as shared variance to the prediction of self-reported time spent and money risked gambling (Study 3a), and problem gambling severity (Study 3b). Taken together, findings from my dissertation highlight the relevance of outcome expectancies in gambling and provide evidence of the differential impact of gambling cues on the activation of implicit and explicit gambling outcome expectancies, as well as the influence of positive gambling outcome expectancies on gambling behaviour and gambling problems. In light of the present findings, it is important that future research make use of both direct (explicit) and indirect (implicit) assessment modes when examining the role of outcome expectancies in gambling.

LIST OF ABBREVIATIONS AND SYMBOLS USED

AACTP	Alcohol Attention-Control Training Program
ANOVA	Analysis of variance
APA	American Psychiatric Association
BOAT	Behavior Outcome Association Task
CPGI	Canadian Problem Gambling Index
d	Cohen's d; measure of effect size
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
EAST	Extrinsic Affective Simon Task
F	Computed value of ANOVA
GEQ	Gambling Expectancy Questionnaire
G-TLFB	Gambling Timeline Followback
IAT	Implicit Association Test
M	Mean
ms	Milliseconds
N	Total sample size
n	Subsample size
η_p^2	Partial eta squared; measure of effect size
p	Probability of Type I error
PGSI	Problem Gambling Severity Index
r	Pearson product-moment correlation
R^2	Measure of strength of association in regression
RT	Reaction time
SD	Standard deviation
SOGS	South Oaks Gambling Screen
t	Computed value of t test
α	Alpha co-efficient; index of internal consistency
β	Beta weight; standardized multiple regression coefficient
ΔF	Change in computed value of ANOVA
ΔR^2	Change in value of strength of association in regression

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CHAPTER 1. INTRODUCTION

My dissertation research focuses on increasing our understanding of the role of implicit and explicit outcome expectancies in gambling. I have included three publication-style manuscripts in my dissertation. Together, they present the results of a series of experiments investigating the impact of exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies, as well as the utility of direct (i.e., explicit) and indirect (i.e., implicit) measures of positive gambling outcome expectancies in the prediction of gambling behaviour and gambling-related problems. Before presenting the research findings, I outline relevant background information and provide justification for the current research in this introductory chapter.

Outcome Expectancies

Outcome expectancies are the beliefs we hold about a future occurrence. Specifically, they involve the anticipated positive or negative effects that individuals perceive may occur when engaging in a given behaviour. They have been conceptualized as mental "if...then" propositions that make connections between behaviour and expected consequences (Goldman, Del Boca, & Darkes, 1999). For example, a gambler may think: "If I gamble on a slot machine, then I will feel more relaxed". These beliefs serve as the mechanism through which we use past experience and knowledge to predict future occurrences, forming the basis for most behaviour (Olson, Roese, & Zanna, 1996; Tolman, 1932). In addition, outcome expectancies are viewed as structures in long-term memory formed through associations between past behaviours and their outcomes, and are said to influence cognitive processes governing current and future behaviour (Jones, Corbin, & Fromme, 2001).

Outcome Expectancies and Addictive Behaviours

Over the past several decades, a number of models of addictive behaviour, particularly those from a cognitive/social learning perspective, have proposed that outcome expectancies are influential determinants of the decision to engage in addictive behaviours (e.g., Abrams & Niaura, 1987; Cooper, Russell, & George, 1988; Cox & Klinger, 1988; Goldman, Brown & Christiansen, 1987; Goldman et al., 1999; Jones et al., 2001; Marlatt & Gordon, 1985). Such models provide a useful framework to help explain what motivates individuals to engage in potentially addictive behaviours, such as gambling, as well as to help identify factors implicated in the development and maintenance of addictive behaviours (Jones et al., 2001). One model closely associated with outcome expectancies, which provides insight into the decisional process involved in addictive behaviours, is expectancy theory (Jones et al., 2001). Drawing upon a social learning perspective (Bandura, 1977; Rotter, Chance & Phares, 1972), expectancy theory proposes that the choice to engage in a given behaviour is guided by an individual's expectations of the reinforcing effects of engaging in that behaviour (i.e., outcome expectancies; Jones et al., 2001). In relation to alcohol use, for example, consumption is explained by the endorsement of alcohol outcome expectancies, as individuals appear to consume alcohol in a manner that delivers the outcome or result they expect. Whether such expectancies are valid is not thought to be important; instead, it is proposed that outcome expectancies simply need to be held in order to have an impact on behaviour (Jones et al., 2001).

Applied to addictive behaviours, expectancy theory examines how individuals anticipate the outcomes of engagement in addictive behaviours, predicting positive

associations between positive outcome expectancies and addictive behaviours, and negative associations between negative outcome expectancies and addictive behaviours (Jones et al., 2001; Kirsch, 1999). Consistent with a social learning framework (Bandura, 1977; Rotter et al., 1972), the specific outcome expectancies held by an individual are the result of their direct and indirect experience with addictive behaviours and associated cues. As such, experiences will differ across individuals, and the resulting variability in outcome expectancies held by different individuals is thought to explain variability in observed consumption patterns. According to expectancy theory, positive outcome expectancies (e.g., "If I have a few drinks, I expect that I will enjoy myself and will feel more relaxed") represent a central component of motivation to engage in addictive behaviours. In contrast, negative outcome expectancies (e.g., "If I have some drinks, I expect that I will feel guilty about it the next day") represent a central component of motivation to refrain from engagement in such behaviours (Cox & Klinger, 1988; Lang & Michalec, 1990; Jones & McMahon, 1998; Jones et al., 2001).

In the addictions field, recent conceptualizations of outcome expectancies view such beliefs as structures in long-term memory that influence cognitive processes associated with engagement in addictive behaviours (e.g., Ames, Franken, & Coronges, 2006; Jones et al., 2001). Over time, individuals develop learned associations among cues related to the addictive behaviour, the specific addictive behaviour, and the cognitive, affective, and behavioural effects of engagement in the addictive behaviour (Wall, McKee, Hinson, & Goldstein, 2001). It has been theorized that associations between cues and addictive behaviours develop because these cues signify that the expected outcomes will be imminent if the individual engages in the behaviour in this context (Jones et al.,

2001). If there is a strong association between stimuli related to the addictive behaviour and a positive effect, the behavioural option to engage in the addictive behaviour becomes highly accessible in memory when the positive effect of engagement in a given addictive behaviour is contemplated. In general, it is expected that activation of any concept in semantic memory will influence subsequent responses such that individuals with strong associations between positive outcomes and engagement in addictive behaviours should be biased toward engaging in these behaviours (Goldman et al., 1999; Rather, Goldman, Roehrich, & Brannick, 1992). One way to facilitate this activation is through exposure to the cues commonly associated with engaging in the behaviour (Jones et al., 2001). Cues associated with gambling, for example, include pictures of casinos, slot machines, cards, or dice, as well as gambling advertisements.

Outcome expectancies have been found to exert powerful influences on addictive behaviours. Indeed, a vast amount of research has examined the role of outcome expectancies in the development and maintenance of various addictive behaviours, including alcohol consumption, smoking, and substance use (e.g., McKee, Wall, Hinson, Goldstein, & Bissonnette, 2003; Wood, Sher, & Strathman, 1996). Such research has shown that outcome expectancies are robust predictors of alcohol (e.g., Fromme & D'Amico, 2000), tobacco (e.g., Lewis-Esquerre, Rodrigue, & Kahler, 2005), and illicit drug use (e.g., Aarons, Brown, Stice, & Coe, 2001). Research on outcome expectancies has been particularly influential in the field of alcohol addiction (see Goldman et al., 1999; Sayette, 1999, for reviews). Beginning with the seminal work of Brown and her colleagues in 1980, research has demonstrated that alcohol use behaviours are influenced by the anticipated outcomes that individuals expect will occur from consuming alcohol

(e.g., "If I drink, then…"). Previous research using self-report questionnaires has shown

that both the number of positive alcohol outcome expectancies (Brown, Goldman, Inn, &

Anderson, 1980; Rohsenow, 1983) and the certainty with which they are held (Fromme,

Stroot, & Kaplan, 1993) are associated with increased levels of drinking. Indeed, a vast

amount of research has found that positive alcohol outcome expectancies are strongly

associated with more frequent and intense drinking (e.g., Fromme et al., 1993; Goldman

et al., 1999; Houben & Wiers, 2007a, 2007b, 2008; Jajodia & Earleywine, 2003;

McCarthy & Thompsen, 2006; Rather et al., 1992; Rooke, Hine & Thorsteinsson, 2008).

Further, positive alcohol outcome expectancies have been shown to predict consumption

patterns prospectively among both nonclinical (i.e., college students who were not

receiving treatment for alcohol-related problems; Carey, 1995; Sher, Wood, Wood, &

Raskin, 1996) and clinical populations (i.e., alcohol-dependent clients enrolled in a

detoxification program; Jones & McMahon, 1996). Positive alcohol outcome

expectancies have also been theorized as a key mediator of the relation between exposure

to alcohol-related cues (or drinking 'triggers') and alcohol use behaviour (Goldman &

Rather, 1993; Goldman et al., 1999; Goldman, 2002).

Given the significance of outcome expectancies in the alcohol domain, it is

natural to postulate that outcome expectancies may also play an important role in

gambling. Indeed, the similarities between drinking and gambling as addictive behaviours

have been previously highlighted in the substance use field (e.g., Moreyra, Ibanez, Saiz-

Ruiz, & Blanco, 2004; Petry, 2006; Potenza, 2006). Disordered gambling has often been

viewed as a non-pharmacological "addiction" because although it does not involve the

ingestion of a substance, it does share a number of defining features with substance-

related disorders (Moreyra et al., 2004; Petry, 2006; Potenza, 2006). This view has been recognized in the recently published *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* [DSM-5; American Psychiatric Association (APA), 2013], as gambling disorder is no longer classified as an impulse control disorder but instead is included in the chapter outlining substance-related and addictive disorders. In the DSM-5, alcohol use disorder and gambling disorder are both characterized by preoccupation, a need to increase the behaviour to achieve the desired effect, symptoms of withdrawal, loss of significant social, occupational, or recreational activities, and continued engagement in the behaviour despite awareness of its negative effects (APA, 2013). The commonalities between drinking and gambling as addictive behaviours are also highlighted by research demonstrating a high comorbidity between alcohol use and gambling disorders (Lorains, Cowlishaw, & Thomas, 2011; Petry, Stinson, & Grant, 2005; Stewart & Kushner, 2003), which is perhaps not surprising given the various similarities in the defining features of both disorders, as well as the common risk factors implicated in the development and maintenance of both alcohol use and gambling disorders (e.g., Petry, 2006; Potenza, 2006). Lastly, gambling and alcohol use disorders share similarities in relation to development, course, and outcomes, which is reflected in the fact that many psychological interventions for disordered gambling were adapted from alcohol use disorder treatments, such as 12-Step programs, motivational and cognitive-behavioural therapies, and pharmacotherapies (Petry, 2005, 2006).

Despite the increased recognition of the commonalities between alcohol use and gambling as addictive behaviours (e.g., APA, 2013; Petry 2006; Potenza, 2006), as well as the prominent role of outcome expectancies in the alcohol domain (see Goldman et al.,

1999), research examining gambling outcome expectancies is in its nascent stage compared to that of alcohol outcome expectancies. Indeed, in contrast to the extensive body of literature examining the influence of outcome expectancies in alcohol use, researchers have only recently turned their attention to investigating the role of outcome expectancies in gambling. The following section outlines emerging research findings on gambling outcome expectancies, as well as research highlighting the importance of outcome expectancies in gambling behaviour and associated gambling-related problems.[1]

Gambling Outcome Expectancies

As discussed above, the influential role of outcome expectancies in the decision to engage in behaviours that are potentially harmful has been demonstrated across a range of addictive behaviours, including alcohol (e.g., Goldman et al., 1999), tobacco (e.g., Lewis-Esquerre et al., 2005), and illicit drug use (e.g., Aarons et al., 2001). Based on such findings, as well as the similarities between gambling and other addictive behaviours (APA, 2013; Petry, 2006; Potenza, 2006), gambling researchers have begun focusing their attention on the role of outcome expectancies in gambling. In order to assess the impact of outcome expectancies on gambling behaviour and facilitate research in this area, a number of self-report measures of gambling outcome expectancies have been developed in recent years (Gillespie, Derevensky, & Gupta, 2007a; Stewart & Wall, 2005; Wickwire, Whelan, & Meyers, 2010; Wong & Tsang, 2012). Research using these

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[1] While gambling behaviour refers to gambling frequency and intensity of participation in general (e.g., types of gambling activities, amount of time spent and money risked gambling), gambling-related problems refer to the negative consequences that can occur from gambling (e.g., betting more money than you can afford to lose, feeling guilty about the way you gamble or what happens when you gamble, going back another day to try to win back the money you lost gambling). Thus, gambling behaviour and gambling-related problems are intricately related to one another, as some types of gambling behaviour (e.g., spending excessive amounts of time and money gambling) can lead to gambling-related problems for some individuals. But while related, they are independent constructs.

measures in the assessment of gambling outcome expectancies has increased our understanding of the different types of outcome expectancies held by gamblers. Consistent with the alcohol outcome expectancy literature (e.g., Jones et al., 2001), research utilizing self-report questionnaires to examine the role of outcome expectancies in gambling has revealed that gamblers hold a range of positive as well as negative expectancies about the outcomes of gambling, and such outcome expectancies have been found to be associated with both gambling behaviour and gambling-related problems.

For example, Gillespie and colleagues' (2007a) self-report measure of adolescent gambling outcome expectancies (i.e., Gambling Expectancy Questionnaire; GEQ) assesses positive outcome expectancies related to enjoyment/arousal, self-enhancement, and money, as well as negative outcome expectancies related to over-involvement and negative emotional impact. In a follow-up study using this self-report measure, Gillespie and colleagues (2007b) found that probable pathological and at-risk adolescent gamblers scored higher than social gamblers and non-gamblers on each of the three positive outcome expectancy subscales (i.e., enjoyment/arousal, self-enhancement, and money) of the GEQ. An examination of negative gambling outcome expectancies revealed that probable pathological adolescent gamblers were more likely than social gamblers and at-risk gamblers to anticipate over-involvement in gambling. Taken together, such findings suggest that gambling outcome expectancies are most strongly endorsed by adolescents who are currently experiencing or are at-risk for experiencing gambling-related problems.

Using a sample of adolescent gamblers, Wickwire and colleagues (2010) identified five outcome expectancy domains that assess both positive (i.e., material gain, positive self-evaluation) and negative (i.e., negative affect, negative social consequences,

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and parent disapproval for gambling) gambling outcome expectancies. Wickwire and colleagues (2010) found that each of these five outcome expectancy domains accounted for significant variance in gambling frequency, with greater endorsement of gambling outcome expectancies related to material gain, negative affect, and positive self-evaluation associated with more frequent gambling, and greater endorsement of negative social consequences and parental disapproval associated with less frequent gambling. Consistent with the alcohol outcome expectancy literature (see Jones & McMahon, 1996; Stacy, Widaman, & Marlatt, 1990), positive gambling outcome expectancies were found to be more closely associated with gambling behaviour than negative outcome expectancies.

Lastly, Wong and Tsang's (2012) Chinese Adolescent Gambling Expectancy Scale assesses five gambling outcome expectancy domains, tapping into both positive and negative gambling outcome expectancies – namely, social benefits, relational costs, material gain, being out of control, and money loss. In a sample of adolescent gamblers, the two domains assessing positive gambling outcome expectancies (i.e., social benefits, material gain) were found to be associated with a higher level of gambling behaviour, as was the negative outcome expectancy of being out of control. In contrast, the remaining two domains of negative gambling outcome expectancies (i.e., relational cost and money loss) were negatively associated with gambling behaviours.

Role of Gambling Outcome Expectancies on Gambling Behaviour and Problems

In addition to the research outlined above, a number of studies have demonstrated that gambling outcome expectancies are associated with increased levels of gambling behaviour and gambling-related problems (e.g., Gillespie et al., 2007b; Ginley et al.,

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2013; Shead & Hodgins, 2009; St-Pierre, Temcheff, Gupta, Derevensky, & Paskus, 2014; Stewart & Wall, 2005). For example, research examining self-reported gambling outcome expectancies among college students found that both positive and negative gambling outcome expectancies were predictive of gambling problems (St-Pierre et al., 2014) and gambling frequency (Ginley et al., 2013; St-Pierre et al., 2014). In addition, Shead and Hodgins (2009) found that adult gamblers who endorsed strong positive gambling outcome expectancies related to affect regulation (i.e., reward and relief) reported significantly higher levels of gambling problems than those who did not endorse such outcome expectancies.

Taken together, these studies highlight the importance of examining the role of both positive and negative outcome expectancies in gambling. Although previous research in this area has been helpful in elucidating the role of outcome expectancies in gambling, such research has relied on *direct* assessment modes (e.g., self-report questionnaires) in order to assess *explicit* gambling outcome expectancies. Described in more detail in the following section, alcohol researchers have increasingly employed *indirect* assessment modes [e.g., reaction time (RT) tasks] in order to investigate the role of *implicit* outcome expectancies on alcohol use and associated behaviours. In the following section, the distinction between implicit and explicit outcome expectancies is described and the importance of utilizing both direct (e.g., self-report) and indirect (e.g., RT tasks) assessment modes in research examining the role of cognitions on subsequent behaviour is outlined.

Implicit and Explicit Outcome Expectancies

While there is often a lack of clarity as to the respective definitions of *explicit* and *implicit* cognitions, it has been suggested that explicit cognitions are measured using *direct* assessment modes, such as self-report questionnaires and other tasks that involve conscious, intentional response selections (Wiers & Stacy, 2006a). Specifically, direct or explicit modes of assessment refer to a class of measurement procedures that tap into cognitions thought to be deliberate and controlled, and those that involve conscious engagement, introspection, and reflection (Stacy & Wiers, 2010). In contrast, implicit cognitions are measured using *indirect* assessment modes, such as computerized RT tasks (De Houwer, 2006; Wiers et al., 2002). In contrast to direct measures, indirect measurement procedures assess attitudes and cognitions in an automatic manner, are said to be unconscious and involuntary in nature, and influence individuals' memory without explicit recall or introspection (De Houwer, 2006; Wiers et al., 2002).

For many years, researchers have employed direct measures, most often using self-report questionnaires, to assess cognitions in an attempt to understand or predict human behaviour (De Houwer, 2006). Despite significant research advances made using direct modes of assessment, as well as the importance of assessing explicit cognitions via direct measures, its limitations have been increasingly recognized in the alcohol outcome expectancy literature (e.g., Kramer & Goldman, 2003; Palfai & Ostafin, 2003). For example, it is unlikely that a specific episode of drinking is the result of a deliberate and conscious consideration of the expected outcomes of drinking – the construct reflected in self-report measures of alcohol outcome expectancies (Cox & Klinger, 1988; Goldman & Rather, 1993; Oei & Baldwin, 1994). In addition, direct assessment modes have been

criticized because of their susceptibility to social desirability bias, acquiescence and extreme responding, and demand characteristics (Paulus & Vazire, 2009), as well as the possibility that cognitive processes involved in addictive behaviours are not accessible through conscious introspection (Stacy, 1997).

In order to overcome some of the limitations of direct assessment modes and capture aspects of cognitions that may not be accessible via participant self-report, addiction researchers have increasingly drawn upon methods employed in cognitive psychology and used indirect (i.e., implicit) assessment modes in addition to direct measures when examining the role of outcome expectancies on addictive behaviour. Given that both direct and indirect assessment modes appear to tap into distinct aspects of cognitions (i.e., implicit versus explicit cognitions), it is important to make use of both assessment modes in order to determine the role of explicit and implicit outcome expectancies in gambling. Prior to discussing potential ways in which this can be achieved, the following section discusses the theoretical background upon which indirect measures are based, as well as the utility of implicit cognition in understanding the development and maintenance of addictive behaviours. An overview of research employing indirect measures to assess implicit alcohol outcome expectancies is then provided.

Implicit Cognition and Addictive Behaviours

Over the past several decades, implicit cognition has become an increasingly influential research area in cognitive science (Wiers et al., 2002; Fazio & Olson, 2003). Implicit cognition, a term which has been used to describe both implicit processes and their assessment, is said to influence an individual's memory and behaviour without

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explicit recall or introspection. Indeed, implicit cognition has been defined as unconscious processes derived from perception, memory, and learning that influence behaviours without subjective awareness (Reingold & Ray, 2005). It is also said to operate in an automatic manner, without the need for awareness, deliberation, or reflection of the process responsible for a given behaviour (Stacy & Wiers, 2010). In addition, qualities such as goal independence, absence of intentionality, uncontrollability, and lack of awareness of one or more aspects of the process are all ways in which implicit cognitive processes have be classified (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009; Moors & De Houwer, 2006).

In recent years, researchers have turned their attention to an examination of the role of implicit cognition in addictive behaviours. Indeed, the study of implicit processes and cognitions provides a viable explanation for why people engage in behaviours that they know are harmful and potentially life threatening (Stacy & Wiers, 2010). Rather than assuming that such a decision is based on a conscious weighing of the advantages and disadvantages of engaging in addictive behaviours, implicit cognitive theories of addictive behaviours postulate that such decisions are influenced by associations in memory that become spontaneously activated under specific conditions, such as when exposed to alcohol cues (Stacy & Wiers, 2010). It is said that these associations are learned from past direct or vicarious experience and influence behaviour in ways that are not accessible through explicit introspection or reflection. It is important to note, however, that implicit cognitive theories of addictive behaviours do not imply that explicit or deliberate processes are unimportant. Instead, such views highlight the

importance of acknowledging both implicit and explicit cognitions when attempting to understand and treat addictive behaviours (Wiers & Stacy, 2006a).

Role of Implicit Outcome Expectancies in Addictive Behaviours

Given the importance of explicit outcome expectancies in the alcohol domain (e.g., Goldman et al., 1999), researchers have drawn upon cognitive psychological principles in order to determine whether implicit alcohol outcome expectancies also impact alcohol use behaviours and problems. Consistent with principles of implicit cognition, addiction researchers have increasingly adopted the view that outcome expectancies are represented in the associative memory network (e.g., Earleywine, 1995; Goldman, 1999; Goldman et al., 1999; Goldman & Rather, 1993; Oei & Baldwin, 1997; Stacy 1995; Stacy, 1997). Specifically, it has been theorized that situational cues related to alcohol use that are repeatedly paired with positive outcomes of drinking are stored together in memory along with the alcohol use behavioural response. When individuals are later exposed to situational alcohol cues, these cues substantially facilitate the degree to which the concept of alcohol activates alcohol outcome expectancies and this, in turn, precipitates alcohol consumption. Thus, the accessibility and strength of associations between alcohol use and alcohol outcome expectancies is thought to be associated with the use and abuse of alcohol (Stacy, 1995). Moreover, it is proposed that exposure to relevant cues activates memories for both the associated outcomes and the behaviours. According to this view, the strength of a given alcohol outcome expectancy is operationalized as the speed with which the concept of drinking (or exposure to alcohol-related cues) facilitates the activation of the outcome expectancy in memory. For example, individuals who have a very strong positive outcome expectancy of alcohol use

should experience faster activation of the positive outcome expectancy when exposed to beer or liquor bottles (i.e., alcohol-related cues) than those with weak positive outcome expectancies regarding alcohol use (Stacy, 1995).

In order to assess individual differences in the strength of implicit outcome expectancies, addiction researchers have used indirect assessment modes adopted from methods in cognitive psychology, such as computerized RT tasks (see Houben, Wiers, & Roefs, 2006). Findings from investigations employing indirect measures of alcohol outcome expectancies have demonstrated that alcohol outcome expectancies can be activated implicitly (i.e., automatically) by alcohol-related cues, without conscious, intentional retrieval of expectancy information, and in the absence of a deliberate decision about whether to consume alcohol (e.g., Goldman, 1999; Kramer & Goldman, 2003; Palfai & Ostafin, 2003; Roehrich & Goldman, 1995; Stacy, 1997). Moreover, the activation of alcohol outcome expectancies via implicit priming with alcohol-related cues has been found to influence alcohol consumption (Roehrich & Goldman, 1995; Stein, Goldman, & Del Boca, 2000; Palfai & Ostafin, 2003; Wiers, Ames, Hofmann, Krank & Stacy, 2010). Taken together, these findings are consistent with the view that alcohol-related cues activate implicit outcome expectancy memory networks and that activation of these processes influences alcohol consumption (e.g., Stacy, 1995).

One computerized RT-based implicit measure of cognitions relevant to the current dissertation research is the affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Fazio, 2001). Widely used in the examination of automatic activation of attitudes from memory, this procedure assesses the extent to which the presentation of a prime (e.g., a picture) activates an associated evaluation (i.e., positive or negative) from

memory. On each trial of the classic affective priming task, the presentation of a prime is followed by the display of either a positive or negative evaluative adjective (i.e., target). The participant's task is to indicate the connotation of the target word as quickly as possible (e.g., is the word 'positive' or 'negative'?). Participants' RT latency to this judgment represents the outcome measure (Fazio, Jackson, Dunton, & Williams, 1995; Fazio, 2001).

Numerous affective priming studies (see Klauer & Musch, 2003 for a review) have found that valenced target stimuli are responded to more rapidly following the presentation of an affectively related prime stimulus than following the presentation of an affectively unrelated prime stimulus. This affective priming effect has been demonstrated when (1) the interval between the prime and target is short (e.g., Fazio et al., 1986; Hermans, De Houwer, & Eelen, 2001), (2) when any instructions that might induce a strategic evaluative processing goal are eliminated (e.g., Bargh, Chaiken, Raymond, & Hymes, 1996; Spruyt, Hermans, De Houwer, & Eelen, 2002), (3) when a secondary cognitive load task is introduced (e.g., Hermans, Crombez, & Eelen, 2000), and (4) when primes are presented subliminally (e.g., Draine & Greenwald, 1998; Hermans, Spruyt, De Houwer, & Eelen, 2003). Moreover, the affective priming effect has been exhibited with a wide range of stimuli used as primes, including words (e.g., Fazio et al., 1986), pictures (e.g., Spruyt et al., 2002), and odours (e.g., Hermans, Baeyens, & Eelen, 1998). Taken together, previous research using the affective priming task has demonstrated that the affective priming effect is a robust and replicable phenomenon that has been observed using a variety of prime and target stimuli, and under a range of specific task requirements (e.g., Greenwald, Draine, & Abrams, 1996; Greenwald, Klinger, & Liu,

1989; Wittenbrink, Judd, & Park, 1997).

Implicit alcohol outcome expectancies assessed using indirect measures, such as the affective priming task, have been found to be positively associated with alcohol consumption (see Goldman, Reich, & Darkes, 2006). For example, Palfai and Ostafin (2003) used an affective priming task to investigate the influence of alcohol consumption on the activation of implicit alcohol outcome expectancies. Results indicated that participants responded significantly faster to positive outcome expectancy target words after consuming alcohol than after consuming a placebo beverage. Such results suggest that moderate doses of alcohol increase the activation of implicit positive alcohol outcome expectancies in memory and alcohol consumption may influence the incentive value of positive relative to negative implicit alcohol outcome expectancies (Palfai & Ostafin, 2003).

Applying the affective priming paradigm to the domain of gambling, differences in the strength of gambling outcome expectancies theoretically can be assessed by comparing the speed with which exposure to the concept of gambling facilitates the automatic activation of gambling outcome expectancies in memory. Specifically, individuals who have a strong positive expectancy of gambling outcomes should experience faster activation of the positive expectancy upon exposure to gambling cues than those with a weak positive expectancy of gambling. Although indirect measures have recently been used to examine automatic processes, such as perceptual vigilance and selective attention to gambling stimuli (see Evans & Coventry, 2006; Zack & Poulos, 2006), research has yet to utilize indirect measures, such as the affective priming task, to

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assess individual differences in the automatic activation of gambling outcome expectancies.

Despite the advantages associated with indirect assessment modes (e.g., less susceptible to confounds associated with self-report, more efficient, and more difficult for participants to consciously control; Wiers et al., 2002), it is important to note that self-report measures of outcome expectancies are not necessarily inferior to RT measures. Dual-process models of addictive behaviour (e.g., Deutsch & Strack, 2006; Evans & Coventry, 2006; Stacy, Ames, & Knowlton, 2004; Wiers et al. 2007) view addictive behaviours as the joint outcome of two interrelated processes: relatively automatic or *impulsive* processes and relatively controlled or *reflective* processes. In line with dual-process models, direct (e.g., self-report) and indirect (e.g., RT tasks) measures can be considered complementary in assessing outcome expectancies. Indeed, whereas self-report measures assess deliberative or explicit determinants of behaviour, RT measures assess implicit or automatic determinants of behaviour (see Wiers & Stacy, 2006b).

As direct and indirect measures have been found to tap into different facets of outcome expectancies in the alcohol field (e.g., de Jong, Wiers, van de Braak, & Huijding, 2007; Kramer & Goldman, 2003) and have been found to independently predict alcohol-related behaviours in the alcohol outcome expectancy area (Ostafin, Palfai, & Wechsler, 2003; Wiers et al., 2002), it may be similarly important to utilize both assessment modes when investigating the role of outcome expectancies in the gambling field. However, as previously highlighted, gambling researchers have focused on explicit gambling outcome expectancies (as measured via self-report) when investigating the role of such cognitions on gambling behaviour and gambling-related problems.

Moreover, as noted above, exposure to cues associated with addictive behaviours has been found to influence the activation of individuals' expectancies regarding the consequences of engaging in such behaviours (e.g., Goldman, 1999; Kramer & Goldman, 2003; Palfai & Ostafin, 2003; Roehrich & Goldman, 1995; Stacy, 1997). In the field of cognitive science, support has been provided for the notion that implicit and explicit cognitive processes are differentially impacted by duration of stimulus exposure (see Reder, Park, & Kieffaber, 2009). Namely, a number of studies have found that brief stimulus exposure is capable of activating implicit but not explicit cognitions, and that prolonged stimulus exposure leads to an increased facilitation of explicit but not implicit cognitive processing (e.g., Jacoby & Dallas, 1981; Parkin, Reid, & Russo, 1990; Murphy & Zajonc, 1993). Although this dissociation of implicit and explicit cognitive processes has been found in the broad field of cognitive science, to my knowledge, research has yet to investigate its applicability to addictive behaviours generally and gambling in particular. As such, it appears important to investigate the impact of duration of cue exposure on the activation of gambling outcome expectancies.

To address these gaps in the literature and increase our understanding of both implicit and explicit gambling outcome expectancies, it appears important to make use of both direct and indirect modes of assessment when examining factors (i.e., gambling-related cues) that facilitate the activation of gambling outcome expectancies among gamblers. It also appears important to determine whether implicit and explicit gambling outcome expectancies independently predict gambling behaviour and problem gambling severity.

Aims of the Present Dissertation

In the alcohol field, the importance of implicit and explicit alcohol outcome expectancies in alcohol consumption patterns and associated behaviours is well established (see Goldman et al., 1999). In light of this evidence, as well as the commonalities between gambling and alcohol use as addictive behaviours (APA, 2013; Petry, 2006; Potenza, 2006), it is natural to expect that outcome expectancies may play a similar role in gambling. However, in contrast to the extensive body of literature on alcohol outcome expectancies, researchers have only recently turned their attention to investigating outcome expectancies in gambling. While such research has aided in clarifying the role of outcome expectancies in gambling, previous research in this area has primarily focused on explicit gambling outcome expectancies (as measured via self-report questionnaires). In order to increase our understanding of the influence of both implicit and explicit outcome expectancies in gambling and facilitate research in this area, the aims of my dissertation were to examine the role of exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies, as well as to assess the utility of implicit and explicit gambling outcome expectancies in predicting gambling outcomes.

Drawing upon the extant alcohol outcome expectancy literature demonstrating an activation of both implicit and explicit alcohol outcome expectancies following exposure to alcohol-related cues (e.g., Goldman, 1999; Kramer & Goldman, 2003; Palfai & Ostafin, 2003; Stacy, 1997; Wiers et al., 2002), the first research aim of my dissertation was to examine whether cue exposure has a similar effect in the area of gambling outcome expectancies. To do so, I conducted two studies that assessed the effects of

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exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies stored in regular gamblers' memory networks. Drawing upon findings from the broad cognitive science literature highlighting the differential impact of cue exposure duration on the activation of implicit and explicit cognitive processes (see Reder et al., 2009), these two studies examined the influence of gambling cues of varying duration on the facilitation of implicit and explicit gambling outcome expectancies. In the first study, I examined whether the presentation of gambling cues of relatively long duration (i.e., a five-minute video of gambling scenes) facilitated the activation of positive and negative gambling outcome expectancies using both direct (i.e., self-report) and indirect [i.e., RT task based on the affective priming task; Fazio et al., 1986; Fazio, 2001] assessment modes. This study serves as the first manuscript in my dissertation (Study 1; see Chapter 2 of this dissertation). Employing the same measures of implicit and explicit gambling outcome expectancies but using gambling cues of relatively shorter duration, the second study of my dissertation assessed the effects of exposure to printed gambling advertisements on the activation of implicit and explicit gambling outcome expectancies. This study serves as the second manuscript in my dissertation (Study 2; see Chapter 4 of this dissertation).

As previous research has demonstrated that gambling outcome expectancies (measured via self-report) are associated with increased levels of gambling behaviour and gambling problems (e.g., Gillespie et al., 2007b; Shead & Hodgins, 2009; St-Pierre et al., 2014; Wickwire et al., 2010), it was also of interest to examine whether implicit and explicit gambling outcome expectancies were capable of independently predicting gambling outcomes. Thus, the final aim of my dissertation was to assess the utility of

implicit and explicit gambling outcome expectancies in predicting gambling behaviour (i.e., the amount of time spent and money risked gambling over the past three months) and problem gambling severity. In the final (third) empirical paper of my dissertation, I conducted a set of two studies to examine whether direct and indirect assessment modes of gambling outcome expectancies independently predicted gambling behaviour (Study 3a) and problem gambling severity (Study 3b). Specifically, these two studies assessed the incremental contributions of the RT task and self-report measure of positive gambling outcome expectancies in predicting the amount of time spent and money risked gambling, as well as gambling-related problems (see Chapter 6 of this dissertation).

Taken together, these three manuscripts describe an investigation of the effects of exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies, as well as the utility of implicit and explicit gambling outcome expectancies in predicting gambling behaviour and gambling problems. Results of these studies have important clinical and policy implications for the prevention and treatment of disordered gambling, particularly among those who hold strong positive expectancies regarding gambling outcomes (see Chapter 7 of this dissertation for a general discussion of research findings and implications).

CHAPTER 2. STUDY 1: EFFECTS OF GAMBLING CUES ON THE ACTIVATION OF IMPLICIT AND EXPLICIT GAMBLING OUTCOME EXPECTANCIES [2]

Abstract

The current research examined whether the presentation of gambling cues facilitates the activation of gambling outcome expectancies using both reaction time (RT) and self-report modes of assessment. Gambling outcome expectancies were assessed by having regular casino or online gamblers ($N = 58$) complete a gambling outcome expectancy RT task, as well as a self-report measure of gambling outcome expectancies, both before and after exposure to one of two randomly assigned video cue conditions (i.e., casino or control video). Consistent with hypotheses, participants exposed to gambling cues (i.e., casino cue video condition) responded faster to positive outcome expectancy words preceded by gambling prime relative to non-gambling prime pictures on the post-cue RT task. Similarly, participants in the casino cue video condition self-reported significantly stronger positive gambling outcome expectancies than those in the control cue video condition following cue exposure. Activation of negative gambling outcome expectancies was not observed on either the RT task or self-report measure. Results indicate that exposure to gambling cues activates both implicit and explicit positive gambling outcome expectancies among regular gamblers.

Introduction

Research on outcome expectancies has been extremely influential in the field of alcohol addiction (see Goldman, Darkes, & Del Boca, 1999; Sayette, 1999). Researchers have demonstrated that alcohol use behaviours are influenced by the outcomes that individuals expect may occur from consuming alcohol (e.g., "If I drink, then…"). Further, alcohol outcome expectancies have been theorized as a key mediator of the relation between exposure to alcohol-related cues (or drinking 'triggers') and alcohol use behaviour (Goldman, 2002; Goldman & Rather, 1993). Indeed, positive alcohol outcome expectancies have been found to be strongly associated with more frequent and intense drinking (Goldman et al., 1999).

Given the theoretical significance of outcome expectancies in the alcohol field, as well as the similarities between alcohol and gambling as addictions (e.g., APA, 2013; Petry, 2006; Potenza, 2006), outcome expectancies may also play an important role in gambling. However, little research has investigated the significance of outcome expectancies in relation to gambling. This is troubling as the few studies that have been conducted have shown that gambling outcome expectancies are indeed associated with increased levels of gambling problems (e.g., Gillespie, Derevensky, & Gupta, 2007b; Shead & Hodgins, 2009; St-Pierre, Temcheff, Gupta, Derevensky, & Paskus, 2014; Wickwire, Whelan, & Meyers, 2010). Previous research on gambling outcome expectancies has primarily relied on self-report assessment modes (e.g., Gillespie, et al., 2007a, 2007b; Shead & Hodgins, 2009). For example, Gillespie and colleagues (2007a) developed a self-report measure of gambling outcome expectancies, which consists of 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]. Probable pathological gamblers scored higher than other gamblers on their expectations of both the positive and negative outcomes of gambling (Gillespie et al., 2007b).

Although use of the self-report mode has been typical in assessing outcome expectancies, its limitations have been increasingly recognized (e.g., Kramer & Goldman, 2003; Palfai & Ostafin, 2003). Influenced by cognitive psychology, addiction researchers have increasingly adopted the view that alcohol outcome expectancies are represented in the associative memory network (e.g., Goldman et al., 1999; Stacy, 1997). According to this view, the strength of a given alcohol outcome expectancy is defined as the speed with which the concept of drinking (or exposure to alcohol-related cues) facilitates the activation of the outcome expectancy in memory. For example, individuals who have a very strong positive outcome expectancy of alcohol use should experience faster activation of the positive outcome expectancy when exposed to beer or liquor bottles than those with weak positive alcohol outcome expectancies.

In order to assess these individual differences in the strength of outcome expectancies, addiction researchers have used implicit measures, such as reaction time (RT) tasks. Compared to self-report measures of outcome expectancies, RT measures are less susceptible to social desirability bias, more efficient, and more difficult for participants to consciously control (De Houwer, 2006; Wiers et al., 2002). One such implicit RT measure is the affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Fazio, 2001), which is widely used for examining the automatic activation of attitudes from memory. Specifically, this procedure assesses the extent to which the

presentation of a prime (e.g., a picture) activates an associated evaluation (i.e., positive or negative) from memory. On each trial, the presentation of a prime is followed by the display of either a positive or negative evaluative adjective (i.e., target). The participant's task is to indicate the connotation of the target word as quickly as possible (e.g., is the word 'positive' or 'negative'?). Participants' RT latency to this judgment represents the outcome measure (Fazio, Jackson, Dunton, & Williams, 1995). Recent research has found that alcohol outcome expectancies assessed using implicit measures, such as the affective priming task, are positively associated with alcohol consumption (see De Houwer, 2006).

Applying the affective priming paradigm to the gambling domain, differences in the strength of gambling outcome expectancies theoretically can be assessed by comparing the speed with which exposure to the concept of gambling facilitates the automatic activation of gambling outcome expectancies in memory. Specifically, individuals who have a strong positive expectancy of gambling outcomes should experience faster activation of the positive outcome expectancy upon exposure to gambling cues than those with a weak positive outcome expectancy of gambling.

Despite the advantages of implicit measures discussed above, self-report measures of outcome expectancies are not necessarily inferior to RT measures. In their reflective-impulsive model, Strack and Deutsch (2004) purport that behaviour is controlled by two interacting systems: the reflective system and the impulsive system. In the reflective system, behaviour is the result of a conscious decisional process whereas in the impulsive system, behaviour is evoked through unconscious associations. Thus, both self-report and RT measures can be considered complementary in assessing outcome expectancies in that

self-report measures assess deliberative determinants of behaviour, while RT measures assess automatic determinants of behaviour (see Wiers & Stacy, 2006b). Given that implicit and explicit measures appear to tap into different facets of outcome expectancies in the alcohol field (e.g., de Jong, Wiers, van de Braak, & Huijding, 2007; Kramer & Goldman, 2003), it may be similarly important to make use of both modes of assessment when examining the role of outcome expectancies in gambling.

Study Aims and Hypotheses

The purpose of this study was to investigate factors that facilitate the activation of gambling outcome expectancies using both RT and self-report modes of assessment. Drawing upon the affective priming paradigm (Fazio et al., 1986; Fazio, 2001), the current study assessed whether the presentation of gambling-related concepts (i.e., primes) leads to the automatic activation of gambling outcome expectancies stored in regular gamblers' memory networks. Specifically, it has been previously postulated in the alcohol field (Goldman & Rather, 1993; Goldman, 2002) that situational cues related to alcohol use that are repeatedly paired with positive affective outcomes of drinking are stored together in memory. When individuals are later exposed to situational alcohol cues, these cues are said to activate positive outcome expectancies in memory. In fact, Palfai and Ostafin (2003) found that RTs to positive alcohol outcome expectancy terms were significantly faster when hazardous drinkers consumed a priming dose of alcohol than when they consumed a non-alcoholic placebo beverage.

In the present study, it was proposed that exposure to gambling cues (i.e., a five-minute video of gambling scenes) immediately prior to the assessment of gambling outcome expectancies would activate positive gambling outcome expectancies in

memory among regular gamblers. Thus, it was predicted that compared to those who viewed a video unrelated to gambling (i.e., control cue video condition), gamblers who viewed a gambling-related video (i.e., casino cue video condition) would subsequently be significantly faster in responding to positive outcome expectancy target words when they were preceded by gambling picture primes relative to non-gambling picture primes. In relation to the explicit (self-report) measure of gambling outcome expectancies, it was predicted that participants in the casino cue video condition would self-report significantly higher positive gambling outcome expectancies following cue exposure than those in the control cue video condition. It was expected that these effects would only be observed at the post-cue test phase (i.e., after viewing the video). The pre-cue test phase was included and analyzed as a pre-manipulation baseline. Drawing upon the reflective-impulsive model of behaviour (Strack & Deutsch, 2004), because the casino cue video was of a relatively long duration, allowing ample opportunity for participants to process the gambling stimuli, it was expected that the video manipulation would have similar effects on both the direct and indirect measures of positive gambling outcome expectancies.

With respect to negative outcome expectancies, in the alcohol literature some studies have found a negative association between negative outcome expectancies and drinking while others have found a positive association. These findings suggest that negative alcohol outcome expectancies may be protective against heavy drinking or a consequence of heavy consumption, respectively (Jones & McMahon, 1996; Stacy, Widaman, & Marlatt, 1990). Since the direction of the hypothesized relation between negative outcome expectancies and gambling remains unclear, direct and indirect

measures of negative gambling outcome expectancies were included to explore the effects of gambling cue exposure on these measures.

Method

Participants

Participants consisted of 58 adult gamblers (38 males and 20 females) who ranged in age from 19 to 61 years ($M = 29.97$, $SD = 12.04$; see Table 2.1 for additional demographic information). Participants were recruited through advertisements posted on university bulletin boards, as well as in local newspapers and classified websites. Thirty-six participants were recruited from the Halifax Regional Municipality in Nova Scotia, while the remaining 22 participants were recruited from the greater Guelph area in Ontario. 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[3] at least three times over the past two 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 problem gambling given ethical concerns that exposure to gambling cues could theoretically trigger a return to problem gambling (Binde, 2009). 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 & Wynne, 2001), participants consisted of 3 non-problem

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[3] The inclusion criterion that individuals had to have gambled at a casino or online were made to ensure that the gambling primes in the RT task would apply to all gambler participants equally.

gamblers (i.e., total score of 0), 8 low-risk gamblers (i.e., total score ranging from 1 to 2), 32 moderate-risk gamblers (i.e., total score ranging from 3 to 7), and 15 high-risk/problem gamblers (i.e., total score of 8 or above). Total scores on the PGSI ranged from 0 to 25 ($M = 6.26$; $SD = 5.20$). Participants engaged in a range of gambling activities during the three 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.

Measures

Problem gambling symptoms. The nine-item PGSI scale of the CPGI (Ferris & Wynne, 2001) was used to assess the presence and severity of gambling problems among participants. 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 with which they had 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*). Previous research indicates that the PGSI has good psychometric properties. Specifically, Ferris and Wynne (2001) found that the PGSI demonstrated adequate reliability in terms of both internal consistency ($\alpha = .84$) and test-retest reliability ($r = .78$). The PGSI has also been found to demonstrate overall good validity (i.e., construct, criterion, content validity) as a measure of problem gambling (Ferris & Wynne, 2001). Further, an independent study found that compared to other gambling

measures [e.g., South Oaks Gambling Screen (SOGS)], the PGSI demonstrated favourable psychometric properties in a sample of regular gamblers (i.e., individuals who reported gambling at least once per week) in terms of construct validity, classification validity, and item difficulty (McMillen & Wenzel, 2006). In the present study, the PGSI demonstrated good internal consistency ($\alpha = .89$).

Self-reported gambling outcome expectancies. The 23-item Gambling Expectancy Questionnaire (GEQ; Gillespie et al., 2007a) was used to assess self-reported gambling outcome expectancies at both pre and post-cue exposure. The GEQ consists of three positive expectancy subscales (enjoyment/arousal, self-enhancement, and money) and two negative expectancy subscales (over-involvement and emotional impact). Participants were asked to what extent they expected each item/outcome (e.g., "I win money"; "I feel excited"; I will feel guilty"; "I will not be able to stop") would occur when gambling on a seven-point scale ranging from 1 (*no chance*) to 7 (*certain to happen*). In relation to its psychometric properties, Gillespie and colleagues (2007a) reported that each of the subscales of the GEQ demonstrated adequate to good internal reliability. In order to obtain an overall measure of participants' positive gambling outcome expectancies, the three positive expectancy subscales of the GEQ were combined in the present study. This combination resulted in a 15-item scale assessing positive gambling outcome expectancies. The two negative expectancy subscales of the GEQ were also combined to obtain an overall measure of participants' negative gambling outcome expectancies. This combination resulted in an 8-item scale assessing self-reported negative gambling outcome expectancies. The 15-item positive gambling expectancy scale of the GEQ demonstrated adequate to good reliability at both pre-cue (α

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= .78) and post-cue (α = .83) administration. Further, the 8-item negative gambling

expectancy scale demonstrated excellent reliability during both pre-cue (α = .92) and

post-cue administration (α = .95) in the present study. An examination of the correlations

between control cue video condition participants' pre- and post-advertisement cue scores

on the GEQ revealed excellent test-retest reliability for both the combined positive [r (27)

= .84, p < .001] and negative [r (27)= .87, p < .001] gambling expectancy scales of the

GEQ.

      Gambling outcome expectancy RT task. Adapted from the classic affective

priming task (Fazio et al., 1986), this RT-based task was used to assess the activation of

implicit gambling outcome expectancies. The task was designed to measure how quickly

individuals respond to positive and negative gambling outcome expectancy words (i.e.,

targets) immediately after being primed by gambling versus control category (i.e., track

and field) pictures (see Appendix A for pictures used during RT task).[4] The task was

executed 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 gambling outcome expectancies (e.g., GEQ; Gillespie et al., 2007a),

as well as synonyms of words from these measures. In total, there were 10 positive

outcome expectancy words (e.g., "enjoyment", "excitement", "relaxation") and 10

negative outcome expectancy words (e.g., "anxiety", "tension", "guilt") were used as

targets (see Appendix B for a full list of words used as targets). In addition, 10 gambling

and 10 non-gambling pictures were used as primes. The task consisted of two phases:

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[4] I chose track and field as the control category because it is an activity that is similar in both size and
complexity. Specifically, both gambling and track and field are broad categories that encompass a variety
of different activities. They are also both activities that could theoretically be associated with both positive
outcomes (excitement, winning) and negative outcomes (frustration, tension).

pre-cue test phase (i.e., baseline) and post-cue test phase. Each phase began with one

block of four practice trials, and two blocks with 20 test trials each (total number of trials

was 88 across the two phases). The stimuli for practice trials were different than those

presented during the test trials. Each priming phase was presented to participants as one

continuous series. During each priming phase, 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.

In the *pre-cue test phase*, each trial began with the presentation of either a

gambling or non-gambling (i.e., track and field) picture in the centre of the screen which

lasted for 200 milliseconds (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 had either a

positive (e.g., excitement) or negative (e.g., tension) connotation. Participants were

asked to respond to words that had a negative connotation by clicking the "Z" key on the

keyboard, and to respond to words that have a positive connotation by clicking the "/"

key. The length of the inter-trial interval was 1000 ms. The *post-cue test phase* was

identical to the pre-cue test phase. Participants were told that they needed to pay attention

to the pictures presented on the screen as their memory for the pictures may be tested

later. Participants were also informed that the first four trials of each test phase were

practice trials.

Procedure

Upon arrival at the laboratory, participants provided informed consent and were

randomly assigned to the casino cue video condition or control cue video condition.

Participants then engaged in the first phase of the gambling outcome expectancy RT task (*pre-cue test phase*). Immediately after the *pre-cue test phase*, participants completed the GEQ (Gillespie et al., 2007a) and a demographic questionnaire. Upon completing these questionnaires, participants were exposed to the cue exposure manipulation to which they had been randomly assigned (either the *casino cue video* or *control cue video condition*). In the *casino cue video condition* ($n = 29$), participants watched a five-minute video of typical casino scenes with ambient noise reflecting the sounds that would be heard in a casino (e.g., sounds of slot machines paying out). In the *control cue video condition* ($n = 29$), participants watched a five-minute video of typical track and field scenes with ambient noise reflecting the sounds that would be heard in a track and field audience (e.g., cheering and clapping). After watching the video, participants engaged in the *post-cue test phase* of the RT task. Participants then completed a second administration of the GEQ (Gillespie et al., 2007a) in order to determine whether any differences in outcome expectancies were present upon being exposed to the gambling/control video. Participants were then debriefed and compensated $30 for their time and effort.

Results

Preliminary Analyses

The data in both the pre-cue and post-cue exposure phases contained a small proportion of extremely slow and fast responses. Respectively, such responses typically indicate momentary inattention and responses initiated prior to receiving the stimulus (Greenwald, McGhee, & Schwartz, 1998). Not only are such responses considered problematic because they lead to a distortion of means and inflation of variance, but also because they represent phenomenon outside of interest. Following the recommended

procedures to correct for such responses (Greenwald et al., 1998), values below 300 ms were recoded to 300 ms and those above 3000 ms were recoded to 3000 ms. Overall, errors in responses to target words were quite rare, occurring on 5.6% of trials in the pre-cue exposure phase and 5.3% of trials in the post-cue exposure phase. Given this low error rate, all responses were analyzed. 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. At each testing time (i.e., pre- and post-video exposure), four composite RT scores were calculated for each participant. These represented the mean RTs for trials involving each of the four prime-target combinations (i.e., gambling prime-positive outcome expectancy target; gambling prime-negative outcome expectancy target; non-gambling prime-positive outcome expectancy target; non-gambling prime-negative outcome expectancy target).

In order to confirm random assignment and the equivalency of groups by experimental condition, analyses were conducted to determine whether there were any systematic, pre-existing differences between the casino cue video condition and the control cue video condition on level of problem gambling severity, age, and sex. In relation to level of problem gambling severity, an independent samples t-test revealed no significant difference between the control cue video ($M = 6.07$, $SD = 5.48$) and casino cue video ($M = 6.44$, $SD = 5.00$) conditions on level of problem gambling severity, $t(56) = .28$, $p = .78$. Further, an independent samples t-test revealed no significant age differences between participants in the control cue video ($M = 30.66$, $SD = 12.70$) and

casino cue video ($M = 29.28$, $SD = 11.52$) conditions, $t(56) = -.43$, $p = .67$. Lastly, a chi square test revealed no significant sex differences between the control cue video (males: $n = 19$; females: $n = 10$); and casino cue video (males: $n = 19$; females: $n = 10$) conditions, $\chi^2(1, N = 58) = .00$, $p = 1.00$. As such, it was deemed that any differences observed between groups may be attributed to the effect of the manipulation and not to pre-existing or systematic differences between groups. Further, correlational analyses failed to reveal any significant correlations ($ps > .05$) between the implicit and explicit measures of gambling outcome expectancies in either the casino or control video cue conditions at pre- and post-video cue exposure (correlations ranged from -.08 to .33).

Gambling Outcome Expectancy RT Task Performance

Prior to testing our hypotheses, I examined whether there were any cue exposure condition differences in RTs to positive or negative outcome expectancy targets when they were preceded by gambling versus non-gambling primes during the pre-cue exposure phase (i.e., baseline) of the RT task. To do so, two separate 2 x 2 mixed factorial ANOVAs were conducted – one for the RT data for the positive outcome expectancy targets, and the other for the RT data for the negative outcome expectancy targets. In both ANOVAs, the between subjects factor was cue exposure condition (casino cue video versus control cue video) and the within subjects factor was type of prime (gambling versus non-gambling). The analyses confirmed that during the pre-cue exposure phase, there were no significant condition [$F(1, 56) = .14$, $p = .71$], prime [$F(1, 56) = .13$, $p = .72$], or interaction effects [$F(1, 56) = .03$, $p = .86$] on RTs to positive outcome expectancy targets. Similarly, there were no significant condition [$F(1, 56) = .01$, $p = .92$], prime [$F(1, 56) = 1.92$, $p = .17$], or interaction effects [$F(1, 56) = .03$, $p =$

.86] on RTs to negative outcome expectancy targets during the pre-cue exposure phase.
These findings indicate that there was no tendency to associate gambling primes with
positive (or negative) outcomes in either of the two randomly assigned cue conditions
(casino or control video cue) prior to video cue exposure. Descriptive statistics for RTs
to negative and positive outcome expectancy targets when preceded by gambling and
non-gambling primes for the casino cue video and control cue video conditions during
the pre-cue exposure phase are displayed in Table 2.2. This lack of effects at the pre-cue
exposure phase meant that baseline RTs did not need to be controlled in hypothesis
testing.

Following the analytic strategy of Birch, Stewart, Wiers, Klein, MacLean, and
Berish (2008), I then analyzed RT data on the post-cue exposure gambling outcome
expectancy RT task with relation to the initial hypotheses by decomposing the full 2 (cue
exposure: casino cue versus control cue) x 2 (primes: gambling versus non-gambling) x 2
(targets: positive versus negative outcome expectancy words) table of means into a series
of *a priori* planned comparisons. As recommended by Tabachnick and Fidell (2007),
conventional alpha levels were used to analyze the comparisons of primary interest first.
Specifically, a series of directional paired-samples t-tests were used to compare RTs to
categorize outcome expectancy targets after exposure to gambling versus non-gambling
primes at the post-cue exposure testing time, for each cue exposure condition and target
type separately. Descriptive statistics for RTs to negative and positive outcome
expectancy targets when preceded by gambling and non-gambling primes for the casino
cue and control cue video conditions during the post-cue exposure phase are displayed in
Table 2.3.

Consistent with hypotheses, participants in the casino cue video condition responded faster to positive outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes, $t(28) = -1.69$, $p = .05$, $\eta_p^2 = .093$, representing a marginally significant difference in RTs (see Table 2.3). While participants in control cue video condition tended to respond faster to positive outcome expectancy words when they were preceded by non-gambling primes relative to gambling primes, a significant facilitation of positive gambling outcome expectancies by non-gambling primes was not observed in the control cue condition, $t(28) = 1.04$, $p = .16$, $\eta_p^2 = .037$. This lack of significance can be attributed to greater variability (i.e., larger standard deviation) in RT among participants in the control cue video condition relative to those in the gambling cue video condition when responding to positive target words after being exposed to both gambling primes and non-gambling primes (see Table 2.3).

When examining RTs to negative outcome expectancy targets among participants in the casino cue video condition, no significant differences were found between participants' RTs to targets preceded by gambling primes versus non-gambling primes, $t(28) = -.46$, $p = .33$, $d = .07$ (see Table 2.3). Similarly, there were no significant differences in RTs to negative outcome expectancy targets among participants in the control cue video condition when they were exposed to gambling primes versus non-gambling primes, $t(28) = -.33$, $p = .37$, $d = .05$ (see Table 2.3).

Cue Condition Differences in Self-Reported Gambling Outcome Expectancies

Prior to assessing whether exposure to gambling cues led to an increase in self-reported gambling outcome expectancies, I examined whether any group differences existed in self-reported positive and negative gambling outcome expectancies [as

measured by the GEQ (Gillespie et al., 2007a)] before viewing the cue exposure videos

(i.e., at baseline). In order to test this, two separate independent-samples t-tests were

conducted. In both t-tests, the independent variable was cue exposure condition (casino

cue video versus control cue video). In the first t-test, the dependent variable was self-

reported positive gambling outcome expectancies on the GEQ, whereas the dependent

variable in the second t-test was self-reported negative gambling outcome expectancies

on the GEQ. The analyses revealed that there were no significant differences in either

self-reported positive (casino cue video: $M = 4.46$, $SD = .61$; control cue video: $M = 4.27$,

$SD = .68$; $t(56) = 1.11$, $p = .66$) or negative (casino cue video: $M = 2.96$, $SD = 1.35$;

control cue video: $M = 2.72$, $SD = 1.05$; $t(56) = .76$, $p = .45$) gambling outcome

expectancies prior to the cue exposure. These findings indicate random assignment to

cue exposure conditions was effective in equating the two conditions on their baseline

(pre-cue exposure) positive and negative gambling outcome expectancies. This lack of

condition effects at the pre-cue exposure (baseline) phase meant that baseline GEQ scores

did not need to be controlled in hypothesis testing.

I then examined our *a priori* planned comparison regarding cue condition

differences in self-reported positive gambling outcome expectancies following exposure

to the cue manipulation by performing directional independent samples t-tests. Consistent

with our hypothesis, participants in the casino cue video condition ($M = 4.26$, $SD = .60$)

reported significantly higher scores on the self-report measure of positive gambling

outcome expectancies than those in the control cue video condition ($M = 3.87$, $SD = .85$),

$t(56) = 1.98$, $p = .03$, $d = .53$. However, this effect was not found for negative gambling

outcome expectancies. Specifically, an independent samples t-test revealed that

participants in the casino cue video (*M* = 2.66, *SD* = 1.47) and control cue video

condition (*M* = 2.45, *SD* = 1.29) did not significantly differ in their self-reported negative

gambling outcome expectancies after exposure to the cue manipulation, *t* (56) = .58, *p* =

.56, *d* = .15.

<h2 align="center">Discussion</h2>

Although outcome expectancies have been found to play an important role in

addictive behaviours (e.g., Goldman et al., 1999; Sayette, 1999), a paucity of research has

been conducted on the relation between outcome expectancies and gambling. To address

this gap in the literature, the current research investigated the possibility that exposure to

gambling cues (i.e., a five-minute video of gambling scenes) facilitates the activation of

gambling outcome expectancies using indirect (i.e., RT), as well as direct (i.e., self-

report) modes of assessment. It was hypothesized that compared to those who viewed a

video unrelated to gambling (i.e., control cue video condition), gamblers who viewed a

gambling-related video (i.e., casino cue video condition) would subsequently be

significantly faster in responding to positive outcome expectancy targets when they are

preceded by gambling picture primes relative to non-gambling picture primes. In relation

to the direct (self-report) measure of gambling outcome expectancies, it was predicted

that participants in the casino cue video condition would self-report significantly higher

positive gambling outcome expectancies following cue exposure than those in the control

cue video condition.

Cue Condition Differences in the RT Measure of Outcome Expectancies

Consistent with our predictions, participants who were exposed to a video of

typical gambling scenes (i.e., casino cue video condition) responded faster to positive

outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes ($p = .05$). This facilitation of positive outcome expectancies by gambling primes was not observed in the control cue video condition, as participants who viewed a video of typical track and field scenes did not significantly differ in RTs to positive outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes. While participants in this latter condition, who were exposed to a track-and-field control video, tended to respond faster to positive outcome expectancy words when they were preceded by track-and-field control primes relative to gambling primes, this difference was not statistically significant ($p > .05$). This pattern of findings rules out the possibility that participants just responded faster to positive outcome expectancy words following primes that were similar to the previously viewed videos (i.e., following gambling primes in the gambling video condition; following track-and-field primes in the track and field video condition) than following primes that were different than the previously viewed videos (i.e., following track and field primes in the gambling video condition; following gambling primes in the track and field video condition).

Instead, these results suggest that exposure to gambling cues immediately prior to the assessment of gambling outcome expectancies activates implicit positive gambling outcome expectancies in memory among regular gamblers. This finding provides support to previous research (Goldman, 2002; Goldman & Rather, 1993) on the role of outcome expectancies in alcohol use, which proposes that situational cues related to alcohol use that are repeatedly paired with positive affective outcomes are stored together with these outcomes in memory. When later exposed to alcohol cues, these cues substantially

facilitate the degree to which the concept of alcohol activates positive outcome expectancies. In addition to providing further empirical support for this proposal, the current study extends this line of reasoning by showing evidence of its applicability to gambling. It is also important to highlight that engaging in gambling activities was not necessary to obtain these findings. Specifically, the activation of positive gambling outcome expectancies was found to occur when participants were simply exposed to typical gambling scenes, an experience that appears quite similar to watching others gamble or viewing gambling advertisements.

In addition, these findings partially coincide with Palfai and Ostafin's (2003) research assessing the activation of alcohol outcome expectancies using a similar RT task. Specifically, Palfai and Ostafin (2003) found that compared to administration of a non-alcoholic beverage, administration of a low dose of alcohol was associated with a faster RT to positive alcohol outcome expectancy words among hazardous drinkers. Unexpectedly, participants' RT to positive alcohol outcome expectancy words did not differ depending upon whether participants in their study received alcohol or non-alcohol related primes prior to the presentation of outcome expectancy targets. In contrast, the current research found that participants in the casino cue video condition exhibited evidence of faster responses to positive outcome expectancy targets when primed by gambling pictures than when primed by non-gambling pictures.

One possible explanation for this discrepancy in findings may relate to the stimuli used as primes. Specifically, primes in the current research consisted of gambling and non-gambling pictures, whereas in Palfai and Ostafin's (2003) research, alcohol and non-alcohol related words were used as primes. Given that pictures have been found to be

remembered better than words (e.g., Grady, McIntosh, Rajah, & Craik, 1998; Seifert, 1997) and the primes in both studies were presented only briefly, it is possible that for participants in the current study, the gambling and non-gambling primes were better maintained in memory. As a result of a potential increased memory of primes in the current research, it appears that the presentation of gambling primes relative to non-gambling primes among those previously exposed to the gambling video cue led to a faster activation of positive outcome expectancy concepts in memory. Applying this to the alcohol domain, results of the current research suggest that the activation of positive outcome expectancies among regular drinkers may only require exposure to drinking scenes rather than actual alcohol use. A further potential explanation for the discrepancy in findings may relate to the different analytic strategies employed in the present study and Palfai and Ostafin's (2003) research. Specifically, the current research analyzed the RT data on the post-cue phase of the gambling outcome expectancy RT task with relation to our initial hypotheses by conducting specific planned comparisons, whereas Palfai and Ostafai (2003) did not decompose the full tables of means (i.e., video cue manipulation, primes, and targets) when analyzing the RT task performance in their research and instead used an omnibus ANOVA.

Although exposure to gambling cues appeared to activate positive gambling outcome expectancies in memory among regular gamblers in our study, this was not the case for negative gambling outcome expectancies. Specifically, when examining RTs to negative outcome expectancy targets among participants in the casino cue video condition, no significant differences were found between participants' RTs to targets that were preceded by gambling primes versus non-gambling primes. Similarly, there were no

significant differences in the RTs to negative outcome expectancy targets among participants in the control cue video condition after they were exposed to gambling primes versus non-gambling primes. These findings are consistent with previous research in the alcohol field, which suggests that negative outcome expectancies reflect outcomes less proximal to alcohol use than positive outcome expectancies (e.g., Jones, Corbin, & Fromme, 2001; Stacy, Widaman, & Marlatt, 1990).

Cue Condition Differences in Self-Reported Gambling Outcome Expectancies

When examining participants' self-reported positive gambling outcome expectancies following exposure to the cue manipulation, it was found that participants in the casino cue video condition scored significantly higher on the self-report measure of positive gambling outcome expectancies than those in the control cue video condition. However, this was not the case for negative gambling outcome expectancies, as participants in the casino cue and control cue video conditions did not significantly differ in their self-reported negative gambling outcome expectancies after exposure to the video cue manipulation.

As predicted, these findings suggest that the presentation of gambling cues leads to an increase in the expected positive outcomes that gamblers report will occur from gambling. These findings are consistent with the results of the RT task and as such, provide converging evidence of the impact of gambling cues on the facilitation of positive gambling outcome expectancies. That is, using both direct and indirect modes of assessment, the current research found that the presentation of gambling cues activates both implicit and explicit positive gambling outcome expectancies in memory. Further, these results build upon previous research (e.g., Gillespie et al., 2007b) using this self-

report measure to assess gambling outcome expectancies by suggesting that exposure to gambling cues is associated with an increase in self-reported positive gambling outcome expectancies. In addition, consistent with some findings from the alcohol outcome expectancy literature (e.g., de Jong et al., 2007; Jajodia & Earleywine, 2003; Kramer & Goldman, 2003), the implicit and explicit measures of positive gambling outcome expectancies were not significantly correlated, suggesting that these two modes of assessment may be assessing distinct aspects of gambling cognitions. In order to determine whether this is the case, it is important that future research investigate whether implicit measures of gambling outcome expectancies assess a unique facet of the gambling cognition domain that cannot be accessed through explicit measurement. Further, it is important that future research examine situational variables that may enhance the predictive validity of implicit measures of gambling outcome expectancies on gambling behaviour.

It is important to note the potential impact of duration of gambling-cue exposure on the activation of implicit and explicit positive gambling outcome expectancies. Although we found that the five-minute video of gambling scenes activated both implicit and explicit positive outcome expectancies, different results may have been found had the gambling cue been of a shorter duration. As highlighted in Chapter 1 of this dissertation, findings from basic cognitive science research provide support for the notion that implicit and explicit cognitive processes are differentially impacted by duration of stimulus exposure (see Reder, Park, & Kieffaber, 2009). Indeed, a number of studies have found that brief duration of stimulus exposure activates implicit but not explicit cognitions, and that prolonged stimulus exposure leads to an increased facilitation of explicit but not

implicit cognitive processing (e.g., Jacoby & Dallas, 1981; Parkin, Reid, & Russo, 1990; Murphy & Zajonc, 1993). In light of such findings, a relatively brief presentation of gambling cues may not allow individuals the time to engage in the conscious, deliberative processing of gambling outcome expectancies that is captured by explicit, self-report modes of assessment. As such, had the gambling cue been shorter (e.g., 30 seconds), an activation of implicit but not explicit positive outcome expectancies may have been observed among participants in the current study. Further research is necessary to investigate whether shorter exposure to gambling cues (e.g., gambling advertisements) activates implicit but not explicit gambling outcome expectancies, as has been found in basic cognitive science research (see Reder et al., 2009).

Limitations

Some limitations of the present study should be addressed. First, the hypothesized effect on the gambling outcome expectancy RT task (i.e., faster RTs to positive expectancy words following gambling versus control primes in the gambling video condition) reached marginal significance ($p = .05$) rather than the conventional alpha level criterion of $p < .05$. Thus, it is important that this effect be replicated in future research to determine its reliability. Second, although findings from the current research provide support to the prediction that, relative to non-gambling cues, gambling cues would lead to an increased activation of positive gambling outcome expectancies among gamblers, it did not include a control group of individuals who do not gamble. As such, it is not known whether gamblers respond to this RT task differently than non-gamblers. In order to address this limitation, future research should use the affective priming paradigm (Fazio et al., 1986) to determine whether gamblers display a stronger activation

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of positive gambling outcome expectancies following exposure to gambling cues than non-gamblers.

A further caveat of the current research involves the failure to assess differences in the activation of gambling outcome expectancies based on level of problem gambling severity. Specifically, given the current sample size, I was unable to assess whether the presentation of gambling cues led to a greater activation of positive gambling outcome expectancies among problem gamblers relative to at-risk or low-risk gamblers. As such, it is important that future research examine whether findings of the present study differ depending upon level of problem gambling severity. In addition, while the current research found that exposure to gambling cues led to an activation of both implicit and explicit positive gambling outcome expectancies, I did not assess whether these modes of assessing gambling outcome expectancies are capable of predicting prospective gambling behaviour. Further, I did not examine whether direct and indirect measures of gambling outcome expectancies contribute unique, as well as shared variance in the prediction of different forms of gambling behaviour, such as the amount of time spent and money risked gambling. As such, it is important that future research make use of both modes of assessment to determine whether they are independent predictors of gambling behaviour, as has been previously shown in the alcohol outcome expectancy literature (e.g., Wiers et al., 2002).

Lastly, a limitation inherent to the RT task used in the present study should be acknowledged. Specifically, the current research assessed associations between gambling and outcome expectancies relative to associations with another control activity (i.e., track and field). As such, I cannot discern whether similar results would persist if an activity

other than track and field had been used as a control. In order to address this limitation, it is important that future research examine associations between gambling cues and the facilitation of outcome expectancies relative to associations with different activities.

Despite these limitations, results of this study have a number of important implications related to both policy and clinical (i.e., prevention and treatment) issues. These implications are reviewed in Chapter 7, together with the theoretical, practical, and clinical implications stemming from my dissertation research as a whole.

Conclusion

Despite the importance of outcome expectancies in addictive behaviours (e.g., Goldman et al., 1999; Sayette, 1999), research examining outcome expectancies in the gambling field is in its nascent stage. In order to address this gap in the literature as well as facilitate further research on gambling outcome expectancies, the present study assessed whether exposure to a five-minute video of gambling scenes activates implicit and explicit gambling outcome expectancies using both indirect (i.e., RT) and direct (i.e., self-report) assessment modes. As predicted, findings from the current research indicate that exposure to gambling cues selectively activates both implicit and explicit positive, but not negative, gambling outcome expectancies among regular gamblers. Findings stemming from this preliminary investigation of the role of gambling cues on the implicit and explicit activation of positive gambling outcome expectancies highlight the relevance of outcome expectancies in the field of gambling research, and point to the need for further research that examines the role of outcome expectancies in gambling. Further, results of the current research indicate that this novel RT task is a useful instrument, in

addition to self-report measures, in terms of its ability to measure the activation of

gambling outcome expectancies among regular gamblers.

Table 2.1

Demographic Information Reported by Sample Participants in Study 1

	% (*n*) of Sample or [*M* (*SD*)]
Marital Status (*N* = 54)	
Single	68.5 (37)
Married or cohabitating	24.1 (13)
Separated/divorced	6.9 (4)
Annual Income (*N* =57)	
Up to $10,000	10.5 (6)
$11,000 - $20,000	5.2 (3)
$21,000 - $30,000	14.0 (8)
$31,000 - $40,000	8.8 (5)
$41,000 - $50,000	10.5 (6)
$51,000 - $60,000	12.3 (7)
More than $60,000	38.6 (22)
Education (total years of schooling; *N* = 53)	[14.68 (2.95)]

Table 2.2

Means and Standard deviations of Pre-Cue RTs (in milliseconds) to Positive and

Negative Expectancy Words upon Presentation of Gambling and Non-Gambling Primes

for the Control Cue and Casino Cue Video Conditions

	Gambling Primes		Non-Gambling Primes	
	M	*SD*	*M*	*SD*
Control Cue Video Condition				
Positive target words	807.82	237.81	795.86	194.79
Negative target words	840.56	264.90	866.45	301.84
Casino Cue Video Condition				
Positive target words	837.39	250.08	818.97	218.77
Negative target words	833.65	218.11	863.00	247.41

Table 2.3

Means and Standard Deviations of Post-Cue RTs (in milliseconds) to Positive and

Negative Expectancy Words upon Presentation of Gambling and Non-Gambling Primes

for the Control Cue and Casino Cue Video Conditions

	Gambling Primes		Non-Gambling Primes	
	M	*SD*	*M*	*SD*
Control Cue Video Condition				
Positive target words	750.28	262.45	712.74	177.81
Negative target words	788.64	258.26	801.77	281.38
Casino Cue Video Condition				
Positive target words	721.19*	160.79	739.34*	166.19
Negative target words	740.34	157.61	753.23	190.37

Note. *Indicates a significant difference between means ($p = .05$)

CHAPTER 3. PROLOGUE TO STUDY 2

Results of Study 1 showed that exposure to a five-minute gambling video led to an activation of both implicit (measured by the RT task) and explicit (measured via self-report) positive (but not negative) gambling outcome expectancies among regular gamblers, relative to control cue video exposure. Although Study 1 revealed that full attention to a five-minute video of gambling scenes activated both implicit and explicit positive gambling outcome expectancies, different results may have been found had the cue exposure been shorter and/or had attention been divided. Specifically, a relatively brief presentation of gambling cues may not permit the conscious, deliberative processing of gambling outcome expectancies that is captured by self-report or "direct" assessment modes, and this might be particularly true when attentional resources are not fully available during the gambling cue exposure.

To investigate this possibility, the aim of the next study of my dissertation, Study 2, was to assess whether brief exposure to gambling cues while simultaneously engaged in other cognitive tasks differentially activates implicit and explicit gambling outcome expectancies. Gambling advertisements are one such gambling cue that individuals are exposed to on a regular basis. Indeed, recent years have witnessed an increase in the amount of advertisements promoting a range of gambling activities (Griffiths, 2005). Portrayed in various forms of media, including print, television and Internet, gambling advertisements have been found to encourage positive attitudes toward gambling (Friend & Ladd, 2009), trigger impulses to gamble and make it more difficult for problem gamblers to reduce or abstain from gambling (Binde, 2009). Given such findings,

gambling advertisements may influence the perceived outcomes individuals believe will occur from gambling.

Therefore, the goal of Study 2 was to assess whether exposure to gambling advertisements activates gambling outcome expectancies among regular gamblers using both direct and indirect modes of assessment. Study 2 employed the same self-report measure (GEQ; Gillespie et al., 2007a) and gambling outcome expectancy RT task (based upon the affective priming paradigm; Fazio et al., 1986; Fazio, 2001) used in Study 1 to assess participants' explicit and implicit gambling outcome expectancies. Extending Study 1 of my dissertation, which used gambling cues of relatively long duration (i.e., five minute video of typical gambling scenes), Study 2 investigated whether exposure to gambling cues of relatively short duration (i.e., gambling advertisements) activated implicit and/or explicit gambling outcome expectancies among regular gamblers. Findings from Study 2 could inform us of the influence of different types of gambling cues on the activation of implicit and explicit gambling outcome expectancies and in turn, may have important policy and clinical implications.

CHAPTER 4. STUDY 2: EFFECTS OF GAMBLING ADVERTISEMENTS
ON THE ACTIVATION OF IMPLICIT VERSUS EXPLICIT
GAMBLING OUTCOME EXPECTANCIES[5]

Abstract

Outcome expectancies are mental "if...then" propositions that make connections between

behaviour and anticipated consequences. Despite their theoretical significance in

addictive behaviours, little research has investigated the role of outcome expectancies in

gambling. The present study examined whether brief exposure to gambling

advertisements activates implicit and explicit gambling outcome expectancies using both

indirect (i.e., reaction time) and direct (i.e., self-report) assessment modes. Gambling

outcome expectancies were assessed by having regular gamblers ($N = 96$) complete a

gambling outcome expectancy reaction time task adapted from the affective priming task

(Fazio, Sanbonmatsu, Powell, & Kardes, 1986) and self-report measure of gambling

outcome expectancies (Gillespie, Derevensky, & Gupta, 2007a) before and after exposure

to one of two randomly assigned advertisement cue conditions (i.e., gambling

advertisement or fitness advertisement). As predicted, participants exposed to gambling

advertisements (but not those exposed to fitness advertisements) responded significantly

faster to positive outcome expectancy words preceded by gambling prime relative to non-

gambling prime pictures on the reaction time task. In contrast, and in line with

predictions, participants in the two advertisement cue conditions did not significantly

differ in their self-reported positive gambling outcome expectancies following cue

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[5] This manuscript is adapted from 'Stewart, M.J., Yi, S., Ellery, M., & Stewart, S.H. (2014). Effects of gambling advertisements on the activation of implicit and explicit gambling outcome expectancies in regular gamblers' and is currently under review at a peer-reviewed journal. As first author of this manuscript, I played a lead role in designing the study, organizing and managing participant recruitment, and collecting data. In addition, I conducted the data analyses, wrote the manuscript, and revised the manuscript in accordance with suggestions from my co-authors.

exposure. Activation of negative gambling outcome expectancies by gambling advertisement exposure was not observed on either the reaction time task or self-report measure of gambling outcome expectancies. Results suggest that while brief exposure to gambling advertisements activates implicit positive gambling outcome expectancies, it may not allow gamblers the time to engage in the conscious, deliberative processing of outcome expectancies that is captured by direct (i.e., self-report) assessment modes.

Introduction

Outcome expectancies are mental "if...then" propositions that make connections between behaviour and anticipated consequences, and are said to be formed in memory through associations between past behaviours and their outcomes (Goldman, Darkes, & Del Boca, 1999). In the alcohol literature, outcome expectancies have been found to exert powerful influences on alcohol use. For example, positive alcohol outcome expectancies have been found to be strongly associated with increased levels of alcohol use (e.g., Houben & Wiers, 2007a, 2007b, 2008; Jajodia & Earleywine, 2003; McCarthy & Thompsen, 2006; Rooke, Hine & Thorsteinsson, 2008) and have been found to play an important role in the relation between exposure to alcohol cues and drinking (Goldman & Rather, 1993; Goldman, 2002; Palfai & Ostafin, 2003).

Drawing upon such findings, as well as the commonalities between gambling and alcohol use as addictive behaviours (e.g., Petry, 2006; Potenza, 2006; APA, 2013), researchers have recently begun to examine the role of outcome expectancies in gambling. Such investigations have revealed that gambling outcome expectancies play an important role in gambling behaviour as well as gambling-related problems (e.g., Gillespie et al., 2007a, 2007b; Shead & Hodgins, 2009; Teeters, Ginley, Whelan, Meyers,

& Pearlson, 2013). For example, Gillespie and colleagues (2007b) found that probable

pathological and at-risk gamblers endorsed higher positive gambling outcome

expectancies than other gamblers. More recently, it has been found that gamblers who

self-reported outcome expectancies related to financial gain and negative emotional

impact endorsed increased levels of gambling-related problems (St-Pierre, Temcheff,

Gupta, Derevensky, & Paskus, 2014).

Although such research has been helpful in elucidating the role of outcome

expectancies in gambling, previous research in this area has primarily relied on self-

report measures to assess gamblers' outcome expectancies. However, the limitations of

self-report assessment modes have been increasingly highlighted in the addiction field

(e.g., Kramer & Goldman, 2003; Palfai & Ostfin, 2003). Limitations of self-report modes

include social desirability bias, acquiescent and extreme responding, and demand

characteristics (Paulus & Vazire, 2009). Moreover, self-report relies on the assumption

that individuals are consciously aware of the cognition or behaviour assessed, and that

they are willing to accurately and truthfully report these (Birch et al., 2008).

Applying cognitive psychological principles to the domain of outcome

expectancies, addiction researchers have postulated that outcome expectancies are

represented in the associative memory network (e.g., Goldman et al., 1999; Stacy, 1997).

Consistent with this view, the strength of a given gambling outcome expectancy is

defined as the speed with which exposure to gambling cues activates the outcome

expectancy in memory. To assess the strength of a given outcome expectancy, addiction

researchers have employed indirect measures, such as reaction time (RT) measures. For

example, in the alcohol area, drawing upon research on the accessibility of attitudes

(Fazio & Williams, 1986) and automatic affective priming (see Fazio, 2001), Palfai and Ostafin (2003) created an outcome expectancy RT task to assess the influence of low-dose alcohol consumption on the activation of alcohol outcome expectancies in a drinker's memory. In this study, it was found that drinkers' RT to positive alcohol outcome expectancy words was significantly faster when they consumed a priming dose of alcohol compared to a non-alcoholic, placebo beverage. Such research is consistent with previous alcohol outcome expectancy literature (Goldman & Rather, 1993; Goldman, 2002) suggesting that following repeated pairings, alcohol-related cues are stored together with positive affective outcomes in a drinker's memory. Later exposure to alcohol cues is said to activate positive outcome expectancies in memory.

In an effort to determine whether exposure to gambling cues has a similar impact on the facilitation of outcome expectancies as has been found in the alcohol field (e.g., Palfai & Ostafin, 2003), we previously conducted a study to examine the role of exposure to a five-minute video of typical gambling scenes on the activation of implicit and explicit gambling outcome expectancies in memory among regular gamblers (Stewart, Yi, & Stewart, 2014; i.e., Study 1 of this dissertation). Applying the affective priming paradigm (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Fazio, 2001) to the domain of gambling, we designed a RT task to assess the extent to which the presentation of a prime (i.e., a picture) activates an associated outcome expectancy word (i.e., positive or negative) from a gambler's memory immediately following exposure to gambling versus non-gambling videos (Stewart et al., 2014; i.e., Study 1 of this dissertation). Exposure to the gambling cue video led to an activation of both implicit (measured by the RT task) and explicit (measured via self-report) positive gambling outcome expectancies among

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regular gamblers, relative to control cue video exposure. Although the five-minute video of typical gambling scenes with full attention activated both implicit and explicit positive outcome expectancies, different results may have been found had the cue exposure been shorter. Indeed, findings from the broad cognitive science field provide support to the notion that implicit and explicit cognitive processes are differentially impacted by duration of stimulus exposure (see Reder, Park, & Kieffaber, 2009). Specifically, a number of studies have found that brief duration of stimulus exposure is capable of activating implicit but not explicit cognitions (e.g., Jacoby & Dallas, 1981; Parkin, Reid, & Russo, 1990; Murphy & Zajonc, 1993). In light of such findings, a relatively brief presentation of gambling cues may not permit the conscious, deliberative processing of gambling outcome expectancies that is captured by self-report or "direct" modes of assessment. This might be particularly true when attentional resources are not fully available during the gambling cue exposure.

Gambling advertisements are one such gambling cue that individuals are exposed to on a regular basis. Indeed, recent years have witnessed an increase in the amount of advertisements promoting a range of gambling activities (Griffiths, 2005). Portrayed in various forms of media, including print, television and Internet, gambling advertisements can often mislead the public by highlighting monetary gains without disclosing the actual low probability of winning or mentioning the risks associated with problematic gambling (Binde, 2014; Fried, Teichman, & Rahav, 2010; Sklar & Derevensky, 2010). In addition, gambling advertisements have been found to encourage positive attitudes toward gambling (Friend & Ladd, 2009) and it has been suggested that such advertisements reinforce the social construction of gambling as an exciting and harmless form of

entertainment (Dechant & Ellery, 2011; Kusyszyn, 1978; Sklar & Derevensky, 2010). In fact, in a recent study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviours, adolescents reported perceiving the primary message of gambling advertisements to be that gambling is fun, exciting, entertaining, and that wealth, success, and happiness is easily attained via gambling (Derevensky, Sklar, Gupta, & Messerlian, 2010). Moreover, it was found that gambling advertisements were not only most frequently viewed by adolescents who reported gambling but also by those who were experiencing problems related to gambling. Similarly, recent qualitative research has found that gambling advertisements trigger impulses to gamble and make it more difficult for problem gamblers to reduce or abstain from gambling (Binde, 2009). Given such findings, it is natural to postulate that gambling advertisements may influence the perceived outcomes individuals believe will occur from gambling. As such, it is important to assess whether gambling advertisements, which individuals are frequently exposed to in print, as well as on television, and which are generally presented for a brief duration, facilitate the activation of implicit and explicit gambling outcome expectancies in gamblers.

Study Aims and Hypotheses

Therefore, the purpose of the current research was to assess whether exposure to gambling advertisements activates gambling outcome expectancies among regular gamblers using both direct and indirect modes of assessment. Similar to our previous research examining the impact of gambling cue exposure on gambling outcome expectancies (Stewart et al., 2014; i.e., Study 1 of this dissertation), the current research drew upon the affective priming paradigm (Fazio et al., 1986) in order to assess whether

the presentation of gambling-related concepts (i.e., primes) automatically activated gambling outcome expectancies in regular gamblers' memory networks following exposure to gambling cues. Extending our previous research, which used gambling cues of relatively long duration (i.e., five minute video of typical gambling scenes), the current study examined whether gambling cues of relatively short duration (i.e., gambling advertisements) activated implicit and/or explicit gambling outcome expectancies among regular gamblers.

Overall, it was predicted that brief exposure to gambling advertisements would have a differential activation on implicit and explicit gambling outcome expectancies. Drawing upon our previous findings (Stewart et al., 2014; i.e., Study 1 of this dissertation), which suggested that exposure to longer duration gambling cues (i.e., a five-minute video of typical gambling scenes) increased the accessibility of positive gambling outcome expectancies, as well as similar findings in the alcohol literature (e.g., Palfai & Ostafin, 2003), it was hypothesized that brief exposure to gambling advertisements would activate positive but not negative gambling outcome expectancies in memory and that such a facilitation of positive gambling outcome expectancies would only be observed implicitly. Thus, for implicit positive gambling outcome expectancies, it was predicted that compared to those who viewed advertisements unrelated to gambling (i.e., fitness advertisement cue condition), gamblers who viewed gambling advertisements (i.e., gambling advertisement cue condition) would subsequently respond more quickly to positive gambling expectancy targets when they are preceded by gambling picture primes relative to non-gambling picture primes.

In contrast, given the relatively brief duration of exposure to the gambling

advertisements and additional processing requirements during the cue exposure (i.e., asking participants to indicate the orientation of each advertisement), it was expected that participants would not have the time or attentional resources to engage in the conscious, deliberative processing of gambling outcome expectancies that is captured by self-report (direct) modes of assessment. As such, it was anticipated that exposure to gambling advertisements would not lead to a strong endorsement of explicit positive outcome expectancies in gamblers. Thus, it was predicted that participants in the gambling and fitness (i.e., control) advertisement cue conditions would not significantly differ in their self-reported positive gambling outcome expectancies following cue exposure. Lastly, drawing upon findings from the alcohol (e.g., Houben & Wiers, 2008; Jajodia & Earleywine, 2003; Jones et al., 2001; McCarthy & Thompsen, 2006) and gambling literature (Brevers et al., 2013; Stewart et al., 2014; Yi & Kanetkar, 2010) suggesting a less proximal relationship between addictive behaviours and negative associations, it was hypothesized that exposure to gambling advertisements would not activate implicit or explicit negative gambling outcome expectancies.

Method

Participants

Participants consisted of 96 adult gamblers (66 men and 30 women) who ranged in age from 19 to 71 years ($M = 29.63$; $SD = 12.08$; additional demographic information is included in Table 4.1). Participants were recruited through advertisements posted on university bulletin boards, as well as in local newspapers and classified websites. Fifty participants were recruited from the Halifax Regional Municipality in Nova Scotia, 22 participants from the greater Guelph area in Ontario, and 24 from the Winnipeg area in

Manitoba. Upon replying to the recruitment advertisement and leaving their contact

information, potential participants were contacted by telephone and screened to

determine eligibility. To be eligible, individuals had to have gambled online, at a casino

or played any casino games outside of a casino, gambled on a slot machine or video

lottery terminal, bet on horses at a racetrack, or played dice games for money, at least

once over the past 90 days to ensure that participants had at least some recent gambling

experience.[6] 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 problem gambling given ethical concerns that exposure to gambling cues could

theoretically trigger a return to problem gambling (Binde, 2009). Participants received

$30 for their participation.

Using the Problem Gambling Severity Index (PGSI) from the Canadian Problem

Gambling Index (CPGI; Ferris & Wynne, 2001), participants consisted of 11 non-

problem gamblers (i.e., total score of 0), 27 low-risk gamblers (i.e., total score ranging

from 1 to 2), 39 moderate-risk gamblers (i.e., total score ranging from 3 to 7), and 19

high-risk/problem gamblers (i.e., total score of 8 or above). Total scores on the PGSI

ranged from 0 to 21 ($M = 4.73$; $SD = 4.57$).

Measures

Problem gambling symptoms. The nine-item PGSI scale of the CPGI (Ferris &

Wynne, 2001) was used to assess the presence and severity of gambling problems. The

PGSI contains five items that assess problem gambling behaviour (e.g., "Have you felt

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[6] Due to difficulties with participant recruitment and time constraints, I decided to broaden the gambling
frequency criterion from gambling at least three times over the past 60 days (the criterion used in Study 1
of this dissertation) to gambling at least once over the past 90 days.

that you might have a problem with gambling?") and four items addressing the negative

consequences of gambling (e.g., "Has gambling caused any financial problems for you or

your household?"). For each item, respondents indicated the frequency with which they

had 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*). Previous research

indicates that the PGSI has good psychometric properties. Specifically, Ferris and Wynne

(2001) found that the PGSI demonstrated adequate reliability in terms of both internal

consistency ($\alpha = .84$) and test-retest reliability ($r = .78$). The PGSI has also been found to

demonstrate overall good validity (i.e., construct, criterion, and content validity) as a

measure of problem gambling (Ferris & Wynne, 2001). Further, an independent study

found that compared to other gambling measures [e.g., South Oaks Gambling Screen

(SOGS)], the PGSI demonstrated favourable psychometric properties in a sample of

regular gamblers (i.e., individuals who reported gambling at least once per week) in terms

of construct validity, classification validity, and item difficulty (McMillen & Wenzel,

2006). In the present study, the PGSI demonstrated good internal consistency ($\alpha = .87$).

Self-reported gambling outcome expectancies. The 23-item Gambling

Expectancy Questionnaire (GEQ; Gillespie et al., 2007a) was used to assess self-reported

gambling outcome expectancies at both pre- and post-cue exposure. The GEQ consists of

three positive expectancy subscales (enjoyment/arousal, self-enhancement, and money)

and two negative expectancy subscales (over-involvement and emotional impact).

Participants were asked to rate, using a seven-point scale ranging from 1 (*no chance*) to 7

(*certain to happen*), the extent to which they expected each outcome (e.g., "I win

money"; "I feel excited"; I will feel guilty"; "I will not be able to stop") to occur when

gambling. Gillespie and colleagues (2007a) reported that each of the subscales of the GEQ demonstrated adequate to good internal reliability. In order to obtain an overall measure of participants' positive gambling outcome expectancies, the three positive expectancy subscales of the GEQ were combined in the present study (see Stewart et al., 2014; i.e., Study 1 of this dissertation). This combination resulted in a 15-item scale assessing positive gambling outcome expectancies. The two negative expectancy subscales of the GEQ were also combined to obtain an overall measure of participants' negative gambling outcome expectancies (see Stewart et al., 2014; i.e., Study 1 of this dissertation). This combination resulted in an 8-item scale assessing self-reported negative gambling outcome expectancies. An examination of the correlations between fitness advertisement cue condition participants' pre- and post-advertisement cue scores on the GEQ revealed excellent test-retest reliability for both the combined positive [r (43) = .91, p < .001] and negative [r (42)= .93, p < .001] gambling expectancy scales of the GEQ. In addition, the 15-item positive gambling expectancy scale of the GEQ demonstrated good reliability at both pre-advertisement (α = .82) and post-advertisement (α = .86) testing times. Further, the 8-item negative gambling expectancy scale demonstrated excellent reliability during both pre-cue (α = .92) and post-cue administration (α = .94) in the present study.

Gambling outcome expectancy RT task. Adapted from the classic affective priming task (Fazio et al., 1986), this RT-based task was used as an indirect (i.e., implicit) measure of gambling outcome expectancies. The task was designed to measure how quickly individuals respond to positive and negative gambling outcome expectancy words (i.e., targets) immediately after being primed by gambling versus control category

(i.e., track and field) pictures (see Appendix A for picture primes).[7] Empirisoft Inc.'s

DirectRT experimental psychology software (Jarvis, 2010) was used to execute the task.

The target word exemplars were selected based on a review of established self-report

measures of gambling outcome expectancies (e.g., GEQ; Gillespie et al., 2007), as well

as synonyms of words from these measures. A total of 10 positive outcome expectancy

words (e.g., "enjoyment", "excitement", "relaxation") and 10 negative outcome

expectancy words (e.g., "anxiety", "tension", "guilt") were used as targets (see Appendix

B for the full list of words used as targets). In addition, 10 gambling and 10 non-

gambling pictures (i.e., track and field) were used as primes. The task consisted of two

phases: pre-cue test phase (i.e., baseline) and post-cue test phase. Presented to

participants as one continuous series, each test phase began with one block of four

practice trials, and two blocks with 20 test trials each (i.e., the total number of trials was

88 across the two phases). The stimuli presented during the practice trials were different

than those presented during the test trials. During each test phase, 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.

In the *pre-cue test phase*, each trial began with the presentation of either a

gambling or non-gambling (i.e., track and field) picture in the centre of the screen which

was displayed for 200 milliseconds (ms). This was immediately followed by a blank

screen (100 ms), then by the presentation of a target word (in the centre of the screen as

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[7] Track and field was chosen as the control category because it is an activity that is similar in both size and complexity. Specifically, both gambling and track and field are broad categories that encompass a variety of different activities. They are also both activities that could theoretically be associated with both positive outcomes (excitement, winning) and negative outcomes (frustration, tension).

well) that had either a positive (e.g., "excitement") or negative (e.g., "tension")

connotation. Participants were instructed to respond to words that had a negative

connotation by clicking the "Z" key on the keyboard, and to respond to words that have a

positive connotation by clicking the "/" key (which was reversed for half of participants).

The length of the inter-trial interval was 1000 ms. The *post-cue test phase* was identical

to the pre-cue test phase. Participants were told that they needed to pay attention to the

pictures presented on the screen as their memory for them may be tested later. They were

also informed that the first four trials of each test phase were practice trials.

Procedure

Upon arrival at the laboratory, participants provided informed consent and were

randomly assigned to the gambling advertisement or the fitness advertisement cue

condition. Participants then engaged in the first test phase of the gambling outcome

expectancy RT task (*pre-cue test phase*). Immediately following the *pre-cue test phase*,

participants completed the first (baseline) administration of the GEQ (Gillespie et al.,

2007a) and a demographic questionnaire. Upon completing these questionnaires,

participants were exposed to the cue manipulation to which they had been randomly

assigned (either the *gambling advertisement* or *fitness advertisement cue condition*). In

the *gambling advertisement cue condition* ($n = 51$), participants viewed 20

advertisements, which were each displayed for 3000 ms. Embedded within 10 gambling

advertisements were 10 restaurant advertisements. These latter advertisements were

included in order to increase ecological validity, as individuals are rarely exposed to just

one form of print advertisement when viewing advertisements in everyday life. In the

fitness advertisement cue condition (*n* = 45), participants also viewed 10 advertisements, which were each displayed for 3000 ms. Participants in this condition viewed 10 fitness advertisements, which served as the control advertisements[8], embedded within the same 10 restaurant advertisements viewed by participants in the gambling advertisement condition. The order in which the advertisements were presented to participants in both conditions was randomized for each participant. Further, each advertisement used in the cue exposure manipulation was rated by an independent sample and those ratings were used to create three sets of advertisements (i.e., gambling, restaurant, fitness) that were balanced in terms of mean levels of visual complexity, salience, appeal/attractiveness, and effectiveness (see Appendix C for advertisements used during cue exposure manipulation).

Prior to viewing the advertisements, participants in both conditions were informed that they would view some advertisements that were either portrait or landscape in orientation. Following this instruction, participants were shown a picture of a rectangle depicting a portrait orientation and then a picture depicting a landscape orientation. Participants were informed that after viewing each advertisement, a black screen would appear displaying two rectangles in the corners of the screen corresponding to a landscape and portrait orientation and they must indicate whether the advertisement they had just seen was portrait or landscape in orientation. Participants were asked to respond to pictures that had a portrait orientation by pressing the "Q" key on the keyboard, and to

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[8] Fitness advertisements were chosen as the control advertisement category because they promote a range of different activities that are similar in both size and complexity to gambling advertisements. In addition, this category of advertisements could theoretically be associated with both positive outcomes ("esteem", "relaxation") and negative outcomes ("guilt", "frustration"). Fitness advertisements were also chosen to correspond with the non-gambling (i.e., track and field) picture primes included in the gambling outcome expectancy RT task, as were the gambling advertisements chosen to correspond with the gambling picture primes.

respond to pictures that had a landscape orientation by pressing the "P" key (which was reversed for half of participants). Previously used in the assessment of implicit alcohol cognitions (Wiers, Rinck, Kordts, Houben, & Strack, 2010), the purpose of this orientation identification task was to increase participants' cognitive load while viewing the advertisements. Given that cognitive resources are often devoted to other tasks when viewing advertisements in real life (e.g., viewing a billboard gambling advertisement while driving), this task was designed to increase the ecological validity of the gambling cue exposure manipulation by permitting participants to view each advertisement while not drawing their attention to the nature of the advertisements. The first four trials of the task were practice trials using scenic pictures rather than advertisements, and the same scenic pictures were used in both advertisement cue exposure conditions.

Following exposure to the advertisements, participants engaged in the *post-cue test phase* of the RT task. Participants then completed a second administration of the GEQ (Gillespie et al., 2007a), after which they were debriefed and compensated $30.

Results

Preliminary Analyses[9]

The data in both the pre-cue and post-cue exposure phases for the gambling outcome expectancy RT task contained a small proportion of extremely slow and fast responses. Respectively, such responses typically reflect momentary inattention and

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[9] An inspection of missing data revealed missing data points for two participants on the GEQ (Gillespie et al., 2007a). Specifically, one participant failed to answer four items on the positive subscale and all items of the negative subscale of the GEQ during both the pre-cue and post-cue administrations of the questionnaire. One participant also failed to respond to six items of the negative subscale of the GEQ during the post-cue administration of the measure. As these participants were missing data from the majority of items of the negative subscale of the GEQ, their data points were not included in analyses examining the negative subscale of the GEQ. In contrast, the four missing data points on the positive subscale of the GEQ during both administrations of the scale were replaced with the participant's own item-level means on the remaining items comprising this GEQ subscale prior to the calculation of GEQ subscale scores (i.e., scores were prorated).

responses initiated prior to receiving the stimulus (Greenwald, McGhee, & Schwartz, 1998). They are considered problematic because they lead to a distortion of means and inflation of variance and represent phenomena outside of interest. Following the recommended procedures for correcting such responses (Greenwald et al., 1998), values below 300 ms were recoded to 300 ms and those above 3000 ms were recoded to 3000 ms. Overall, errors in responses to target words were quite rare, occurring on 6.7% of trials in the pre-cue exposure phase and 6.3% of trials in the post-cue exposure phase. Given this low error rate, all responses were analyzed. To reduce the characteristic positive skewness of RT latencies and normalize the distribution, a log transformation was performed on the RT data prior to calculating mean RT scores (see Fazio, 1990; Greenwald et al., 1998). To facilitate interpretation, raw (untransformed) RTs are displayed. At each testing time (i.e., pre- and post-advertisement cue exposure), four composite RT scores were calculated for each participant. These were the mean RTs for trials involving each of the four prime-target combinations (i.e., gambling prime-positive outcome expectancy target; gambling prime-negative outcome expectancy target; non-gambling prime-positive outcome expectancy target; non-gambling prime-negative outcome expectancy target).

In order to confirm random assignment and the equivalency of groups by experimental condition, analyses were conducted to determine whether there were any systematic, pre-existing differences between the gambling advertisement cue condition and the fitness advertisement cue condition on level of problem gambling severity, age, and sex. Independent samples t-tests revealed no significant differences between the gambling and fitness advertisement condition in level of problem gambling severity

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[t (94) = .95, p = .33] or age [t (94) = 1.34, p = .18]. Further, a chi square test revealed no significant sex differences between the two advertisements conditions, χ^2 (1, N = 96) = .00, p = 1.00. As such, it was deemed that any differences observed between groups may be attributed to the effect of the manipulation, and not to pre-existing or systematic differences between groups in terms of problem gambling severity, age, or sex.

Gambling Outcome Expectancy RT Task Performance

Prior to testing our hypotheses, I assessed for the presence of any cue exposure condition differences in RTs to positive or negative outcome expectancy targets when preceded by gambling versus non-gambling primes during the pre-cue exposure phase (i.e., baseline) of the RT task. In order to do so, two separate 2 x 2 mixed factorial ANOVAs were conducted – one for the RT data for the positive outcome expectancy targets, and the other for the RT data for the negative outcome expectancy targets. In both ANOVAs, the between subjects factor was cue exposure condition (gambling advertisement cue versus fitness advertisement cue condition) and the within subjects factor was type of prime (gambling versus non-gambling). The analyses confirmed that during the pre-cue exposure phase, there were no significant condition [F (1, 94) = .1.32, p = .25], prime [F (1, 94) = .002, p = .96], or interaction effects [F (1, 94) = .98, p = .33] on RTs to positive outcome expectancy targets. Similarly, there were no significant condition [F (1, 94) = 1.69, p = .20], prime [F (1, 94) = .18, p = .67], or interaction effects [F (1, 94) = .81, p = .37] on RTs to negative outcome expectancy targets during the pre-cue exposure phase. These results indicated that there was no tendency to associate gambling primes with positive (or negative) outcome expectancies in either of the cue conditions (gambling advertisement cue or fitness advertisement cue) prior to

advertisement cue exposure (see Table 4.2 for descriptive statistics of RTs to positive and negative expectancy targets when preceded by gambling and non-gambling primes for the gambling advertisement cue and fitness advertisement cue conditions during the pre-cue exposure phase). The absence of effects at the pre-cue advertisement exposure phase meant that baseline RTs did not need to be controlled in the hypothesis tests.

Following the analytic strategy employed in our previous research in this area (Birch, et al., 2008; Stewart et al., 2014), I then analyzed the RT data on the post-cue phase of the gambling outcome expectancy RT task with relation to the initial hypotheses by decomposing the full 2 (advertisement cue manipulation: gambling advertisement cue versus fitness advertisement cue) x 2 (primes: gambling versus non-gambling) x 2 (targets: positive versus negative outcome expectancy words) table of means into a series of *a priori* planned comparisons. These planned comparisons were used in order to analyze the comparisons of primary interest first, using conventional alpha levels (Tabachnick & Fidell, 2007). Specifically, a series of directional paired-samples t-tests were used to compare RTs to categorize outcome expectancy targets after exposure to gambling versus non-gambling primes at the post-advertisement cue manipulation testing time, for each cue exposure condition and target type separately.

Consistent with predictions, participants in the gambling advertisement cue condition responded significantly faster to positive outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes, $t(50) = 1.78$, $p = .04$, $\eta_p^2 = .06$. This facilitation of positive outcome expectancies by gambling primes was not observed in the fitness advertisement cue condition, as participants exposed to fitness advertisements did not significantly differ in RTs to positive outcome expectancy words

when they were preceded by gambling primes relative to non-gambling primes, $t(44) = -1.03$, $p = .16$, $\eta_p^2 = .024$. When examining RTs to negative outcome expectancy targets among participants in the gambling advertisement cue condition, no significant differences were found between participants' RTs to targets preceded by gambling primes versus non-gambling primes, $t(50) = .35$, $p = .36$, $\eta_p^2 = .002$. Similarly, there were no significant differences in the RTs to negative outcome expectancy targets among participants in the fitness advertisement cue condition when they were exposed to gambling primes versus non-gambling primes, $t(44) = .24$, $p = .41$, $\eta_p^2 = .001$. Descriptive statistics for RTs to positive and negative expectancy targets when preceded by gambling and non-gambling primes for the gambling advertisement cue and fitness advertisement cue conditions during the post-cue exposure phase are displayed in Table 4.3.

Self-Reported Gambling Outcome Expectancies

Prior to testing our predictions, I examined whether any group differences existed in self-reported positive and negative gambling outcome expectancies (as measured by the GEQ; Gillespie et al., 2007a), prior to advertisement cue exposure (i.e., at baseline), using two separate independent-samples t-tests. In both t-tests, the independent variable was advertisement cue condition (gambling advertisement cue versus fitness advertisement cue). In the first t-test, the dependent variable was self-reported positive gambling outcome expectancies, whereas the dependent variable in the second t-test was self-reported negative gambling outcome expectancies. The analyses revealed that there were no significant condition differences in either self-reported positive gambling outcome expectancies [gambling advertisement cue video: $M = 4.42$, $SD = .64$; fitness

advertisement cue: $M = 4.24$, $SD = .78$; $t(94) = 1.26$, $p = .21$, $d = .25$] or negative

gambling outcome expectancies [gambling advertisement cue: $M = 3.01$, $SD = 1.39$;

fitness advertisement cue: $M = 2.68$, $SD = 1.06$; $t(93) = 1.29$, $p = .20$, $d = .27$] prior to

the cue exposure. This indicated that random assignment to cue exposure conditions was

effective in equating the two conditions on their baseline (pre-cue exposure) positive and

negative gambling outcome expectancies. The absence of effects at the pre-cue exposure

(baseline) phase meant that baseline GEQ scores did not need to be controlled in the

hypothesis tests.

To assess the effect of gambling advertisements on self-reported gambling

outcome expectancies following cue exposure, two separate independent samples t-tests

were conducted. In the first t-test, the dependent variable was self-reported positive

gambling outcome expectancies, whereas the dependent variable in the second t-test was

self-reported negative gambling outcome expectancies. Consistent with my predictions,

no significant differences were found between the gambling advertisement cue condition

($M = 4.35$, $SD = .76$) and fitness advertisement cue condition ($M = 4.13$, $SD = .85$) on the

self-report measure of positive gambling outcome expectancies $t(94) = 1.33$, $p = .19$, $d = $

$.27$. Similarly, an independent samples t-test revealed that participants in the gambling

advertisement cue condition ($M = 2.87$, $SD = 1.51$) and fitness advertisement cue

condition ($M = 2.40$, $SD = 1.18$) did not significantly differ in their self-reported negative

gambling outcome expectancies after exposure to the cue manipulation, $t(92) = 1.67$, $p = $

$.10$, $d = .35$.

Discussion

Despite research highlighting the importance of outcome expectancies in addictive behaviours (e.g., Sayette, 1999), along with the increased recognition of disordered gambling as an addiction (e.g., DSM-5; APA, 2013), researchers have only recently begun to assess the role of outcome expectancies in gambling. Further, little research has assessed the impact of gambling cues on the outcomes individuals perceive will occur from gambling. To increase our understanding of this important topic and extend our previous research in this area (Stewart et al., 2014; i.e., Study 1 of this dissertation), the present study assessed whether exposure to gambling cues of relatively short duration (i.e., gambling advertisements) activates implicit and explicit gambling outcome expectancies.

Cue Condition Differences in Positive Gambling Outcome Expectancies

Consistent with predictions, results revealed that participants in the gambling advertisement cue condition responded significantly faster to positive outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes. This facilitation of positive outcome expectancies by gambling primes was not observed in the fitness advertisement cue condition, as participants exposed to fitness advertisements did not significantly differ in RTs to positive outcome expectancy words when they were preceded by gambling primes relative to non-gambling primes. Thus, results suggest that brief exposure to gambling advertisements led to an increased facilitation of implicit positive gambling outcome expectancies among regular gamblers. Importantly, these findings reveal that the activation of implicit positive gambling outcome expectancies among regular gamblers is specific to gambling advertisement

exposure, as fitness advertisement exposure did not lead to a similar activation of implicit positive outcome expectancies for a fitness activity (i.e., track and field) in this population. When examining the effect of gambling advertisement exposure on the activation of explicit positive gambling outcome expectancies, a different pattern of results was revealed. Specifically, a facilitation of positive gambling outcome expectancies was not observed explicitly, as evidenced by the lack of significant differences between the gambling advertisement and fitness advertisement cue condition on the self-report (direct) measure of positive gambling outcome expectancies.

The present findings extend our previous research examining the role of gambling cues on the activation of gambling outcome expectancies (Stewart et al., 2014; i.e., Study 1 of this dissertation). In this previous study, it was found that exposure to a five-minute video of typical gambling scenes activated both implicit and explicit positive gambling outcome expectancies. In contrast, only implicit positive gambling outcome expectancies were activated following relatively brief exposure to gambling advertisements in the present study. These divergent findings may be attributed to differences between the two studies in processing duration of gambling cues and availability of sufficient cognitive resources to allow for conscious, deliberative processing. Specifically, it appears that the use of a gambling cue of shorter duration (i.e., gambling advertisements) in the present study, along with the additional processing requirements during advertisement cue exposure (i.e., asking participants to indicate the orientation of the advertisements in order to simulate the typical real-world experience of advertisement exposure under dual processing conditions), led to the activation of implicit, positive gambling outcome expectancies in a regular gambler's memory.

However, this relatively brief duration gambling cue did not appear to allow a regular gambler the time or attentional resources to engage in the conscious, deliberative processing of gambling outcome expectancies that is captured by direct assessment modes. Thus, the present study provides an extension of our previous research in this area (Stewart et al., 2014; Study 1 of this dissertation) by demonstrating that brief exposure to an ecologically valid gambling cue (i.e., actual gambling advertisements) is capable of activating implicit but not explicit positive gambling outcome expectancies. These results are consistent with previous findings from the broad cognitive science literature revealing an activation of implicit but not explicit cognitions following brief duration stimulus exposure (e.g., Jacoby & Dallas, 1981; Parkin, Reid, & Russo, 1990; Murphy & Zajonc, 1993). Importantly, the current results extend previous findings from the broad field of cognitive science by demonstrating the applicability of such findings to addictive behaviours generally and gambling in particular.

The present findings also build upon the emerging literature on the impact of gambling advertisements on gamblers' attitudes and behaviours (e.g., Binde, 2014; Derevensky et al., 2010; Fried et al., 2010; Friend & Ladd, 2009; Sklar & Derevensky, 2010) by presenting a potential cognitive mechanism by which such advertisements may influence gambling behaviour. Specifically, an activation of implicit positive gambling outcome expectancies may help explain why gambling advertisements have been found to trigger impulses to gamble and make it more difficult for problem gamblers to reduce or abstain from gambling (Binde, 2009). In order to determine whether this is the case, it is important that future research examine whether exposure to gambling advertisements predicts craving to gamble, gambling abstinence self-efficacy, as well as subsequent

gambling behaviour, and whether these effects are mediated by the activation of implicit positive gambling outcome expectancies.

Lastly, the present findings are consistent with the reflective-impulsive model of social behaviour (Strack & Deutsch, 2004), which posits that behaviour and social cognition are the result of two interactive systems: the reflective system and the impulsive system. In the reflective system, behaviour is said to result from a conscious, non-automatic decisional process whereas in the impulsive system, behaviour is said to occur through unconscious, automatic associations. In line with this model, results suggest that relatively brief exposure to gambling advertisements under divided attention conditions activates the impulsive system of behaviour, as evidenced by the facilitation of participants' implicit positive gambling outcome expectancies. However, results suggest that participants did not engage in the conscious, non-automatic decisional process that is characteristic of the reflective system, given the brief duration of the cue exposure (i.e., 30 seconds) and additional processing requirements during the cue exposure.

Cue Condition Differences in Negative Gambling Outcome Expectancies

Consistent with predictions, exposure to gambling advertisements did not activate implicit or explicit negative gambling outcome expectancies. Specifically, there were no significant differences in RTs to negative outcome expectancy targets among participants in the gambling advertisement cue condition when they were exposed to gambling primes versus non-gambling primes. Similarly, participants in the fitness advertisement cue condition did not significantly differ in their RTs to negative outcome expectancy targets when they were exposed to gambling primes versus non-gambling primes. Moreover, results revealed no significant differences between the gambling advertisement cue

condition and fitness advertisement cue condition in self-reported negative gambling outcome expectancies after exposure to the cue manipulation. These findings are consistent with our previous research on the effects of a five-minute video of typical gambling scenes on the activation of implicit and explicit gambling outcome expectancies, which showed that the activating effects of cue exposure were specific to positive gambling outcome expectancies (Stewart et al., 2014; i.e., Study 1 of this dissertation). Further, the present results concur with previous research in both the alcohol (e.g., Houben & Wiers, 2008; Jajodia & Earleywine, 2003; Jones et al., 2001; McCarthy & Thompsen, 2006) and gambling fields (e.g., Brevers et al., 2013; Yi & Kanetkar, 2010) suggesting that positive outcome expectancies may be more important in understanding addictive behaviours than negative gambling outcome expectancies.

Although exposure to gambling advertisements was not found to activate implicit or explicit negative gambling outcome expectancies, different results may have been found had an alternative type of gambling advertisement been used. Specifically, the present study examined the effect of exposure to advertisements promoting gambling on the activation of gambling outcome expectancies. In other words, the chosen ads were likely designed with the purpose of creating or activating positive outcome expectancies. As a result, the effect of exposure to other types of gambling advertisements (e.g., those promoting responsible gambling) on gamblers' outcome expectancies is not known. Given that responsible gambling advertisements aim to educate gamblers' on the risks associated with gambling, as well as the low probabilities of winning, it may be the case that exposure to responsible gambling advertisements activates negative but not positive gambling outcome expectancies. In the alcohol field, recent research investigating the

impact of alcohol warning labels aimed at contradicting positive alcohol outcome expectancies (e.g., "Alcohol does not reduce your tension") found that exposure to such advertisements was associated with more negative implicit attitudes toward alcohol, as well as increased negative explicit alcohol outcome expectancies (Glock & Krolak-Schwerdt, 2013). In order to determine whether such findings are applicable in the gambling domain, it is important that future research examine potential differences in gamblers' implicit and explicit gambling outcome expectancies following exposure to advertisements promoting gambling versus advertisements encouraging responsible gambling.

Limitations

It is important to acknowledge some limitations of the current research. As discussed in more detail in Chapter 7 of this dissertation, the present study used only one indirect measure of gambling outcome expectancies, which was based upon the affective priming paradigm (Fazio et al., 1986; Fazio, 2001). Although measures stemming from this paradigm have been found to reliably assess implicit cognitions in the addictions field (e.g., Reich, Below, & Goldman, 2010; Roefs et al., 2011), future research may wish to make use of other indirect measures, such as the Implicit Association Test (IAT task; Greenwald et al., 1998) or word association tests (Stacy, Ames, & Grenard, 2006; Stacy & Wiers, 2010), when investigating the impact of gambling cues on the activation of implicit gambling outcome expectancies.

A further caveat of the present study relates to the fact that differences in the activation of gambling outcome expectancies based on level of problem gambling severity were not examined. Specifically, I was not able to assess whether brief exposure

to gambling advertisements led to an increased facilitation of gambling outcome expectancies among high-risk/problem gamblers relative to those at low-risk for gambling-related problems due to the fact that the sample was comprised of relatively few high-risk/problem gamblers (as measured by the PGSI; Ferris & Wynne, 2001) compared to low-risk gamblers. Given that individuals experiencing gambling-related problems have been found to be more likely to view gambling advertisements (Deverensky et al., 2010), as well as endorse positive expectancies in relation to gambling outcomes (e.g., Gillespie et al., 2007b; Shead & Hodgins, 2009; Wickwire et al., 2010), it is important that future research examine whether the effect of gambling advertisements on the activation of implicit and explicit gambling outcome expectancies differs depending upon level of problem gambling severity. Relatedly, although results of the current research concur with and extend our previous findings in this area (Stewart et al., 2014; i.e., Study 1 of this dissertation), the present study did not include a control group of non-gamblers. As a result, it is not known whether gamblers respond to this RT task differently than non-gamblers. In order to address this limitation, future research should examine whether gamblers display a stronger activation of gambling outcome expectancies following gambling cue exposure than non-gamblers.

An additional potential limitation of the current research involves the cognitive load aspect included during the advertisement cue manipulation. Specifically, all participants underwent the same task to increase their cognitive load during the advertisement cue exposure. Although this task was included to increase the ecological validity of the advertisement cue exposure (as individuals' cognitive resources are often being used on other tasks while viewing gambling advertisements), it is possible that

different results may have been found had such a cognitive load aspect not been included or had cognitive load varied as an experimental manipulation. Indeed, according to dual-process models of social behaviour, such as the reflective-impulsive model (Strack & Deutsch, 2004), when individuals' cognitive or self-regulatory resources are depleted in a given situation, behaviour is said to be more strongly influenced by automatic (i.e., implicit) associations activated from the associative memory network than by deliberative and reflective (i.e., explicit) consideration. In contrast, when individuals' cognitive or self-regulatory resources are intact, the opposite is said to occur (i.e., behaviour is more strongly influenced by deliberative and reflective consideration). Applying this line of reasoning to the current research, it may be the case that brief exposure to gambling advertisements activates both implicit and explicit positive gambling outcome expectancies under undivided attention conditions (i.e., when cognitive resources are not being used on some other task). In order to assess whether this is the case, it is important that future research examine whether exposure to gambling cues activates implicit and/or explicit gambling outcome expectancies when gamblers' cognitive resources are temporarily depleted by high versus low/no cognitive load.

Lastly, it is important to note a limitation inherent to the RT task used in the present study, as well as the control advertisements used during the cue exposure manipulation. Specifically, the present study examined associations between gambling and outcome expectancies relative to associations with a control activity (i.e., track and field), and used fitness advertisements as the control advertisements. Although I chose a control activity and control advertisements that I believe are comparable to gambling in terms of both size and complexity (i.e., each involve a range of activities and could

readily be associated with both positive and negative outcomes), it is not known whether a similar pattern of results would occur had a different activity or different advertisements been used as controls. As such, it is important that future research examine the associations between gambling advertisements and the activation of implicit and explicit outcome expectancies relative to associations with different activities.

Despite these limitations, results of this study have a number of important practical and clinical implications. As these implications are relevant to the present study as well as this dissertation research as a whole, they are discussed in Chapter 7 of this dissertation.

Conclusion

In contrast to the large body of research examining outcome expectancies in the alcohol field, researchers have only recently begun to investigate the role of outcome expectancies in gambling. In order to address this gap in the literature and extend our previous research in this area (Stewart et al., 2014; i.e., Study 1 of this dissertation), the current study assessed whether relatively brief exposure to gambling advertisements facilitates the activation of implicit and/or explicit gambling outcome expectancies. As predicted, findings from the current research indicated that brief exposure to gambling advertisements directly prior to the assessment of gambling outcome expectancies differentially activates positive and negative gambling outcome expectancies. In relation to positive gambling outcome expectancies, results revealed that exposure to gambling advertisements selectively activates implicit, but not explicit, positive gambling outcome expectancies. In line with predictions, activation of negative gambling outcome expectancies was not observed either implicitly or explicitly. The present findings concur

with and extend our preliminary investigation of the role of gambling cues on the implicit and explicit activation of gambling outcome expectancies (Stewart et al., 2014; i.e., Study 1 of this dissertation). Importantly, results of the current research highlight the relevance of outcome expectancies in the gambling field and point to the need for further research in this area in order to increase our understanding of the role of outcome expectancies in gambling.

Table 4.1

Demographic Information Reported by Sample Participants in Study 2

	% (*n*) of Sample
Ethnicity (*N* = 96)	
White	68.8 (66)
Black	1.0 (1)
Native Canadian/First Nations	8.3 (8)
Chinese	3.1 (3)
South Asian	12.5 (12)
South East Asian	2.1 (2)
Arab/West Asian	1.0 (1)
Other	3.1 (3)
Marital Status (*N* = 96)	
Single	55.2 (53)
Long-term relationship	22.9 (22)
Married/common-law	15.6 (15)
Divorced/separated	6.3 (6)
Annual Income (*N* = 95)	
Less than $20,000	48.4 (46)
$20,000 - $40,000	28.4 (27)
$41,000 - $60,000	16.8 (16)
$61,000 – $80,000	5.3 (5)
$100,000 or more	1.1 (1)
Level of Education (*N* = 96)	
Some high school	4.2 (4)
High school graduate	11.5 (11)
Some college/university	33.3 (32)
College/university graduate	28.1 (27)
Some post-graduate	6.3 (6)
Post-graduate degree	16.7 (16)

Table 4.2

Means and Standard Deviations of Pre-Cue RTs (in milliseconds) to Positive and

Negative Expectancy Words upon Presentation of Gambling and Non-Gambling Primes

for the Fitness Advertisement and Gambling Advertisement Cue Conditions

	Gambling Primes		Non-Gambling Primes	
	M	*SD*	*M*	*SD*
Fitness Ad Cue Condition				
Positive target words	879.94	229.64	901.22	256.74
Negative target words	895.81	256.06	916.34	271.25
Gambling Ad Cue Condition				
Positive target words	958. 23	287.64	942.35	291.80
Negative target words	988.62	313.97	985.28	338.82

Table 4.3

Means and Standard Deviations of Post-Cue RTs (in milliseconds) to Positive and Negative Expectancy Words upon Presentation of Gambling and Non-Gambling Primes for the Fitness Advertisement and Gambling Advertisement Cue Conditions

	Gambling Primes		Non-Gambling Primes	
	M	*SD*	*M*	*SD*
Fitness Ad Cue Condition				
Positive target words	790.55	157.41	778.43	220.60
Negative target words	764.11	173.42	767.32	158.79
Gambling Ad Cue Condition				
Positive target words	779. 47*	180.64	815.83*	188.90
Negative target words	812.36	235.31	819.26	239.68

Note. *Indicates a significant difference between means ($p = .04$)

CHAPTER 5. PROLOGUE TO STUDY 3A AND STUDY 3B

Consistent with findings from the alcohol outcome expectancy literature (e.g., Palfai & Ostafin, 2003; Wall, Hinson, McKee, & Goldstein, 2001), results from Study 1 and Study 2 of this dissertation demonstrated an activation of positive but not negative gambling outcome expectancies following exposure to gambling cues. In light of such findings, it was important to assess whether implicit and explicit positive gambling outcome expectancies were capable of independently predicting gambling outcomes, as has been previously demonstrated in the alcohol outcome expectancy field (e.g., Wiers et al., 2002). Thus, the goals of Study 3a and Study 3b were to investigate whether implicit and explicit positive gambling outcome expectancies independently predicted two important indices of gambling behaviour (i.e., amount of time and money spent gambling; Study 3a), as well as problem gambling severity (Study 3b). Specifically, this set of studies aimed to assess the incremental contributions of the direct (i.e., explicit) and indirect (i.e., implicit) measures of positive gambling outcome expectancies in the prediction of self-reported gambling behaviour and problem gambling severity. Findings stemming from this research may have important implications for the prevention and treatment of gambling problems among those who hold positive expectancies regarding the outcomes of gambling.

CHAPTER 6. STUDY 3A AND STUDY 3B: PREDICTING GAMBLING BEHAVIOUR AND PROBLEMS FROM IMPLICIT AND EXPLICIT POSITIVE GAMBLING OUTCOME EXPECTANCIES [10]

Abstract

In two studies, I investigated whether implicit and explicit positive gambling outcome expectancies were independent predictors of gambling behaviour (i.e., amount of time spent and money risked gambling; Study 3a) and problem gambling severity (Study 3b). In both studies, implicit positive gambling outcome expectancies were assessed by having regular gamblers ($N = 58$ in Study 3a; $N = 96$ in Study 3b) complete a gambling outcome expectancy reaction time (RT) task adapted from the affective priming task (Fazio Sanbonmatsu, Powell, & Kardes 1986). Explicit positive gambling outcome expectancies were assessed by having participants complete a self-report measure of positive gambling outcome expectancies (Gillespie, Derevensky, & Gupta, 2007a). Consistent with hypotheses, results revealed that both the RT task and self-report measure of positive gambling outcome expectancies significantly contributed unique as well as shared variance to the prediction of self-reported time spent and money risked gambling (Study 3a) and problem gambling severity (Study 3b). Results highlight the importance of using both direct and indirect assessment modes when examining the role of outcome expectancies in gambling. In addition, results indicate that this novel RT task is a useful measure of gambling outcome expectancies in terms of contributing unique information to the prediction of gambling behaviour and gambling-related problems.

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[10] This manuscript is adapted from 'Stewart, M.J., Stewart, S.H., Yi, S., & Ellery, M. (2014). Predicting gambling behaviour and problems from implicit and explicit positive gambling outcome expectancies' and is currently under review at a peer-reviewed journal. As first author of this article, I played a lead role in designing the study, organizing and managing participant recruitment, and collecting data. In addition, I conducted the data analyses, wrote the manuscript and revised the manuscript in accordance with suggestions from my co-authors.

Introduction

Outcome expectancies involve the perceived positive or negative effects that individuals anticipate may occur from engaging in a given behaviour. Over the past 25 years, an abundance of research has highlighted the role of outcome expectancies in addictive behaviours, such as alcohol use (Goldman, Darkes, & Del Boca, 1999; Sayette, 1999). Indeed, alcohol outcome expectancies have been found to be associated with increased alcohol consumption and alcohol-related problems (Goldman et al., 1999). In light of the theoretical significance of outcome expectancies in the alcohol field, along with the similarities between alcohol use and gambling as addictive behaviours (APA, 2013; Petry, 2006; Potenza, 2006), it is natural to postulate that outcome expectancies may also be relevant in the gambling domain. However, in contrast to the large body of research investigating the role of outcome expectancies on alcohol use behaviours and alcohol-related problems, researchers have only recently turned their attention toward investigating the role of outcome expectancies in gambling. Similar to research on alcohol outcome expectancies, the emerging gambling literature has found that gambling outcome expectancies are associated with increased levels of gambling behaviour and gambling-related problems (e.g., Gillespie, Derevensky, & Gupta, 2007b; Shead & Hodgins, 2009; St-Pierre, Temcheff, Gupta, Derevensky, & Paskus, 2014; Wickwire, Whelan & Meyers, 2010).

Although previous research on gambling outcome expectancies has been helpful in elucidating the role of outcome expectancies in gambling, such research has primarily relied on direct modes of assessment (e.g., self-report questionnaires). *Direct* or *explicit* measures refer to a class of measurement procedures that tap into cognitions and

behaviours thought to be deliberate and controlled, and those that involve conscious

engagement (De Houwer, 2006). Despite significant research advances made using

explicit modes of assessment, as well as the importance of assessing outcome

expectancies via explicit measures, its limitations have been increasingly recognized in

the alcohol outcome expectancy literature (e.g., Kramer & Goldman, 2003; Palfai &

Ostafin, 2003). For example, it is unlikely that a specific episode of drinking is the result

of a deliberate and conscious consideration of the expected outcomes of drinking – the

construct reflected in self-report measures of alcohol outcome expectancies. Additional

limitations of explicit modes of assessment (i.e., self-report) include social desirability

bias, acquiescence and extreme responding, and demand characteristics (Paulus &

Vazire, 2009).

Influenced by cognitive psychology, addiction researchers have increasingly

adopted the view that outcome expectancies are represented in the associative memory

network (Goldman et al., 1999; Stacy, 1997). In accordance with this view, gambling

outcome expectancies are operationalized as the speed with which the concept of

gambling (or exposure to gambling cues) activates a given outcome expectancy in an

individual's memory. For example, individuals who have a very strong positive outcome

expectancy of gambling should experience an increased activation of the positive

outcome expectancy when exposed to gambling activities or gambling cues compared to

those with weak positive gambling outcome expectancies. In order to assess individual

differences in the strength of outcome expectancies, addiction researchers have

increasingly employed *indirect* or *implicit* measures, such as reaction time (RT) tasks, in

conjunction with direct measures (Kramer & Goldman, 2003; Wiers et al., 2002). In

contrast to direct measures, *indirect* or *implicit* measurement procedures assess attitudes and cognitions in an automatic manner, are said to be unconscious and involuntary in nature, and influence individuals' memory without explicit recall or introspection (De Houwer, 2006; Wiers et al., 2002).

Consistent with dual-process models of social behaviour, such as the reflective-impulsive model (Strack & Deutsch, 2004), both direct (e.g., self-report) and indirect (e.g., RT tasks) measures can be considered complementary in assessing outcome expectancies in that self-report measures assess deliberative determinants of behaviour, while RT measures assess automatic determinants of behaviour (see Wiers & Stacy, 2006b). As direct and indirect measures have been found to tap into different facets of outcome expectancies in the alcohol field (e.g., de Jong, Wiers, van de Braak, & Huijding, 2007; Kramer & Goldman, 2003), and provide unique contributions to the prediction of alcohol use behaviours in the alcohol outcome expectancy area (e.g., Wiers et al., 2002), it may be similarly important to utilize both assessment modes when examining the role of outcome expectancies in the gambling field. However, to date, research has yet to assess the utility of direct and indirect measures of gambling outcome expectancies in independently predicting gambling behaviour and associated gambling problems.

In order to facilitate research in this area, I recently conducted a series of studies (Stewart, Yi, & Stewart, 2014; Stewart, Yi, Ellery, & Stewart, under review; i.e., Study 1 and 2 of this dissertation, respectively) that examined the impact of gambling cue exposure on the activation of implicit and explicit gambling outcome expectancies. Both studies involved the administration of a computerized gambling outcome expectancy RT

task based on the affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986) to measure implicit gambling outcome expectancies (i.e., attention to positive expectancy word targets), and completion of a self-report measure of gambling outcome expectancies (Gillespie, Derevensky, & Gupta, 2007a) to assess explicit gambling outcome expectancies. Consistent with previous research in the alcohol field (e.g., Palfai & Ostafin, 2003; Wall, Hinson, McKee, & Goldstein, 2001), results of these studies revealed an activation of positive but not negative gambling outcome expectancies following exposure to gambling cues. In light of such findings, it appears important to assess whether implicit and explicit positive gambling outcome expectancies are capable of predicting gambling behaviour and gambling problems, as has been previously shown in the alcohol outcome expectancy area (e.g., Kramer & Goldman, 2003; Wiers et al., 2002).

Study Aims and Hypotheses

Therefore, the purpose of the current set of studies was to investigate whether implicit and explicit positive gambling outcome expectancies independently predicted two important indices of gambling behaviour (i.e., amount of time spent and money risked gambling; Study 3a), as well as problem gambling severity (Study 3b). Using the same gambling outcome expectancy RT task and self-report measure of positive gambling outcome expectancies (GEQ; Gillespie et al., 2007a) employed in our previous studies in this area (Stewart et al., 2014; Stewart et al., under review; i.e., Study 1 and Study 2 of this dissertation, respectively), the current research aimed to assess the incremental contributions of the direct (i.e., explicit) and indirect (i.e., implicit) measures

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of positive gambling outcome expectancies in the prediction of self-reported gambling behaviour and problem gambling severity.

Overall, it was predicted that the direct (i.e., self-report) and indirect (i.e., RT task) measures of positive gambling outcome expectancies would be positively associated with the amount of time spent and money risked gambling (Study 3a) and problem gambling severity (Study 3b). Furthermore, it was predicted that both assessment modes of positive gambling outcome expectancies would predict unique as well as shared variance in the self-report measures of gambling behaviour (Study 3a) and problem gambling severity (Study 3b).

Study 3a

Method

Participants

Participants ($N = 58$; 38 males and 20 females) for this investigation were gamblers who were part of a larger study investigating the effect of gambling cue exposure on implicit and explicit gambling outcome expectancies (Stewart et al., 2014; i.e., Study 1 of this dissertation). Participants ranged in age from 19 to 61 years ($M = 29.97$, $SD = 12.04$). Participants were recruited from the community via newspaper advertisements and classified websites, and posters displayed on university bulletin boards. Thirty-six participants were recruited from the Halifax Regional Municipality in Nova Scotia, while the remaining 22 participants were recruited from the greater Guelph area in Ontario. Upon leaving their contact information, potential participants were contacted by telephone and screened to determine eligibility.

To qualify for participation, individuals had to meet the following inclusion criteria: (a) 19 years of age or older, (b) gambled at a casino or online at least three times over the past two months, and (c) reported English as their native language (given that RT measures require extremely rapid responses to English words). Due to ethical concerns that exposure to gambling cues in the RT task could theoretically trigger a return to problem gambling (Binde, 2009), individuals were excluded if they were currently attempting to quit gambling or were currently engaging in treatment for problem gambling.

Using the Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001), participants consisted of 3 non-problem gamblers (i.e., total score of 0), 8 low-risk gamblers (i.e., total score ranging from 1 to 2), 32 moderate-risk gamblers (i.e., total score ranging from 3 to 7), and 15 high-risk/problem gamblers (i.e., total score of 8 or above). Total scores on the PGSI ranged from 0 to 25 ($M = 6.26$; $SD = 5.20$). In terms of gambling behaviour [as measured by the Gambling Timeline Followback (G-TLFB; Weinstock, Whelan, & Meyers, 2004)], participants reported spending between 1.92 and 204.00 hours ($M = 35.84$, $SD = 39.07$) gambling over the three months prior to participating in the study. The amount of money participants risked over the three months prior to completing the study ranged from $42 to $3690 ($M = \$991.41$, $SD = \$916.09$).

Materials

Problem gambling symptoms. The nine-item PGSI scale of the CPGI (Ferris & Wynne, 2001) was used to assess the presence and severity of gambling problems among participants 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 with which they had engaged in the behaviour or experienced the given consequence in the last 12 months using a 4-point scale ranging from 0 (*never*) to 3 (*almost always*). The PGSI has good internal consistency ($\alpha = .84$) and test-retest reliability ($r = .78$), and has been found to demonstrate overall good validity (i.e., construct, criterion, content validity) as a measure of problem gambling (Ferris & Wynne, 2001). Further, an independent study by McMillen and Wenzel (2006) found that the PGSI demonstrated favourable psychometric properties in a sample of regular gamblers (i.e., individuals who reported gambling at least once per week) in terms of construct validity, classification validity, and item difficulty compared to other measures of problem gambling symptoms (e.g., South Oaks Gambling Screen). In the present sample, the PGSI demonstrated good internal consistency ($\alpha = .89$).

Self-reported gambling behaviour. The Gambling Timeline Followback (G-TLFB; Weinstock et al., 2004) was used to obtain a self-report measure of the amount of time participants spent gambling, as well as the amount of money risked gambling, which were used as outcome measures in the current study. The G-TLFB is a behavioural assessment instrument that consists of an individually-administered retrospective calendar (covering the past three months) that collects information on gambling frequency, duration, type of game played, intent, risk, win–loss, and number of standard alcoholic drinks consumed while gambling. Using separate samples of problem gamblers, previous research (Weinstock et al., 2004) assessing the psychometric properties of the

G-TLFB found that it demonstrated adequate to excellent test-retest reliability, as well as concurrent validity with gambling screen instruments and discriminant validity with measures of positive impression management.

Self-reported gambling outcome expectancies. The three positive expectancy subscales (enjoyment/arousal, self-enhancement, and money) of the 23-item Gambling Expectancy Questionnaire (GEQ; Gillespie et al., 2007a) were used to assess self-reported positive gambling outcome expectancies. The GEQ served as the explicit or direct measure of positive gambling outcome expectancies, which served as a predictor variable in the present study. Similar to previous research in this area (Stewart et al., 2014; Stewart et al., under review), the three positive expectancy subscales of the GEQ were combined in the present study in order to obtain an overall measure of participants' positive gambling outcome expectancies. This combination resulted in a 15-item scale assessing positive gambling outcome expectancies. Participants were asked to what extent they expect each item/positive outcome (e.g., "I win money"; "I feel excited") will occur when gambling on a 7-point scale ranging from 1 (*no chance*) to 7 (*certain to happen*). In relation to its psychometric properties, Gillespie and colleagues (2007a) reported that each of the subscales of the GEQ demonstrated adequate to good internal reliability. In the current sample, the 15-item positive gambling outcome expectancy scale of the GEQ demonstrated good reliability ($\alpha = .83$).

Gambling outcome expectancy RT task. Adapted from the classic affective priming task (Fazio et al., 1986), this RT-based task was used to assess implicit gambling outcome expectancies. The task was designed to measure how quickly individuals respond to positive and negative gambling outcome expectancy words (i.e., targets)

immediately after being primed by gambling versus control (i.e., track and field) pictures.[11] The task was executed 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 gambling outcome expectancies (e.g., GEQ; Gillespie et al., 2007a), as well as synonyms of words from these measures. In total, there were 10 positive outcome expectancy words (e.g., "excitement", "relaxation", "enjoyment") and 10 negative outcome expectancy words (e.g., "anxiety", "tension", "guilt") used as targets (see Appendix B for the full list of words used as targets). In addition, 10 gambling and 10 non-gambling pictures were used as primes (see Appendix A for picture primes). The task began with one block of four practice trials, and two blocks with 20 test trials each (i.e., total number of trials was 44). The stimuli for practice trials were different than those presented during the test trials. During the task, 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.

Each trial started with the 200 millisecond (ms) presentation of a either a gambling or non-gambling (i.e., track and field) picture in the centre of the screen. This picture was immediately followed by a blank screen (100 ms), then by the presentation of a target word (in the center of the screen as well) that had either a positive (e.g., "excitement") or negative (e.g., "tension") connotation. Participants were asked to

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[11] Track and field was selected 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. They are also both activities that could theoretically be associated with both positive outcomes (excitement, winning) and negative outcomes (frustration, tension).

respond to words that had a negative connotation by clicking the "Z" key on the keyboard, and to respond to words that have a positive connotation by clicking the "/" key (which was reversed for half of participants). The length of the inter-trial interval was 1000 ms. Participants were told that they needed to pay attention to the pictures presented on the screen as their memory for the pictures may be tested later. Participants were also informed that the first four trials were practice trials.

Procedure

As mentioned earlier, the current investigation was part of a larger study (Stewart et al., 2014; i.e., Study 1 of this dissertation). Only those methodological details germane to the present study are described here as the protocol for the larger study is available elsewhere (Stewart et al., 2014; i.e., Study 1 of this dissertation). Upon arrival at the laboratory, participants provided informed consent. The G-TLFB (Weinstock et al., 2004) was then administered in order to obtain a measure of participants' self-reported gambling behaviour over the past three months. Following completion of this, participants engaged in some tasks germane to the larger study (Stewart et al., 2014) and completed a demographic questionnaire. Upon completing these questionnaires, more tasks pertaining to the larger study were completed. Participants then engaged in the RT task followed by completion of the GEQ (Gillespie et al., 2007a). Participants were then debriefed and compensated $30 for their time and effort.

Results

To determine whether the direct (i.e., self-report) and indirect (i.e., RT task) measures of positive gambling outcome expectancies were positively associated with gambling behaviour, correlation analyses (see Table 6.1) were conducted on the variables

of interest, which included the amount of time spent and money risked gambling, participants' self-reported positive gambling outcome expectancies on the GEQ, and the RT difference to positive expectancy targets following gambling primes versus non-gambling primes. This RT difference score was computed by subtracting the mean log-transformed RT[12] to trials involving gambling primes from the mean log-transformed RT to trials involving non-gambling primes. As such, a higher positive value represented a faster RT to positive targets when they followed gambling primes (i.e., greater implicit positive gambling outcome expectancies). As displayed in Table 6.1, both the explicit (i.e., self-report) and implicit (i.e., RT task) measures of positive gambling outcome expectancies were positively associated with the amount of time spent and money risked gambling. In addition, the self-report and RT measures of positive gambling outcome expectancies were not significantly correlated, providing evidence of their independence (see Appendix D for further correlation analyses).

To test our prediction regarding the incremental contributions of the RT measure and self-report measure of positive gambling outcome expectancies in the prediction of gambling behaviour, a set of hierarchical regression analyses were conducted. Beginning with the amount of time spent gambling, two hierarchical multiple regression analyses were conducted to assess the unique and shared contributions of the self-report and RT measure of positive gambling outcome expectancies to the prediction of the amount of time spent gambling (see Table 6.2). In both cases, participants' self-reported amount of time spent gambling over the three months prior to taking part in the study (as assessed

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[12] To reduce the characteristic positive skewness of RT latencies and normalize the distribution, a log transformation was performed on the RT data prior to calculating mean RT scores (see Fazio 1990; Greenwald, McGhee, & Schwartz, 1998). In addition, following the recommended procedures for correcting extremely slow and fast responses (Greenwald et al., 1998), values below 300 ms were recoded to 300 ms and those above 3000ms were recoded to 3000 ms.

by the G-TLFB; Weinstock et al., 2004) served as the criterion variable. In the first regression analysis, the self-report measure of positive gambling outcome expectancies was entered into the initial step of the regression and the RT measure of positive gambling outcome expectancies was entered as an additional predictor in the second step. In the second regression analysis, the RT measure of positive gambling outcome expectancies was entered into the first step of the regression and the self-report measure of positive gambling outcome expectancies was entered as an additional predictor in the second step of the regression.

For the first regression equation, after controlling for the self-report measure of positive gambling outcome expectancies, the RT measure of positive gambling outcome expectancies accounted for an additional 6.2% of the variance in the amount of time spent gambling, $\Delta R^2 = .062$ (ΔF (1, 55) = 4.51, $p = .04$). For the second regression equation, after controlling for the RT measure of positive gambling outcome expectancies, the self-report measure of positive gambling outcome expectancies accounted for an additional 12.4% of the variance in the amount of time spent gambling, $\Delta R^2 = .124$ (ΔF (1, 55) = 8.94, $p = .004$). In the final model (equivalent for both regression equations), both the self-report and RT measure of gambling outcome expectancies accounted for significant unique variance in the amount of time spent gambling. Overall, the self-report and RT measure of gambling outcome expectancies accounted for 23.9% of the variance in the amount of time spent gambling, $R^2 = .239$ (F (2, 55) = 8.63, $p = .001$). Of this explained variance in the amount of time spent gambling, 26% was contributed uniquely by the RT measure of positive gambling outcome expectancies, 52% was contributed uniquely by the self-report measure of

positive gambling outcome expectancies, and the remaining 22% was contributed by what the RT and self-report measure of positive gambling outcome expectancies held in common (see Figure 6.1).[13]

Two hierarchical regression analyses were then conducted to assess the distinct and shared contributions of the RT and self-report measures of positive gambling outcome expectancies to the prediction of the amount of money risked gambling (see Table 6.3). In both cases, participants' self-reported amount of money risked gambling over the three months prior to taking part in the study (as assessed by the G-TLFB) served as the criterion variable. Aside from the difference in criterion variable, the analyses were performed as above. For the first regression equation, after accounting for the self-report measure of positive gambling outcome expectancies, the RT measure of positive gambling outcome expectancies accounted for an additional 6.2% of the variance in the amount of money risked gambling, $\Delta R^2 = .062$ (ΔF (1, 55) = 4.15, $p = .05$). In the second regression equation, after controlling for the RT measure of positive gambling outcome expectancies, the self-report measure of positive gambling outcome expectancies accounted for an additional 7.7% of the variance in the amount of money risked gambling, $\Delta R^2 = .124$ (ΔF (1, 55) = 5.16, $p = .03$). In the final model (equivalent for both regression equations), both the self-report and RT measure of gambling outcome expectancies accounted for significant unique variance in the amount of money risked gambling. Overall, the self-report and RT measure of gambling outcome expectancies accounted for 18.0% of the variance in the amount of money risked gambling, $R^2 = .18$ (F (2, 55) = 6.04, $p = .004$). Of this explained variance in the amount of money risked

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[13] This latter value was calculated by taking the total proportion of explained variance (23.9%) and subtracting the unique variance explained by the RT measure (6.2%) and the unique variance explained by the self-report measure (12.4%).

gambling, 34% was contributed uniquely by the RT measure of positive gambling

outcome expectancies, 43% was contributed uniquely by the self-report measure of

positive gambling outcome expectancies, and the remaining 23% was contributed by

what the RT and self-report measure of positive gambling outcome expectancies held in

common (see Figure 6.1).[14] Thus, as hypothesized, results revealed that the self-report

and RT measure of positive gambling outcome expectancies each predicted unique as

well as shared variance in the prediction of the amount of time spent and money risked

gambling.[15]

Study 3b

Results of Study 3a point to the utility of direct and indirect measures of positive

gambling outcome expectancies in significantly predicting unique as well as shared

variance in two important indices of gambling behaviour – the amount of time spent and

money risked gambling over the past three months. While such findings are important, it

was also desirable to examine the relations of positive gambling outcome expectancies

with problem gambling severity. However, this proved difficult in Study 3a due to the

limited range of gambling problems in the sample (i.e., only 19% of the sample scored in

the non-problem or low-risk range on the PGSI; Ferris & Wynne, 2001). To address this

limitation and allow for an examination of the utility of the direct and indirect measures

of positive gambling outcome expectancies in predicting problem gambling severity, I

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[14] This latter value was calculated by taking the total proportion of explained variance (18.0%) and subtracting the unique variance explained by the RT measure (6.2%) and the unique variance explained by the self-report measure (7.7%).

[15] Given that I was interested in examining the potential moderating effect of advertisement cue exposure on the relationship between implicit and explicit positive gambling outcome expectancies and gambling outcomes, post-cue exposure data was used in the present study. As this was not a primary focus of the study, further discussion of this moderation analysis, along with results, are described in Appendix E.

purposely recruited a sample of participants that exhibited a broader range of gambling problems (i.e., 40% of the sample scored in the non-problem or low-risk range on the PGSI; Ferris & Wynne, 2001) in Study 3b.

Method

Participants

Participants ($N = 96$; 66 males and 30 females) for the present investigation consisted of gamblers who were part of a larger study that investigated the impact of exposure to gambling advertisements on implicit and explicit gambling outcome expectancies (Stewart, Yi, Ellery, & Stewart, under review; i.e., Study 2 of this dissertation). Participants ranged in age from 19 to 71 years ($M = 29.63$; $SD = 12.08$). Participants were recruited through posters placed in local universities, and advertisements in local newspapers and classified websites. Fifty participants were recruited from the Halifax Regional Municipality in Nova Scotia, 22 participants from the greater Guelph area in Ontario, and 24 participants from the Winnipeg area in Manitoba. Upon replying to the recruitment advertisement and 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 played any casino games outside of a casino, gambled on a slot machine or video lottery terminal, bet on horses at a racetrack, or played dice games for money, at least once over the past 90 days to ensure that participants had at least some recent gambling experience. 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 were currently receiving treatment for problem gambling given ethical concerns that exposure to gambling cues on the RT task could theoretically trigger a return to problem gambling (Binde, 2009). Using the PGSI from the CPGI (Ferris & Wynne, 2001), participants consisted of 11 non-problem gamblers (i.e., total score of 0), 27 low-risk gamblers (i.e., total score ranging from 1 to 2), 39 moderate-risk gamblers (i.e., total score ranging from 3 to 7), and 19 high-risk/problem gamblers (i.e., total score of 8 or above). Total scores on the PGSI ranged from 0 to 21 ($M = 4.73$; $SD = 4.57$).[16]

Materials

The measures used to assess implicit (gambling outcome expectancy RT task) and explicit (GEQ; Gillespie et al., 2007a) positive gambling outcome expectancies, and problem gambling severity (PGSI; Ferris & Wynne, 2001), were identical to those used in Study 3a and are not reiterated here. Both the GEQ ($\alpha = .86$) and PGSI ($\alpha = .87$) demonstrated good internal consistency in the present sample.

Procedure

As mentioned earlier, this current investigation was part of a larger study (Stewart et al., under review; i.e., Study 2 of this dissertation). Only those methodological details germane to the present study are described here as the protocol for the larger study is available elsewhere (Stewart et al., under review). Upon arrival at the laboratory, participants provided informed consent. Participants then engaged in tasks relevant to the larger study and completed a demographic questionnaire. Following their involvement in

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[16] Preliminary analyses revealed that the distribution of scores on the PGSI (Ferris & Wynne, 2001) was positively skewed. In order to reduce this positive skewness, a square root transformation was performed (Tabachnick & Fidell, 2007). A comparison of the analyses conducted using the original and transformed data revealed no differences in results. As such, the original, untransformed scores on this measure were retained and used in the regression analyses.

some other tasks relevant to the larger study (Stewart et al., under review), participants engaged in the implicit gambling outcome expectancy RT task and then completed the GEQ (Gillespie et al., 2007a), after which they were debriefed and compensated $30 for their time and effort.

Results

Correlation analyses were conducted to assess the relation between problem gambling severity, participants' self-reported positive gambling outcome expectancies on the GEQ (Gillespie et al., 2007a) and the RT difference to positive expectancy targets following gambling primes versus non-gambling primes. As in Study 3a, this RT difference score was computed by subtracting the mean log-transformed RT to trials involving gambling primes from the mean log-transformed RT to trials involving non-gambling primes.[17] Consistent with predictions, both the self-report and RT measure of positive gambling outcome expectancies were positively associated with level of problem gambling severity (see Table 6.4). In addition, as in Study 3a, the self-report and RT measures of positive gambling outcome expectancies were not significantly correlated, again confirming their independence (see Appendix D for further correlation analyses).

Given the significant relationship between problem gambling severity and both the implicit and explicit measures of positive gambling outcome expectancies, it was of interest to examine the incremental contributions of the RT measure and self-report measure of positive gambling outcome expectancies in predicting problem gambling severity. To do so, the same analytic strategy employed in Study 3a was performed. Specifically, two hierarchical multiple regression analyses were conducted to assess the

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[17] The same procedures employed in Study 3a to reduce the positive skewness of RT latencies and normalize the distribution were performed in Study 3b.

unique and shared contributions of the self-report and RT measure of positive gambling outcome expectancies to the prediction of problem gambling severity (see Table 6.5). In both cases, participants' level of problem gambling severity [as assessed by the CPGI of the PGSI (Ferris & Wynne, 2001)] served as the criterion variable. In the first regression analysis, the self-report measure of positive gambling outcome expectancies (GEQ; Gillespie et al., 2007a) was entered into the initial step of the regression and the RT measure of positive gambling outcome expectancies was entered as an additional predictor in the second step. In the second regression analysis, the RT measure of positive gambling outcome expectancies was entered into the first step of the regression and the self-report measure of positive gambling outcome expectancies was entered as an additional predictor in the second step of the regression.

For the first regression equation, after controlling for the self-report measure of positive gambling outcome expectancies, the RT measure of positive gambling outcome expectancies accounted for an additional 5.5% of the variance in level of problem gambling severity, $\Delta R^2 = .055$ (ΔF (1, 91) = 6.12, $p = .015$). For the second regression equation, after controlling for the RT measure of positive gambling outcome expectancies, the self-report measure of positive gambling outcome expectancies accounted for an additional 12.2% of the variance in level of problem gambling severity, $\Delta R^2 = .122$ (ΔF (1, 91) = 13.59, $p < .001$). In the final model (equivalent for both regression equations), both the self-report and RT measure of positive gambling outcome expectancies accounted for significant unique variance in level of problem gambling severity. Overall, the self-report and RT measure of gambling outcome expectancies accounted for 18.4% of the variance in level of problem gambling severity, $R^2 = .184$ (F

(2, 91) = 10.25, $p < .001$). Of this explained variance in level of problem gambling severity, 30% was contributed uniquely by the RT measure of positive gambling outcome expectancies, 66% was contributed uniquely by the self-report measure of positive gambling outcome expectancies, and the remaining 4% was contributed by what the RT and self-report measure of positive gambling outcome expectancies held in common.[18] Thus, as hypothesized, results revealed that the self-report and RT measure of positive gambling outcome expectancies each contributed unique as well as a small proportion of shared variance in the prediction of level of problem gambling severity (see Figure 6.1).[19]

Discussion

Despite research findings pointing to the importance of outcome expectancies in gambling (e.g., Gillespie et al., 2007b; Shead & Hodgins, 2009; Stewart et al., 2014; Stewart et al., under review; Stewart & Wall, 2005), little research has examined the role of outcome expectancies in gambling behaviour and gambling-related problems. Moreover, much of the research in this area has relied on participant self-report to assess gambling outcome expectancies, despite findings from the alcohol literature pointing to the importance of implicit cognitions in alcohol use and associated problems (see Wiers & Stacy, 2006b), as well as emerging research highlighting the relevance of implicit outcome expectancies in gambling (Stewart et al., 2014; Stewart et al., under review; Yi, Stewart, Collins, & Stewart, in press). To address this gap in the literature, the current set

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[18] This latter value was calculated by taking the total proportion of explained variance (18.4%) and subtracting the unique variance explained by the RT measure (5.5%) and the unique variance explained by the self-report measure (12.2%).

[19] Given that I was interested in examining the potential moderating effect of advertisement cue exposure on the relationship between implicit and explicit positive gambling outcome expectancies and problem gambling severity, post-cue exposure data was used in the present study. As this was not a primary focus of the study, further discussion of this moderation analysis, along with results, are described in Appendix E.

of studies investigated whether positive gambling outcome expectancies, assessed using both direct (i.e., self-report) and indirect (i.e., RT task) measures, independently predicted the amount of time spent and money risked gambling (Study 3a), and problem gambling severity (Study 3b). Specifically, the present studies sought to assess the incremental contributions of the implicit and explicit measures of positive gambling outcome expectancies in the prediction of self-reported gambling behaviour and problem gambling severity.

Consistent with predictions, results of Study 3a revealed that both the indirect (i.e., RT task) and direct (i.e., self-report questionnaire) measures of positive gambling outcome expectancies were positively correlated with the amount of time participants spent gambling, as well as the amount of money participants risked gambling. Moreover, although both measures of gambling behaviour were positively correlated with one another, they were not so highly correlated as to be considered redundant or multicollinear (i.e., correlations were not greater than .90; Tabachnick & Fidell, 2007). That is, it appears that they comprise two sufficiently distinct indices of gambling behaviour and as such, provide a good overall representation of individuals' patterns of gambling behaviour. In line with our predictions, findings from Study 3b revealed a significant relationship between problem gambling severity and both implicit and explicit positive gambling outcome expectancies. Similar to previous findings from the alcohol literature (Wiers et al., 2002), the self-report and RT measures of positive gambling outcome expectancies were not significantly correlated in either Study 3a or 3b. This suggests that these two modes of assessment are tapping into slightly different constructs, or are subsumed by different underlying systems (implicit versus explicit).

As predicted, results from Study 3a revealed that the self-report and RT measure of positive gambling outcome expectancies each predicted unique as well as shared variance in the amount of time spent and money risked gambling. This finding is in line with our predictions and previous research assessing the role of explicit gambling outcome expectancies on adolescents' self-reported gambling behaviour (e.g., Wickwire et al., 2010). However, Study 3a results relating to the predictive utility of explicit positive gambling outcome expectancies on self-reported gambling behaviour fail to coincide with previous studies examining the impact of self-reported gambling-related irrational cognitions on gambling behaviour as assessed in the laboratory (e.g., Cronce & Corbin, 2010; Ellery & Stewart, 2014; May, Whelan, Meyers, & Steenbergh, 2005). In contrast to our findings, gambling-related irrational cognitions were not found to significantly predict gambling behaviour in these previous studies. One potential explanation for these discrepant findings relates to the type of gambling-related irrational cognitions assessed in these previous studies compared to the present study. Whereas previous studies (e.g., Cronce & Corbin, 2010; Ellery & Stewart, 2014) focused their investigations on gambling-related irrational cognitions in general (e.g., those pertaining to perceived luck and control over gambling outcomes; Ladouceur et al., 2001; Toneatto, 1999, 2002), the present studies focused solely on positive gambling outcome expectancies. Thus, it may be the case that positive gambling outcome expectancies represent beliefs distinct from other gambling-related irrational cognitions and may be more closely associated with gambling behaviour. Alternatively, these divergent findings may relate to differences in the measures used to assess gambling behaviour in the current research compared to previous investigations. Whereas the current research used

the G-TLFB (Weinstock et al., 2004) to assess participants' gambling behaviour over the past three months, previous research (e.g., Cronce & Corbin, 2010; Ellery & Stewart, 2014; May et al., 2005) based their measure of gambling behaviour on a single session of gambling in a laboratory environment. As such, the measurement of gambling behaviour used in the current research may have tapped into a broader range of gambling behaviour compared to the single assessments of gambling behaviour used in laboratory-based studies. Alternatively, the broad-based assessment of gambling obtained from the G-TLFB (Weinstock et al., 2004) may have captured more "real world" gambling than the artificial, laboratory-based gambling behaviour assessed in these prior studies.

To increase our understanding of the mechanisms involved in the relationship between gambling-related irrational cognitions and gambling behaviour, it is important that future research examine the impact of specific gambling-related irrational cognitions (e.g., positive gambling outcome expectancies) on prospective gambling behaviour. Indeed, given the cross-sectional design of the current research, as well as the fact that no studies to date have established a causal role of gambling outcome expectancies on subsequent gambling outcomes (i.e., gambling behaviour or problems), an important first step in establishing this causal role would be to examine prospective prediction of gambling behaviour and problems in a longitudinal design, similar to research in the area of alcohol outcome expectancies (e.g., Stacy, 1997; Wiers et al., 2002). Moreover, as implicit positive gambling outcome expectancies were found to predict unique as well as shared variance in gambling behaviour in the current research, it is important that future research make use of indirect as well as direct assessment modes when examining the role of gambling-related irrational cognitions on prospective gambling behaviour.

Similar to Study 3a findings, results of Study 3b revealed that implicit and explicit positive gambling outcome expectancies were both significant predictors of problem gambling severity, with both assessment modes predicting unique as well as shared variance in problem gambling severity. Such findings build upon previous research examining the relationship between self-reported gambling outcome expectancies and gambling-related problems (e.g., Gillespie et al., 2007b; Shead & Hodgins, 2009) by revealing that explicit positive gambling are significant predictors of gambling-related problems even after accounting for the effects of another predictor (i.e., implicit positive gambling outcome expectancies). Similarly, these findings, along with Study 3a findings, highlight the role of implicit cognitions in problem gambling severity and gambling-related problems. Although implicit positive outcome expectancies have been found to play an important role in other addictive behaviours, (e.g., alcohol use; see Wiers & Stacy, 2006b), to my knowledge, the current research is the first to investigate the utility of implicit positive gambling outcome expectancies in the prediction of gambling behaviour and associated problems.

In both studies, results revealed that relatively more variation in the prediction of the amount of time spent and money risked gambling (Study 3a) and problem gambling severity (Study 3b) was due to unique rather than shared aspects of the direct (self-report) and indirect (RT task) measures of positive gambling outcome expectancies. Thus, as previously shown in the alcohol research area (e.g., Wiers et al., 2002), results revealed that implicit and explicit positive gambling outcome expectancies were independent and unique predictors of gambling behaviour (Study 3a) and problem gambling severity (Study 3b). In line with the reflective-impulsive model of social behaviour (Strack &

Deutsch, 2004), such findings (along with the lack of correlation between the direct and indirect measures of positive gambling outcome expectancies) suggest that the RT task and self-report measure of gambling outcome expectancies are tapping into slightly different constructs. Drawing upon both the reflective-impulsive model (Strack & Deutsch, 2004) and research on implicit cognition and addictive behaviours (see Wiers & Stacy, 2006b), the self-report measure appears to assess participants' outcome expectancies after conscious deliberation, whereas the RT measure appears to assess the automatic activation of participants' gambling outcome expectancies in memory by exposure to gambling prime pictures. Given that the direct and indirect measures of positive gambling outcome expectancies both contributed unique variation to the prediction of the amount of time spent and money risked gambling and problem gambling severity in the current research, it appears important to make use of both methods when assessing the role of outcome expectancies in gambling.

Although the implicit and explicit measures of positive gambling outcome expectancies each provided a unique contribution to the prediction of the amount of time spent and money risked gambling (Study 3a), as well as problem gambling severity (Study 3b), the self-report measure of positive gambling outcome expectancies was found to contribute somewhat more variation in the prediction of gambling behaviour and problem gambling severity. It is important to note, however, that the greater contribution of the self-report measure of positive gambling outcome expectancies may be due to common method variance bias, which involves the artificial inflation of relationships between variables that are assessed using the same method (Reio, 2010). Specifically, the questionnaires measuring gambling behaviour and problem gambling severity outcomes,

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as well as those measuring positive gambling outcome expectancies were assessed using self-report methods.

Limitations

Some limitations of the current set of studies should be noted. First, the present studies are correlational in nature, making it impossible to infer causality. Second, participants' gambling behaviour (i.e., amount of time spent and money risked gambling) in Study 3a was assessed via self-report, which is prone to social desirability bias, acquiescence and extreme responding, and demand characteristics (Paulus & Vazire, 2009). Further, measuring gambling behaviour through via self-report relies on the notion that gamblers are consciously aware of the amount of time spent and money risked gambling, and that gamblers are willing to accurately and truthfully report their gambling behaviour to researchers (Birch et al., 2008). Despite these potential limitations, it is important to note that the measure used to assess gambling behaviour in the present studies (i.e., G-TLFB; Weinstock et al., 2004) has been found to produce reliable and valid indices of individuals' gambling behaviour (Hodgins & Makarchuk, 2003; Weinstock et al., 2004). Nonetheless, it is important that future research in this area examine whether implicit and explicit assessment modes of positive gambling outcome expectancies are capable of predicting subsequent gambling behaviour, as has been found in the alcohol domain (e.g., Palfai & Ostafin, 2003; Wiers et al., 2002).

A final limitation of the current research relates to the RT task used in both studies. Specifically, the present studies examined associations between gambling and outcome expectancies relative to associations with a control activity (i.e., track and field). Although I chose a control activity that we believed was comparable to gambling (i.e.,

both involve a range of activities and could readily be associated with both positive and negative outcomes), it is not known whether a similar pattern of results would occur had a different activity been used as a control. In order to address this limitation, it is important that future research examine the associations between gambling primes and the facilitation of outcome expectancies relative to associations with different activities.

Conclusion

In conclusion, results of the current research demonstrated that both the implicit and explicit measures of positive gambling outcome expectancies significantly predicted unique as well as shared variance in the amount of time spent and money risked gambling (Study 3a), and problem gambling severity (Study 3b). Results of these two studies highlight the importance of implicit and explicit positive gambling outcome expectancies in gambling behaviour and gambling-related problems and suggest that in addition to self-report measures of gambling outcome expectancies, this novel RT measure of implicit gambling outcome expectancies is capable of providing valuable and unique information to the prediction of gambling behaviour and gambling-related problems. Findings stemming from the current set of studies have several important clinical and practical implications. These are reviewed in the general discussion of this dissertation (Chapter 7), together with the theoretical, practical, and clinical implications stemming from this dissertation research as a whole.

Table 6.1

Correlations between Explicit and Implicit Positive Gambling Outcome Expectancies and Measures of Gambling Behaviour (Study 3a)

	1	2	3	4
1. Time spent gambling	-	-	-	-
2. Money risked gambling	.73**	-	-	-
3. Positive outcome expectancy RT	.34**	.32*	-	-
4. Positive GEQ	.42**	.34**	.23	-

Note. Time spent gambling and money risked gambling was assessed by the Gambling Timeline Followback (G-TLFB; Weinstock et al., 2004). The positive outcome expectancy RT was computed by subtracting the log-transformed RTs to trials involving gambling primes from the log-transformed reaction times involving non-gambling primes. Positive GEQ = scores on the positive subscale of the Gambling Expectancy Questionnaire (Gillespie et al., 2007a).

* $p < .05$ ** $p < .01$

Table 6.2

Self-Report and RT Measures of Positive Gambling Outcome Expectancies as Predictors

of the Amount of Time Spent Gambling (Study 3a)

	B	t	p	R^2	ΔR^2
*Self-Report & RT Positive GOE Predicting Time Spent Gambling: **Equation 1***					
Step 1					
Self-report GOE	.42	3.47	.001	.177	.177**
*Self-Report & RT Positive GOE Predicting Time Spent Gambling: **Equation 2***					
Step 1					
RT measure of GOE	.34	2.70	.009	.115	.115**
*Self-Report & RT Positive GOE Predicting Time Spent Gambling: **Equation 1 & 2***					
Step 2				Model 1: .239	.062*
				Model 2: .239	.124**
Self-report GOE	.36	2.99	.004		
RT measure of GOE	.26	2.12	.038		

Note. GOE = gambling outcome expectancies

* $p < .05$ ** $p < .01$

Table 6.3

Self-Report and RT Measures of Positive Gambling Outcome Expectancies as Predictors of the Amount of Money Risked Gambling (Study 3a)

	B	t	p	R^2	ΔR^2
Self-Report & RT Positive GOE Predicting Money Risked Gambling: **Equation 1**					
Step 1					
Self-report GOE	.34	2.74	.008	.118	.118**
Self-Report & RT Positive GOE Predicting Money Risked Gambling: **Equation 2**					
Step 1					
RT measure of GOE	.32	2.54	.014	.103	.103**
Self-Report & RT Positive GOE Predicting Money Risked Gambling: **Equation 1 & 2**					
Step 2				Model 1: .180	.062*
				Model 2: .180	.077**
Self-report GOE	.29	2.27	.027		
RT measure of GOE	.26	2.04	.046		

Note. GOE = gambling outcome expectancies

* $p < .05$ ** $p < .01$

Table 6.4

Correlations between Explicit and Implicit Positive Gambling Outcome Expectancies and Problem Gambling Severity (Study 3b)

	1	2	3
1. Problem gambling severity	-	-	-
2. Positive outcome expectancy RT	.26**	-	-
3. Positive GEQ	.34**	.04	-

Note. Problem gambling severity was assessed by the PGSI from the CPGI (Ferris & Wynne, 2001). The positive outcome expectancy RT was computed by subtracting the log-transformed RTs to trials involving gambling primes from the log-transformed reaction times involving non-gambling primes. Positive GEQ = scores on the positive subscale of the Gambling Expectancy Questionnaire (Gillespie et al., 2007a). ** $p < .01$

Table 6.5

Self-Report and RT Measures of Positive Gambling Outcome Expectancies as Predictors of Problem Gambling Severity (Study 3b)

	B	t	p	R^2	ΔR^2
Self-Report & RT Positive GOE Predicting Problem Gambling Severity: **_Equation 1_**					
Step 1					
Self-report gambling GOE	.36	3.69	<.001	.129	.129**
Self-Report & RT Positive GOE Predicting Problem Gambling Severity: **_Equation 2_**					
Step 1					
RT measure of gambling GOE	.25	2.47	.016	.062	.062*
Self-Report & RT Positive GOE Predicting Problem Gambling Severity: **_Equation 1 & 2_**					
Step 2				Model 1: .184	.055*
				Model 2: .184	.122**
Self-report gambling GOE	.35	3.69	<.001		
RT measure of gambling GOE	.24	2.48	.015		

Note. GOE = gambling outcome expectancies
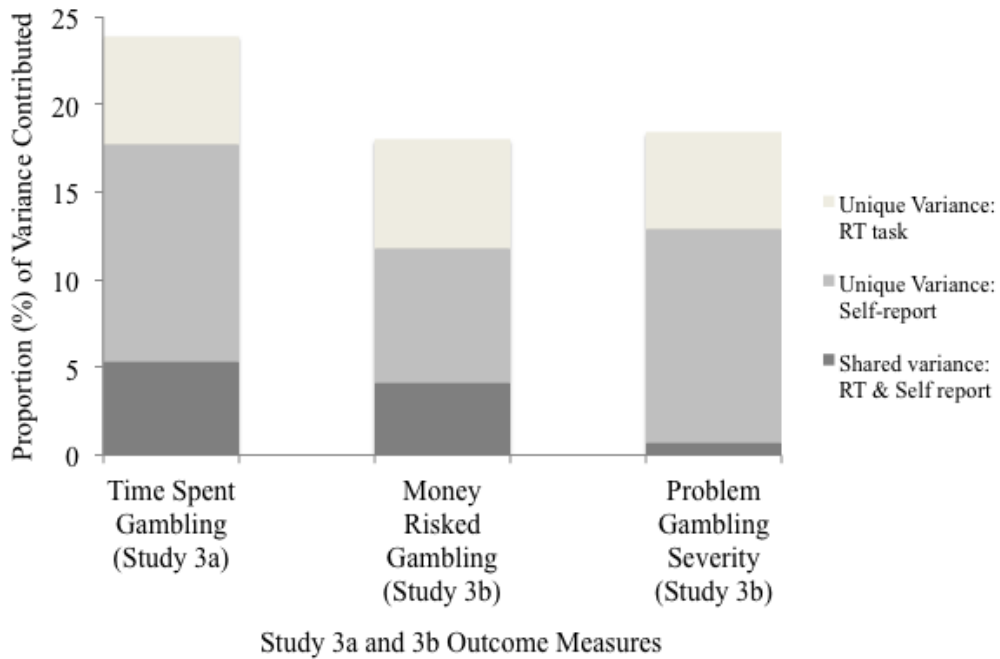
* $p < .05$ ** $p < .01$

Figure 6.1. Proportion (%) of unique and shared variance contributed by the direct (self-report) and indirect (RT task) measures of positive gambling outcome expectancies in the prediction of the amount of time spent and money risked gambling (Study 3a) and problem gambling severity (Study 3b).

CHAPTER 7. GENERAL DISCUSSION

The primary objective of the three studies included in my dissertation research was to investigate the role of both implicit and explicit outcome expectancies in gambling. In contrast to the well-established importance of implicit and explicit outcome expectancies in other addictive behaviours, such as alcohol use (see Goldman et al., 1999; Wiers & Stacy, 2006b), researchers have only recently turned their attention toward investigating the role of outcome expectancies in gambling. While such research has been helpful in explicating the role of outcome expectancies in gambling, research in this area has primarily focused on an examination of explicit (i.e., self-reported) gambling outcome expectancies (e.g., Gillespie et al., 2007a, 2007b; Stewart & Wall, 2005; Wickwire et al., 2010). To increase our understanding of the influence of both implicit and explicit outcome expectancies in gambling and facilitate research in this area, the aims of my dissertation research were to examine the role of exposure to gambling cues [i.e., a five-minute video of gambling scenes (Study 1); 30-second exposure to printed gambling advertisements (Study 2)] on the activation of implicit and explicit gambling outcome expectancies in regular gamblers' memory networks, and to assess the utility of implicit and explicit gambling outcome expectancies in independently predicting gambling behaviour (Study 3a) and gambling-related problems (Study 3b).

Summary of Findings

Before discussing the implications, limitations, and future directions of my dissertation research, a brief review and integration of the findings of my three dissertation studies is warranted.

Study 1: Effects of Gambling Cues on the Activation of Implicit and Explicit Gambling Outcome Expectancies

The aim of Study 1 was to assess whether exposure to gambling cues (i.e., a five-minute video of gambling scenes) immediately prior to the assessment of gambling outcome expectancies would activate implicit (measured via RT task performance) and explicit gambling outcome expectancies (measured via self-report) in memory among regular gamblers. In line with my hypotheses, participants who were exposed to a video of typical gambling scenes (i.e., casino cue video condition) responded faster to positive outcome expectancy target words when they were preceded by gambling primes relative to non-gambling primes. This facilitation of positive gambling outcome expectancies by gambling primes was not observed in the control cue video condition, as participants who viewed a video of typical track and field scenes did not significantly differ in RTs to positive outcome expectancy target words when they were preceded by gambling primes relative to non-gambling primes. When examining RTs to negative outcome expectancy targets among participants in the casino cue video condition, no significant differences were found between participants' RTs to negative outcome expectancy target words that were preceded by gambling primes versus non-gambling primes. Similarly, there were no significant differences in the RTs to negative outcome expectancy target words among participants in the control cue video condition after they were exposed to gambling primes versus non-gambling primes. Taken together, this pattern of data was interpreted as reflecting an activation of implicit positive but not negative gambling outcome expectancies following exposure to gambling cues, thus providing support to my hypotheses.

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An examination of participants' self-reported (i.e., explicit) positive gambling outcome expectancies following exposure to the cue manipulation revealed that participants in the casino cue video condition scored significantly higher on the self-report measure of positive gambling outcome expectancies than those in the control cue video condition. However, this was not the case for negative gambling outcome expectancies, as participants in the casino cue and control cue video conditions did not significantly differ in their self-reported negative gambling outcome expectancies after exposure to the video cue manipulation. Thus, as predicted, results suggest that the presentation of gambling cues leads to an increase in the expected positive outcomes that gamblers report will occur from gambling. These findings are consistent with the results of the RT task and as such, provide converging evidence of the impact of gambling cues on the facilitation of positive gambling outcome expectancies. That is, Study 1 found that exposure to a five-minute video of gambling scenes led to an activation of both implicit and explicit positive gambling outcome expectancies in regular gamblers' memory.

Study 2: Effects of Gambling Advertisements on the Activation of Implicit and Explicit Gambling Outcome Expectancies

Although results from Study 1 revealed that full attention to a five-minute video of gambling scenes activated both implicit (measured by the RT task) and explicit (measured via self-report) positive gambling outcome expectancies, different results may have been found had the cue exposure been shorter. Specifically, a relatively brief presentation of gambling cues (such as gambling advertisements) may not permit the conscious, deliberative processing of gambling outcome expectancies that is captured by self-report or "direct" assessment modes, and this might be particularly true when

attentional resources are not fully available during the gambling cue exposure. To investigate this possibility, the aim of Study 2 was to assess whether brief exposure to gambling advertisements while simultaneously engaged in other cognitive tasks (i.e., asking participants to indicate whether each advertisement was portrait or landscape in orientation) differentially activates implicit and explicit gambling outcome expectancies.

Consistent with predictions, results revealed that participants exposed to gambling advertisements (i.e., gambling advertisement cue condition) responded significantly faster to positive outcome expectancy target words when they were preceded by gambling primes relative to non-gambling primes. This facilitation of positive outcome expectancies by gambling primes was not observed in the fitness advertisement cue condition, as participants exposed to fitness advertisements did not significantly differ in RTs to positive outcome expectancy target words when they were preceded by gambling primes relative to non-gambling primes. Also consistent with predictions, activation of positive gambling outcome expectancies following gambling advertisement exposure was not observed explicitly, as evidenced by the lack of significant differences between the gambling advertisement and fitness advertisement cue conditions on the self-report (direct) measure of positive gambling outcome expectancies.

As predicted, exposure to gambling advertisements did not activate implicit or explicit negative gambling outcome expectancies. Specifically, there were no significant differences in RTs to negative outcome expectancy target words among participants in the gambling advertisement cue condition when they were exposed to gambling primes versus non-gambling primes. Similarly, participants in the fitness advertisement cue condition did not significantly differ in their RTs to negative outcome expectancy target

words when they were exposed to gambling primes versus non-gambling primes. Moreover, no significant differences were found between the gambling advertisement and fitness advertisement cue condition in self-reported negative gambling outcome expectancies after exposure to the cue manipulation. Taken together, these findings support my hypothesis that brief exposure to gambling advertisements would activate only implicit positive gambling outcome expectancies among regular gamblers.

Study 3a & 3b: Predicting Gambling Behaviour and Problems from Implicit and Explicit Positive Gambling Outcome Expectancies in Regular Gamblers

In light of the findings from Study 1 and Study 2 of my dissertation research, it was important to assess whether implicit and explicit positive gambling outcome expectancies were capable of independently predicting gambling outcomes, as has been previously shown in the alcohol outcome expectancy area (e.g., Wiers et al., 2002). Thus, Study 3a and Study 3b aimed to investigate whether implicit and explicit positive gambling outcome expectancies independently predicted two important indices of gambling behaviour (i.e., amount of time spent and money risked gambling; Study 3a), as well as problem gambling severity (Study 3b). Specifically, I aimed to assess the incremental contributions of the direct (i.e., explicit) and indirect (i.e., implicit) measures of positive gambling outcome expectancies in the prediction of self-reported gambling behaviour and problem gambling severity.

As predicted, results from Study 3a revealed that the self-report and RT measure of positive gambling outcome expectancies each predicted unique as well as shared variance in the amount of time spent and money risked gambling. Similarly, results of Study 3b revealed that implicit and explicit positive gambling outcome expectancies were

both significant predictors of problem gambling severity, with both assessment modes predicting unique as well as shared variance in problem gambling severity. In both studies, results revealed that relatively more variation in the prediction of the amount of time spent and money risked gambling (Study 3a) and problem gambling severity (Study 3b) was due to unique rather than shared aspects of the direct (self-report) and indirect (RT task) measures of positive gambling outcome expectancies. Thus, as previously shown in the alcohol research area (e.g., Kramer & Goldman, 2003; Wiers et al., 2002), results revealed that implicit and explicit positive gambling outcome expectancies are independent and unique predictors of gambling behaviour (Study 3a) and problem gambling severity (Study 3b).

Integration of Study Findings

Taken together, results of the three studies in my dissertation research highlight the importance of both implicit and explicit outcome expectancies in gambling. Indeed, results revealed that exposure to gambling cues of relatively long duration (i.e., five minute video of gambling scenes) activated both implicit and explicit positive gambling outcome expectancies. Concurring with and extending upon these findings, results of the second study of my dissertation revealed that brief exposure (i.e., 30 seconds) to gambling advertisements, along with the additional processing requirements during the cue exposure, activated implicit positive gambling outcome expectancies but did not appear to allow gamblers the opportunity to engage in the conscious deliberative processing that is captured by self-report (i.e., explicit) modes of assessing positive gambling outcome expectancies. In light of such findings, as well as the fact that implicit and explicit positive gambling outcome expectancies were found to provide distinct

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contributions to the prediction of the amount of time spent and money risked gambling and problem gambling severity in Study 3, it appears important to make use of both direct and indirect measures when assessing the role of outcome expectancies in gambling.

Implications, Limitations, and Directions for Future Research

As highlighted in the previous chapters of my dissertation, results of the current research have implications for several important theoretical, practical, and clinical issues. In the pages that follow, I discuss a number of these implications as well as future research stimulated by these issues. In addition, while many of the limitations that characterize the studies of my dissertation were noted in each of the individual manuscripts, there are some additional overarching limitations that warrant mention here. As with the implications of the current research, some of these limitations also point to potential directions for future research.

Theoretical Implications

Results stemming from my dissertation research have a number of important implications for theory development. First, the present findings provide additional evidence for the applicability of dual-process models in addictive behaviours (e.g., Deutsch & Strack, 2006; Evans, 2003; Evans & Coventry, 2006; Stacy, Ames, & Knowlton, 2004; Wiers et al. 2007). Importantly, findings stemming from my dissertation research demonstrate the relevance of dual-process models to the understanding of gambling behaviour and gambling problems, which has only recently been postulated among addiction researchers (see Evans & Coventry, 2006). In line with dual-process models of addictive behaviours, results of my dissertation suggest that gambling behaviour and gambling problems involves the joint outcome of two interrelated

processes: relatively automatic or *implicit* processes and relatively controlled or *explicit* processes. Indeed, results of Study 3 found that both implicit and explicit positive gambling outcome expectancies were unique predictors of gambling behaviour and problem gambling severity, thus highlighting the importance of examining the role of both implicit and explicit cognitions in gambling. In addition to providing support for the applicability of dual-process models of addictive behaviours to gambling, results of my dissertation research highlight the differential impact of gambling cues on the activation of the *reflective* (i.e., explicit) and *impulsive* (i.e., implicit) systems outlined in dual-process models of addictive behaviours, as well as the conditions under which implicit processes may operate in the absence of explicit processes (i.e., during brief exposure to gambling cues while simultaneously engaged in another cognitive task as seen in Study 2).

Moreover, overall results of my dissertation research provide further evidence of the role of implicit cognition in addictive behaviours (see Wiers & Stacy, 2006b), particularly in relation to implicit outcome expectancies. Consistent with principles of implicit cognition (e.g., Earleywine, 1995; Goldman, 1999; Goldman et al., 1999; Goldman & Rather, 1993; Oei & Baldwin, 1997; Stacy 1995; Stacy, 1997), the current findings highlight the view that implicit gambling outcome expectancies are represented in the associative memory network and that situational cues related to gambling that are repeatedly paired with gambling are stored together in memory along with the gambling behavioural response and expected positive outcomes. In line with implicit cognitive models of addictive behaviours and findings from the alcohol outcome expectancy literature (e.g., Goldman, 1999; Kramer & Goldman, 2003; Palfai & Ostafin, 2003;

Roehrich & Goldman, 1995; Stacy, 1997), Study 2 findings demonstrated that gambling outcome expectancies can be activated implicitly by gambling cues, without conscious, intentional retrieval of expectancy information. Moreover, results of Study 3 of my dissertation suggest that the accessibility and strength of associations between gambling and outcome expectancies is associated with engagement in gambling (as implicit gambling outcome expectancies were found to predict unique variance in gambling behaviour and problem gambling severity, beyond that predicted by explicit gambling outcome expectancies).

Given the paucity of research on gambling outcome expectancies in general and implicit gambling outcome expectancies more specifically, results of my dissertation research provide an important framework for future research investigating the role of implicit and explicit outcome expectancies in gambling. Indeed, serving as an extension of my dissertation research, I was recently involved in a study that assessed whether gambling prime exposure activates different types of implicit and explicit positive affect-regulation (i.e., reward and relief) gambling outcome expectancies among gamblers who hold different motives for gambling (Yi, Stewart, Collins, & Stewart, in press; see Appendix F). Specifically, we assessed whether enhancement-motivated gamblers (i.e., those who gamble in order to increase positive emotions) and coping-motivated gamblers (i.e., those who primarily gamble in order to decrease negative emotions) differ in the activation of different types of positive affect-regulation gambling outcome expectancies. The two outcome expectancies we focused on were reward gambling outcome expectancies (i.e., expectancies involving the positively reinforcing consequences of gambling, such as enjoyment and pleasure) and relief gambling outcome expectancies

(i.e., expectancies involving the negatively reinforcing consequences of gambling, such as decreased restlessness and irritability) following gambling prime exposure (Yi et al., in press; see Appendix F). Using a modified version of the RT task employed in my dissertation research and a self-report measure of positive-affective regulation gambling outcome expectancies (Stewart & Wall, 2005), we found that reward gambling outcome expectancies were more strongly activated by gambling prime exposure on the RT task than relief gambling outcome expectancies among gamblers with high enhancement motives. On the self-report measure of gambling outcome expectancies, 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. Taken together, this extension of my dissertation research highlights the relationship between implicit and explicit positive affect-regulation gambling outcome expectancies and gambling motives. Similar to the findings of my dissertation research, results of this study point to the importance of using both direct and indirect assessment modes when examining the role of outcome expectancies in gambling.

Results of my dissertation research also provide an important framework for future research investigating the impact of outcome expectancies in gambling (e.g., use of the affective priming paradigm in the assessment of implicit gambling outcome expectancies; Fazio et al., 1986; Fazio, 2001). In addition to assessing whether implicit and explicit positive gambling outcome expectancies are capable of independently predicting gambling behaviour as measured by behavioural observation in either a laboratory or natural gambling environment, it is important that future research examine

whether direct and indirect measures of positive gambling outcome expectancies predict cognitions and behaviours associated with gambling-related problems (e.g., craving to gamble, gambling motives). Similarly, it is important that future research examine potential mediators and moderators of the relationship between implicit and explicit gambling outcome expectancies and gambling behaviour/gambling problems, such as gambling abstinence self-efficacy (Hodgins, Peden, & Makarchuk, 2004), executive functions (discussed on the following page), and self-regulatory resources (Hofmann, Friese, & Strack, 2009; Hofman, Friese, & Wiers, 2008; Hofmann, Rauch, Gawronski, 2007).

An examination of the moderating effect of self-regulatory resources on the relationship between implicit and explicit gambling outcome expectancies and gambling behaviour, for example, could draw upon dual-process models of social behaviour (e.g., Smith & Decoster, 2000; Strack & Deutsch, 2004). According to such models, when individuals' self-regulatory resources are depleted in a given situation, behaviour is said to be more strongly influenced by automatic (i.e., implicit) associations activated from the associative memory network than by deliberative and reflective (i.e., explicit) consideration (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008). In contrast, when individuals' self-regulatory resources are intact, the opposite is said to occur (i.e., behaviour is more strongly influenced by deliberative and reflective consideration). Applying this line of reasoning to the current research, implicit gambling outcome expectancies may account for more variance in the prediction of gambling that occurs when individuals' self-regulatory resources are depleted. In contrast, the opposite may be found when gambling occurs under intact self-regulatory resources (i.e., explicit

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gambling outcome expectancies may be better predictors of gambling behaviour). Evidence supporting this moderating role of self-regulatory resources has recently been demonstrated in eating behaviour (Hofman et al., 2007) and may also be relevant in the gambling domain.

A final theoretical implication relates to the findings stemming from Study 1 and Study 2 of my dissertation, which together demonstrated a dissociation of the types of circumstances in which explicit gambling outcome expectancies are activated. Specifically, whereas results from Study 1 revealed that exposure to a five-minute video of gambling scenes activated both implicit and explicit positive gambling outcome expectancies, implicit (but not explicit) positive gambling outcome expectancies were activated following brief exposure to gambling advertisements in Study 2. Taken together, these findings suggest that the length of gambling cue exposure and/or limited attentional resources resulting from simultaneous engagement in another cognitive task influences the conscious processing of outcome expectancies that is captured by self-report measures. Indeed, it appears that relatively brief exposure (i.e., 30 seconds) to gambling cues while simultaneously engaged in another cognitive task does not permit gamblers the time or attentional resources to engage in the conscious, deliberative processing that are captured by self-report assessment modes of gambling outcome expectancies. Although such findings are important and significantly increase our understanding of the role of different gambling cues on the activation of implicit and explicit gambling outcome expectancies, a *double dissociation* was not demonstrated as implicit positive gambling outcome expectancies were activated following exposure to both types of gambling cues (i.e., in both Studies 1 and 2). As such, it is important that

future research investigate under which circumstances explicit gambling outcome expectancies might be activated by gambling cue exposure in the absence of an activation of implicit gambling outcome expectancies.

One instance in which this double dissociation may occur is among gamblers with relatively impaired executive functioning. The role of executive function in addictive behaviours, such as alcohol use, has recently been delineated in Wiers and colleagues' (2007) model of addictive behaviours, which focuses on the roles of automatic (i.e., implicit) and controlled (i.e., explicit) processes in the development of addictive behaviours. According to this model, implicit alcohol cognitions are said to have the largest influence on subsequent alcohol use among individuals with relatively impaired executive function. In contrast, explicit alcohol cognitions are proposed to have the largest influence on subsequent alcohol use among individuals with relatively intact executive function.

Evidence supporting this model has recently been reported in the alcohol field (Thush et al., 2008; Grenard et al., 2008). For example, Thush and colleagues (2008) had adolescents complete a measure of executive function (i.e., a working memory task), along with a direct measure of alcohol cognitions (i.e., an alcohol outcome expectancy self-report questionnaire) and an indirect measure of alcohol cognitions (i.e., an alcohol-related IAT), before measuring their alcohol consumption one month later. As predicted, among adolescents with low working memory capacity (i.e., executive dysfunction), IAT performance predicted prospective alcohol consumption; however, there was no relationship between IAT performance and prospective alcohol consumption among adolescents with high working memory capacity. A reverse pattern of findings was

observed when examining explicit (i.e., self-reported) alcohol outcome expectancies. Specifically, among adolescents with high working memory capacity, explicit alcohol outcome expectancies predicted prospective alcohol consumption but there was no relationship between explicit alcohol outcome expectancies and prospective alcohol consumption among those with low working memory capacity.

In light of the commonalities between gambling and alcohol use as addictive behaviours (e.g., APA, 2013; Petry, 2006; Potenza, 2006), such findings may also be relevant in the gambling domain. Specifically, an examination of the moderating role of executive functioning on the relationship between implicit and explicit outcome expectancies and gambling could test the prediction that implicit gambling outcome expectancies have less influence on prospective gambling behaviour among those with strong executive functions, as they may be able to exert conscious control over their gambling behaviour better than those with low executive functions. In contrast, implicit cognitions may have a strong automatic triggering effect on the prospective gambling behaviour of those with low executive functions. In relation to explicit gambling outcome expectancies, it may be the case that prospective gambling behaviour is most influenced by such expectancies among individuals with strong executive functions, and the converse would be found among those with low executive functions (i.e., explicit gambling outcome expectancies would have less influence on gambling behaviour among those with low executive functions). In addition to using a working memory task as a measure of executive functioning, it would be important to assess whether the potential relationship between implicit/explicit gambling outcome expectancies and prospective gambling behaviour is moderated by other aspects of executive functioning, such as

impaired response inhibition, as has been demonstrated in the alcohol domain (Houben & Wiers, 2009).

Practical Implications

In terms of practical implications, findings from my dissertation research highlight the significant impact that exposure to cues associated with gambling (i.e., gambling pictures and gambling advertisements) has on gamblers' implicit and explicit expectancies regarding the outcomes of gambling. Specifically, as results revealed that exposure to gambling cues led to an increased activation of positive gambling outcome expectancies, and such expectancies were associated with gambling behaviour and problem gambling severity, frequent or chronic activation of positive gambling outcome expectancies may pose a risk for increased gambling behaviour and gambling problems among members of communities located in close proximity to gambling venues, as well as employees of such establishments.

As previously argued by Derevensky, Gupta, Messerlian, and Gillespie (2004), results of the current research also point to the need for stricter gambling advertisement guidelines and regulations, such as when and where gambling advertisements can be displayed, in order to decrease the risk of automatically activating implicit positive gambling outcome expectancies in gamblers. Unlike alcohol and tobacco advertising, which has been the target of public health initiatives aimed at regulating the specific content conveyed in such advertisements (e.g., Canadian Public Health Association, 2011; Heung, Rempel, & Krank, 2012), gambling advertising remains virtually unregulated in many countries. Although there is some variation by region and country, aside from voluntary, self-imposed ethical guidelines by the gambling industry, there

currently exists little in relation to policy regarding gambling advertisements. For example, whereas the American Gaming Association's voluntary Code of Conduct for Responsible Gaming (American Gaming Association, 2012) includes a pledge to "advertise responsibly", the regulations put forth in the Gaming Control Act of each Canadian province have no application to commercial gambling lottery advertisements (see Sklar & Derevensky, 2010). In light of the present findings, it appears important for policy makers, regulators, and the gambling industry to carefully consider the effects that gambling advertisements may have on the activation of cognitions outside of gamblers' conscious awareness (i.e., implicit gambling outcome expectancies).

Clinical Implications

Findings stemming from my dissertation research have a number of important clinical implications, particularly in relation to the prevention and treatment of disordered gambling. In relation to the prevention of gambling problems, results of my dissertation research point to the importance of focusing on gambling outcome expectancies when designing problem gambling prevention initiatives. Indeed, results point to the importance of including interventions aimed at identifying and modifying gambling outcome expectancies as part of initiatives aimed at preventing disordered gambling. As the modification of explicit outcome expectancies have been a component of successful programs aimed at reducing adolescent cigarette and illicit drug use (e.g., Botvin et al., 1992; Botvin, Griffin, Scheier, Williams & Epstein, 2000), they may also prove useful in the prevention of disordered gambling. In addition, providing individuals with personalized feedback on their self-reported alcohol outcome expectancies is a central aspect of brief, motivational enhancement programs aimed at reducing alcohol use among

youth (D'Amico & Fromme, 2002; Fromme & D'Amico, 2000) and similar procedures have been successfully employed in cognitive behavioural treatments for disordered gambling (Whelan, Steenbergh, & Meyers, 2007). As such, providing personalized feedback on individuals' gambling outcome expectancies may serve as a viable strategy to prevent the incidence of disordered gambling among at-risk populations (e.g., adolescent and young adult gamblers).

Results from Study 3 demonstrating that both implicit and explicit positive gambling outcome expectancies independently predict gambling behaviour and gambling problems provide a potential explanation for the relatively limited effectiveness of current gambling prevention educational initiatives (Dickson-Gillespie, Rugle, Rosenthal, & Fong, 2008; Griffiths, 2008; Williams, Simpson, & West, 2007). Specifically, existing prevention initiatives solely target explicit gambling-related cognitions and results of Study 3 suggest that both implicit and explicit gambling outcome expectancies are uniquely associated with gambling behaviour and problems. In light of such findings, it appears important that problem gambling prevention initiatives include education on the role of both implicit and explicit cognitions in gambling. Relatedly, results of the present studies highlight the potential utility of targeting implicit gambling-related irrational cognitions, in addition to explicit cognitions, when designing problem gambling prevention initiatives. Indeed, as prevention programs aimed at identifying and dispelling explicit gambling-related irrational cognitions have been marked with limited success (e.g., Dickson-Gillespie et al., 2008; Griffiths, 2008; Williams et al., 2007), it may prove useful to focus on identifying and restructuring implicit gambling-related cognitions

when designing such preventative initiatives (see discussion of treatment implications below).

In relation to treatment for disordered gambling, results of my dissertation research point to the importance of assessing both implicit and explicit gambling outcome expectancies among treatment seekers prior to commencing treatment. Such an assessment could help guide case formulation and assist in treatment planning (i.e., identifying interventions that are best suited for clients based on their specific gambling outcome expectancies). As results from Study 3 of my dissertation research revealed that both implicit and explicit positive gambling outcome expectancies predicted unique and shared variance in gambling behaviour and gambling problems, it appears important to assess implicit and explicit gambling outcome expectancies during the assessment phase, as well as over the course of treatment as a measure of treatment progress. It is important to note, however, that further research is required to assess the stability of such measures over repeated assessments in the absence of treatment before it would be appropriate to administer these measures in a clinical setting as a measure of treatment progress.

As highlighted above, results of the current research also point to the potential utility of focusing on identifying and restructuring not only explicit gambling-related cognitions but also implicit cognitions as interventions for disordered gambling. In relation to explicit gambling-related cognitions, results of my dissertation research suggest that expectancy challenges may be a useful intervention for disordered gambling. Indeed, expectancy challenges, which aim to reduce individuals' expectancies about the rewarding properties of a substance, have been used to successfully reduce explicit positive outcome expectancies in the alcohol area (Darkes & Goldman, 1993, 1998;

Labbe & Maisto, 2011; Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012). Further, expectancy challenges have been found to be associated with a reduction in alcohol consumption (see Labbe & Maisto, 2011; Scott-Sheldon et al., 2012). In light of the similarities between alcohol and gambling as addictive behaviours (APA, 2013; Petry, 2006; Potenza, 2006), expectancy challenges may also be effective in reducing explicit gambling outcome expectancies and in turn, serve as a viable intervention for gambling problems. Such interventions have been performed in various ways in the alcohol outcome expectancy domain, but future research assessing the effectiveness of expectancy challenges in reducing explicit gambling outcome expectancies may wish to focus on educating gamblers about the role of outcome expectancies in gambling behaviour and gambling-related problems, and include exercises in which gamblers examine environmental factors and cues that contribute to the expectancies they hold regarding the positive and negative effects of gambling (e.g., collecting gambling advertisements that promote the positive outcomes of gambling, such as winning money, being social, etc.; see Darkes & Goldman, 1993 for a successful example of this intervention procedure in the alcohol area). Given the effectiveness of expectancy challenge interventions in decreasing explicit alcohol outcome expectancies (e.g., Darkes & Goldman, 1993, 1998; Thush et al., 2007; Wiers et al., 2005; Van de Luitgaarden et al., 2006), Wiers and colleagues (2005) investigated the impact of expectancy challenges in reducing implicit, in addition to explicit, alcohol-related cognitions. While it was found that expectancy challenges altered explicit alcohol outcome expectancies, such interventions were found to have minimal impact on implicit alcohol outcome expectancies. Thus, one might predict that expectancy challenge interventions would be

most effective in modifying explicit rather than implicit gambling outcome expectancies. Moreover, based on the results of Study 1 of my dissertation research, it appears that expectancy challenge interventions might be most effective following exposure to gambling cues in order to activate the explicit outcome expectancies in question.

In contrast to the limited effectiveness of expectancy challenges in modifying implicit alcohol cognitions, support has been shown for the effectiveness of recently developed cognitive retraining methods that alter implicit alcohol associations from positive to negative (Houben, Havermans, & Wiers, 2010; see Wiers et al., 2006; Wiers, Rinck, Kordts, Houben, & Strack, 2010). For example, Houben and colleagues (2010) randomly assigned hazardous drinkers to undergo an evaluative conditioning procedure that consistently paired alcohol-related cues with negative stimuli (experimental condition) or a procedure that consistently paired alcohol-related cues with neutral stimuli (control condition). Results revealed that participants in the experimental condition showed stronger negative implicit attitudes toward alcohol and consumed less alcohol compared to those in the control condition. Similar findings have emerged in other studies using evaluative conditioning procedures, with such methods associated with reduced alcohol consumption and improved treatment outcomes (Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011; Wiers, Van de Luitgaarden, van den Wildenberg, & Smulders, 2005). Given the promise of cognitive retraining methods in the alcohol field, these interventions may be effective in altering implicit positive gambling outcome expectancies as a treatment for disordered gambling. Moreover, findings from my dissertation suggest that these interventions might be most helpful following exposure to

gambling cues in order to activate the implicit gambling outcome expectancies in question.

Additionally, the overall finding of Study 2 that brief exposure to gambling advertisements activates implicit but not explicit positive gambling outcome expectancies has important implications for relapse prevention among those attempting to reduce their gambling. Specifically, such findings suggest that brief exposure to gambling advertisements (or exposure to similar gambling cues) while simultaneously engaged in other cognitive tasks may activate gamblers' cognitions without their knowledge or conscious awareness. It is theoretically possible that these activated implicit cognitions may, in turn, lead to gambling relapse. As such, it appears important that relapse prevention initiatives focus on increasing problem gamblers' awareness of how exposure to gambling advertisements and related cues may increase their risk for relapse. This could be achieved by bringing unconscious influences into conscious awareness so that effortful coping strategies can be initiated following gambling advertisement/cue exposure.

One technique that has been found to be effective in bringing unconscious (i.e., implicit) alcohol-related cognitions into conscious awareness is the Alcohol Attention-Control Training Program (AACTP; Fadardi & Cox, 2009). This computerized-based intervention is designed to increase drinkers' awareness of the unconscious, automatic cognitive aspects of their alcohol-use behaviour and help them gain better control over these processes through a series of systematic, volitional exercises aimed at decreasing levels of attentional bias toward alcohol-related cues. The AACTP also consists of explicit, individualized goal setting and the provision of immediate feedback on their

performance. Research examining the effectiveness of this intervention has demonstrated a significant reduction in attentional bias towards alcohol-related cues, as well as a significant reduction in alcohol consumption, both of which were maintained at three-month follow-up (Fadardi & Cox, 2009). Given the promising findings in the alcohol domain, a modification of this intervention may prove useful in increasing gamblers' awareness of the implicit processes involved in their gambling behaviour and in helping gamblers gain control over such processes.

Limitations

The current research has some limitations that are important to address. One limitation relates to the types of gambling cues (i.e., video of gambling scenes and gambling advertisements) used in the three studies of my dissertation. Although I selected gambling cues that I believed would be relevant to a diverse range of gamblers (e.g., gambling pictures used in the gambling video depicted a wide range of gambling activities), it may be the case that these pictures, as well as the gambling advertisements, were more salient to some participants than others. In turn, this may have impacted the activation of implicit and explicit gambling outcome expectancies in participants' memory networks. Indeed, the elicitation of cue-specific response patterns (i.e., cue reactivity) has been investigated extensively in the substance use area (see Carter & Tiffany, 1999), with research demonstrating cue-elicited stimulus specificity in addictive behaviours comparing reactivity to alcohol versus neutral cues (e.g., Kambouropoulos & Staiger, 2011) and cue reactivity to preferred versus non-preferred alcoholic beverages (Staiger & White, 1991). Further, research has found that alcohol and tobacco cravings are strongest in response to cues of the specific addictive behaviour (Drobes, 2002).

Similar cue specific reactivity has recently been demonstrated in the gambling domain (Wulfert, Maxson, & Jardin, 2009). Specifically, Wulfert and colleagues (2009) found that exposure to cues related to participants' preferred mode of gambling (i.e., video clips depicting either horse racing or lottery gambling) was associated with significantly higher urges to gamble. That is, both horse racing and lottery gamblers reported the highest urges when they were exposed to cues of their preferred gambling activity. In light of such findings, it is important that future research assess whether such cue specific reactivity influences gamblers' implicit and explicit gambling outcome expectancies. For example, future research could recruit participants based on their preferred gambling activity (e.g., slot machine gambling versus card games), expose participants to cues of their preferred or non-preferred gambling activity, and then utilize both indirect and direct assessment modes to measure the impact of such cue exposures on the activation of implicit and explicit gambling outcome expectancies.

A second limitation related to the gambling cues used during the cue exposures in the present research is that such cues consisted solely of images of gambling-related activities and gambling advertisements. As such, it is not known whether exposure to settings in which gambling occurs (e.g., casino environments) or engaging in actual gambling impacts the activation of implicit and explicit gambling outcome expectancies. That being said, however, it is important to note that the current research was the first to investigate the role of gambling cues on the activation of implicit and explicit gambling outcome expectancies. As such, I believe that the use of images and videos of gambling-related activities and gambling advertisements were appropriate cues to use as a starting point in this line of research. Nonetheless, it is important that future research investigate

the role of exposure to gambling environments and gambling (as assessed in a gambling laboratory or a natural gambling environment, such as a casino) on the activation of implicit and explicit gambling outcome expectancies in order to determine whether such exposure differentially impacts the facilitation of implicit and explicit gambling outcome expectancies. To do so, researchers could expose gamblers to a gambling environment (e.g., a gambling laboratory) or a sterile laboratory environment followed by the assessment of gambling outcome expectancies via direct and indirect assessment modes. Alternatively, participants could be asked to engage in actual gambling or to engage in a non-gambling task prior to the direct (i.e., self-report) and indirect (i.e., RT task) assessment of gambling outcome expectancies in order to determine whether engaging in gambling influences the activation of implicit and explicit gambling outcome expectancies.

A third limitation of this dissertation research concerns the sample characteristics of participants included in the three studies. First, the participant sample consisted of adult gamblers who reported regular gambling activity [i.e., at least three times in the past 60 days (Study 1 and 3a); at least once in the past 90 days (Study 2 and 3b)]. While recruiting gamblers based on these criteria allowed us to obtain a range of gamblers in terms of age and level of problem gambling severity, results of the current research may not generalize to other populations, such as adolescent gamblers. In light of the increased incidence of gambling and gambling-related problems among adolescents compared to adults (see Derevensky, Shek, & Merrick, 2011), as well as research highlighting the significance of gambling outcome expectancies in adolescent gambling behaviour and gambling-related problems (e.g., Gillespie et al., 2007a, 2007b; Wickwire et al., 2010;

Gupta & Derevensky, 2014), it is important that future research examine the influence of gambling cues on the activation of implicit and explicit gambling outcome expectancies among this age group. In addition, while previous research has assessed the role of gambling outcome expectancies on adolescent gambling behaviour and gambling problems (e.g., Wickwire et al., 2010), such research has focused exclusively on explicit gambling outcome expectancies. As such, it is important that future research examine the utility of both implicit and explicit gambling outcome expectancies in predicting gambling behaviour and gambling problems among adolescent gamblers.

In relation to the previous limitation, the current research was also limited because potential sex differences in the activation of implicit and explicit gambling outcome expectancies following cue exposure in Study 1 or Study 2, and potential moderating effects of sex on the relationship between implicit and explicit gambling outcome expectancies and gambling behaviour and problem gambling severity in Study 3a and Study 3b, were not assessed. Given that this dissertation research was the first to investigate the impact of exposure to gambling cues on the activation of implicit and explicit gambling outcome expectancies, we did not have any a priori hypotheses regarding potential sex differences in the activation of gambling outcome expectancies following cue exposure. As such, this research was not designed or adequately powered to examine sex as a separate between-subjects variable in Study 1 or 2, nor was it designed to examine sex as a potential moderator in Study 3a or 3b (i.e., we did not assign participants to conditions in order to ensure a balanced ratio of males to females). However, as sex differences have been found in previous research investigating the influence of self-reported gambling outcome expectancies on adolescent and young adult

gambling behaviour (e.g., Gillespie et al., 2007b; Teeters et al., 2013), it is important that future research in this area include sex as a separate independent variable when assessing the role of gambling cues on the activation of implicit and explicit gambling outcome expectancies. For example, Teeters and colleagues (2013) found that stronger endorsement of expectancies related to the negative social consequences of gambling was predictive of reduced gambling frequency for females but was not significantly associated with gambling frequency among males, suggesting that such negative outcome expectancies are less proximal among males compared to females. In light of such findings, it is important that future research investigate whether similar sex differences in the relationship between negative gambling outcome expectancies and gambling frequency are present among adult gamblers.

One further potential limitation of the current research relates to the self-report measure of gambling outcome expectancies used to assess participants' explicit gambling outcome expectancies. At present, there is no self-report measure of gambling outcome expectancies that captures the positive and negative expectancies that *adults* perceive will occur from gambling. As a result, we used a self-report measure of gambling outcome expectancies that was designed for *adolescent* gamblers (i.e., GEQ; Gillespie et al., 2007a). Consequently, the self-report measure of explicit gambling outcome expectancies used in the present research may not be the most accurate representation of the different positive and negative gambling outcome expectancies held by adult gamblers. That said, however, the factor structure of other measures of adolescent gambling outcome expectancies (i.e., the Adolescent Gambling Expectancies Survey; Wickwire et al., 2010) have been successfully replicated in adult gamblers (Ginley et al., 2013), suggesting that

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the outcome expectancies captured by self-report measures of adolescent gambling outcome expectancies are relevant to both adult and adolescent gamblers. Nonetheless, it is important that future research investigate the specific positive and negative gambling outcome expectancies held by adult gamblers and that priority be given to the development of a self-report measure of adult gamblers' positive and negative gambling outcome expectancies. When doing so, it appears important to assess outcome expectancies as well as the value that gamblers' place on such expectancies, as has been examined in the alcohol expectancy domain. Drawing upon principles of social learning theory (Bandura, 1977) and utility theory (Edwards, 1954), which view behaviour as a function of not only the likelihood that specific consequences will occur but also the subjective evaluation of those consequences, Fromme, Stroot, and Kaplan (1993) developed a self-report measure of alcohol outcome expectancies that assesses both the positive and negative expected effects of alcohol as well as individuals' subjective evaluation of those effects (i.e., the perceived desirability of the positive and negative effects of drinking). The importance of assessing both is apparent when considering that drinking outcomes typically assumed to be negative (e.g., irresponsibility, behavioural and cognitive impairment) have been commonly reported as desirable outcomes among young adults (Fromme, Marlatt, Baer, & Kivlahan, 1994). As existing self-report gambling outcome expectancies measures do not assess gamblers' subjective evaluations of such expectancies, it is important that future self-report measures of gambling outcome expectancies include items that capture individuals' subjective evaluations of the outcomes of gambling.

As mentioned in previous chapters, it is important to acknowledge a limitation inherent to the RT task used in each of the three studies of my dissertation. Specifically, the current research assessed associations between gambling cues and outcome expectancies relative to associations with another control activity (i.e., track and field). Although I chose a control activity that I believed was comparable to gambling in terms of both size and complexity (i.e., each involve a range of activities and could readily be associated with both positive and negative outcomes), it is not known whether similar results would have been found had an activity other than track and field been used as a control. In order to address this limitation, it is important that future research examine associations between gambling cues and the facilitation of outcome expectancies relative to associations with different activities.

As highlighted in Chapter 4 of this dissertation, one limitation relates to the indirect measure of gambling outcome expectancies used in my dissertation research. Specifically, the present research used only one RT measure, which was based upon the affective priming paradigm (Fazio et al., 1986). Although RT measures stemming from this paradigm have been found to reliably assess implicit alcohol-related cognitions (e.g., Palfai & Ostafin, 2003), it is important that future research make use of other RT measures of implicit cognitions, such as the Extrinsic Affective Simon Task (EAST; De Houwer, 2003) or Implicit Association Test (IAT; Greenwald et al., 1998), when investigating the role of exposure to gambling cues on the activation of implicit gambling outcome expectancies. Given that such measures have been found to provide reliable and valid assessments of implicit cognitions in the broader addictions field (e.g., De Houwer, Crombez, Koster, & De Beul, 2004; Palfai & Ostafin, 2003; Reich, Below, & Goldman,

2010; Roefs et al., 2011), they may also prove useful in assessing implicit gambling-related cognitions. Lastly, a related limitation is that my dissertation research relied solely on a RT measure to assess implicit gambling outcome expectancies. As such, it is important that future research in this area make use of implicit tasks other than RT measures, such as word association tests (Ames et al., 2007; Stacy, Ames, & Grenard, 2006; Stacy & Wiers, 2010). In the gambling domain, such word association tests have recently been developed and used to effectively assess implicit gambling associations (Stewart et al., 2014; see Appendix G). Specifically, I was recently involved in a research study that used a modified version of the Behavior Outcome Association Task (BOAT; Stacy, Leigh, & Weingardt, 1997) to assess automatic positive gambling associations among regular gamblers. Developed in the substance abuse area, the BOAT (Stacy et al., 1997) is a pencil-and-paper implicit measure that involves providing participants with a word or phrase describing a desirable outcome (e.g., "relaxation" or "having fun") and then asking them to name the activities that first come to mind. Previous research using this implicit measure has found that individuals who are more involved with substances are more likely to respond with substance use behaviours to these positive outcome words/phrases, indicating stronger implicit associations between substance use and positive outcomes in memory (e.g., Ames et al., 2007). Using a modified version of the BOAT to assess automatic positive gambling associations, results from our study suggest that gamblers with a stronger tendency to implicitly associate gambling with positive outcomes are also more likely to spend excessive amounts of time and money gambling and to experience more gambling-related problems. Moreover, we found that the relationship between BOAT scores and gambling problems was mediated by increased

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time spent and money lost gambling. Thus, gamblers with a stronger tendency to implicitly associate gambling with positive outcomes spend more time and money gambling which in turn leads to more gambling-related problems. In light of such findings, this word association test could be employed in future research investigating the influence of cue exposure on the activation of implicit gambling outcome expectancies.

Conclusion

Although outcome expectancies have been the target of much research in the broad field of addictive behaviours, a paucity of research has examined the role of outcome expectancies in gambling. This is disconcerting as the little research that has been conducted in this area has found that self-reported gambling outcome expectancies are associated with increased levels of gambling behaviour and gambling problems (e.g., Gillespie et al., 2007b; Shead & Hodgins, 2009; St-Pierre, Temcheff, Gupta, Derevensky, & Paskus, 2014; Wickwire et al., 2010). To increase our understanding of the influence of both implicit and explicit outcome expectancies in gambling and to facilitate research in this area, my dissertation research aimed to investigate the role of exposure to gambling cues on the activation of both implicit and explicit gambling outcome expectancies in regular gamblers' memory networks, and to assess the utility of implicit and explicit positive gambling outcome expectancies in independently predicting gambling behaviour and gambling-related problems.

As previous research in the area of gambling outcome expectancies has focused on examining the impact of explicit outcome expectancies in gambling (e.g., Gillespie et al., 2007b; St-Pierre et al., 2014; Wickwire et al., 2010), the main novel contribution of my dissertation research was the exploration of implicit, in addition to explicit, gambling

outcome expectancies, and their influence on gambling behaviour and gambling problems. The most important findings stemming from my dissertation research were that: (1) exposure to gambling cues of relatively long duration activates both implicit and explicit positive gambling outcome expectancies among gamblers, (2) brief exposure to gambling cues while simultaneously engaged in other cognitive tasks activates only implicit positive gambling outcome expectancies in regular gamblers' memory networks, (3) implicit and explicit negative outcome expectancies appear to play a less proximal role in gambling, and (4) both implicit and explicit positive gambling outcome expectancies contribute unique as well as shared variance in the prediction of gambling behaviour and problem gambling severity. Overall, results of my dissertation research highlight the relevance of outcome expectancies in the gambling field and point to the need for future research in this area in order to increase our understanding of the role of these cognitions on gambling behaviour and associated problems.

REFERENCES

Aarons, G.A., Brown, S.A., Stice, E., & Coe, M.I. (2001). Psychometric evaluation of the marijuana and stimulant effect expectancy questionnaires for adolescents. *Addictive Behaviors, 26*, 219 – 236.

Abrams, D.B., & Niaura, R.S. (1987). Social learning theory. In H.T. Blane & K.E. Leonard (Eds.), *Psychological theories of drinking and alcoholism* (pp. 131 – 178). New York, NY: Guilford Press.

American Gaming Association. (2012). *The American Gaming Association Code of Conduct for Responsible Gaming*. Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Ames, S.L., Grenard, J.L., Thush, C., Sussman, S., Wiers, R.W., & Stacy, A.W. (2007). Comparison of indirect assessments of associations as predictors of marijuana use among at-risk adolescents. *Experimental and Clinical Psychopharmacology, 15*, 204 – 218.

Ames, S.L., Franken, I.H.A., & Coronges, K. (2006). Implicit cognition and drugs of abuse. In R.W. Wiers & A.W. Stacy (Eds). *Handbook of implicit cognition and addiction* (pp. 363 – 378). Thousand Oaks, CA: Sage Publications.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bargh, J. A., Chaiken, S., Raymond, P., & Hymes, C. (1996). The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. *Journal of Experimental Social Psychology, 32*, 104 – 128.

Binde, P. (2009). Exploring the impact of gambling advertising: An interview study of

problem gamblers. *International Journal of Mental Health & Addiction, 7*, 541 –

554.

Binde, P. (2014). *Gambling advertising: A critical research review.* London, UK: The

Responsible Gambling Trust.

Birch, C.D., Stewart, S.H., Wiers, R.W., Klein, R.M., MacLean, A.D., & Berish, M.J.

(2008). The mood-induced activation of implicit alcohol cognition in

enhancement and coping motivated drinkers. *Addictive Behaviors, 33*, 565 – 581.

Botvin, G. J., Dusenbury, L., Baker, E., James-Ortiz, S., Botvin, E. M., & Kerner, J.

(1992). Smoking prevention among urban minority youth: Assessing effects on

outcome and mediating variables. *Health Psychology, 11*, 290 – 299.

Botvin, G. J., Griffin, K. W., Scheier, L. M., Williams, C., & Epstein, J. A. (2000).

Preventing illicit drug use in adolescents: Long-term follow-up data from a

randomized control trial of a school population. *Addictive Behaviors, 25*, 769 –

774.

Brevers, D., Cleeremans, A., Hermant, C., Tibboel, H., Kornreich, C., Verbanck, P., &

Noel, X. (2013). Implicit gambling attitudes in problem gamblers: Positive but not

negative implicit associations. *Journal of Behavior Therapy and Experimental

Psychiatry, 44*, 94 – 97.

Brown, S.A., Goldman, M.S., Inn, A., & Anderson, L.R. (1980). Expectations of

reinforcement from alcohol: Their domain and relation to drinking patterns.

Journal of Consulting and Clinical Psychology, 48, 419 – 426.

Canadian Public Health Association (2011). *The winnable battle: Ending tobacco use in Canada*. Canadian Public Health Association: Ottawa, ON.

Carey, K. (1995). Alcohol-related expectancies predict quantity and frequency of heavy drinking among college students. *Psychology of Addictive Behaviors, 9*, 236 – 241.

Carter, B.L., & Tiffany, S.T. (1999) Meta-analysis of cue-reactivity in addiction research. *Addiction, 94*, 327 – 340.

Cooper, M.L., Russell, M., & George, W.H. (1988). Coping, expectancies, and alcohol abuse: A test of social learning formulations. *Journal of Abnormal Psychology, 97,* 218 – 230.

Cox, W.M. & Klinger, E. (1988) A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*, 165 – 180.

Cronce, J.M., & Corbin, W.R. (2010). Effects of alcohol and initial gambling outcomes on within-session gambling behavior. *Experimental and Clinical Psychopharmacology, 18*, 145 – 157.

D'Amico, E. J., & Fromme, K. (2002). Brief prevention of adolescent risk-taking behavior. *Addiction, 97*, 563 – 574.

Darkes, J., & Goldman, M.S. (1993). Expectancy challenge and drinking reduction: Experimental evidence for a meditational process. *Journal of Consulting Psychology, 61*, 344 – 353.

Darkes, J., & Goldman, M. S. (1998). Expectancy challenge and drinking reduction: Process and structure in the alcohol expectancy network. *Experimental and Clinical Psychopharmacology, 6*, 64 – 76.

Dechant, K. & Ellery, M. (2011). The effect of including a monetary motive item on the Gambling Motives Questionnaire in a sample of moderate gamblers. *Journal of Gambling Studies, 27*, 331-344.

De Houwer, J. (2003). The Extrinsic Affective Simon Task. *Experimental Psychology, 50*, 77 – 85.

De Houwer, J. (2006). What are implicit measures and why are we using them? In Wiers, R.W., & Stacy, A.W. (Eds.). *Handbook of implicit cognition and addiction* (pp. 11 – 28). Thousand Oaks, CA: Sage Publications.

De Houwer, J., Crombez, G., Koster, E.H.W., & De Beul, N. (2004). Implicit alcohol-related cognitions in clinical samples of heavy drinkers. *Journal of Behaviour Therapy and Experimental Psychiatry, 35*, 275 – 286.

De Houwer, J., Teige-Mocigemba, S., Spruyt, A., & Moors, A. (2009). Implicit measures: A normative analysis and review. *Psychological Bulletin, 135*, 347 – 368.

de Jong, P. J., Wiers, R. W., van de Braak, M., & Huijding, J. (2007). Using the Extrinsic Affective Simon Test as a measure of implicit attitudes towards alcohol: Relationship with drinking behavior and alcohol problems. *Addictive Behaviors, 32*, 881 – 887.

Derevensky, J., Gupta, R., Messerlian, C., & Gillespie, M. (2004). Youth gambling problems: A need for responsible social policy. In J. Derevensky & R. Gupta (Eds.), *Gambling problems in youth: Theoretical and applied perspectives* (pp. 231 – 252). New York, NY: Springer.

Derevensky, J., Shek, D., & Merrick, J. (2011). *Youth gambling problems: The hidden addiction.* Boston, MA: De Gruyter.

Derevensky, J., Sklar, A., Gupta, R., & Messerlian, C. (2010). An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors. *International Journal of Mental Health and Addiction, 8,* 21 – 34.

Deutsch, R., & Strack, F. (2006). Reflective and impulsive determinants of addictive behaviors. In R. W. Wiers and A.W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 45 – 57). Thousand Oaks, CA: Sage Publications, Inc.

Dickson-Gillespie, L., Rugle, L., Rosenthal, R., & Fong, T. (2008). Preventing the incidence and harm of gambling problems. *Journal of Primary Prevention, 29*, 37 – 55.

Draine, S. C., & Greenwald, A. G. (1998). Replicable unconscious semantic priming. *Journal of Experimental Psychology: General, 127,* 286 – 303.

Drobes, D. (2002). Cue reactivity in alcohol and tobacco dependence. *Alcoholism: Clinical and Experimental Research, 26*, 1928 – 1929.

Earleywine, M. (1995). Expectancy accessibility, alcohol expectancies, and intentions to consume alcohol. *Journal of Applied Social Psychology, 25*, 933 – 943.

Edwards, W. (1954). The theory of decision making. *Psychological Bulletin, 51*, 380 – 417.

Ellery, M. & Stewart, S.H. (2014). Alcohol affects video lottery terminal (VLT) gambling behaviors and cognitions differently. *Psychology of Addictive Behaviors, 28*, 206 – 216.

Evans, J.St.B.T. (2003). In two minds: Dual-process accounts of reasoning. *Trends in Cognitive Science, 7*, 454 – 459.

Evans, J.St.B.T., & Coventry, K. (2006). A dual-process approach to behavioral addiction: The case of gambling. In R. W. Wiers and A.W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 29 – 43). Thousand Oaks, CA: Sage Publications, Inc.

Fadardi, J.S., & Cox, W.M. (2009). Reversing the sequence: Reducing alcohol consumption by overcoming alcohol attentional bias. *Drug and Alcohol Dependence, 101*, 137 – 145.

Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 75–109). San Diego, CA: Academic Press.

Fazio, R.H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition & Emotion, 15*, 115 – 141.

Fazio, R. H., Jackson, J. R., Dunton, B. C. & Williams, C. J. (1995). Variability in automatic activation as unobtrusive measures of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology, 69,* 1013-1027.

Fazio, R.H., & Olson, M.A. (2003). Implicit measures in social cognition: Their meaning and use. *Annual Review of Psychology, 54,* 297 – 327.

Fazio, R.H., Sanbonmatsu, D.M., Powell, M.C., & Kardes, F.R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*, 229–238.

Fazio, R.H. & Williams, C.J. (1986). Attitude accessibility as a moderator of the attitude-perception and attitude-behavior relations: An investigation of the 1984 presidential election. *Journal of Personality and Social Psychology, 51*, 505 – 514.

Ferris, J. & Wynne, H. (2001). *The Canadian Problem Gambling Index: User's manual*. Ottawa, Canada: Canadian Centre on Substance Abuse.

Fried, B. G., Teichman, M., & Rahav, G. (2010). Adolescent gambling: Temperament, sense of coherence and exposure to advertising. *Addiction Research and Theory, 18*, 586 – 598.

Friend, K. B., & Ladd, G. T. (2009). Youth gambling advertising: A review of the lessons learned from tobacco control. *Drugs: Education, Prevention and Policy, 16*, 283-297.

Fromme, K., & D'Amico, E. J. (2000). Measuring adolescent alcohol outcome expectancies. *Psychology of Addictive Behaviors, 14*, 206 – 212.

Fromme, K., Marlatt, G.A., Baer, J.S., & Kivlahan, D.R. (1994). The alcohol skills training program: A group intervention for young adult drinkers. *Journal of Substance Abuse Treatment, 11*, 143 – 154.

Fromme, K., Stroot, E., & Kaplan, D. (1993). Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment, 5*, 19 – 26.

Gillespie, M. A. M., Derevensky, J. & Gupta, R. (2007a). Adolescent problem gambling: Developing a gambling expectancy instrument. *Journal of Gambling Issues, 19*, 51 – 68.

Gillespie, M. A. M., Derevensky, J. & Gupta, R. (2007b). The utility of outcome
expectancies in the prediction of adolescent gambling behaviour. *Journal of
Gambling Issues, 19*, 69 – 85.

Ginley, M.K., Whelan, J.P., Relyea, G.E., Simmons, J.L., Meyers, A.W., & Pearlson,
G.D. (2013). College student beliefs about wagering: An evaluation of the
Adolescent Gambling Expectancies Survey. *Journal of Gambling Studies*.
Advance online publication. doi: 10.1007/s10899-013-9403-8

Glock, S., & Krolak-Schwerdt, S. (2013). Changing outcome expectancies, drinking
intentions, and implicit attitudes toward alcohol: A comparison of positive
expectancy-related and health-related alcohol warning labels. *Applied
Psychology: Health and Well-Being, 5,* 332 – 347.

Goldman, M.S. (1999). Risk for substance abuse: Memory as a common etiological
pathway. *Psychological Science, 10,* 196 – 197.

Goldman, M.S. (2002). Expectancy and risk for alcoholism: The unfortunate exploitation
of a fundamental characteristic of neurobehavioral adaptation. *Alcoholism:
Clinical and Experimental Research, 26,* 737 – 746.

Goldman, M.S., Brown, S.A., & Christiansen, B.A. (1987). Expectancy theory: Thinking
about drinking. In H.T. Blane & K.E. Leonard (Eds.), *Psychological theories of
drinking and alcoholism* (pp. 181 – 226). New York, NY: Guildford Press.

Goldman, M.S., Darkes, J., & Del Boca, F.K. (1999). Expectancy mediation of
biopsychosocial risk for alcohol use and alcoholism. In I. Kirsch (Ed.), *How
expectancies shape experience* (pp. 223 – 262). Washington, DC: APA Books.

Goldman, M.S., & Rather, B.C. (1993). Substance use disorders: Cognitive models and
architectures. In P. Kendall & K.S. Dobson (Eds.), *Psychopathology and cognition* (pp. 245 – 291). Orlando, FL: Academic Press.

Goldman, M.S., Reich, R.R., & Darkes, J. (2006). Expectancy as a unifying construct in
alcohol-related cognition. In R.W. Wiers & A.W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 105 – 120). Thousand Oaks, CA: Sage
Publications.

Grady, C.L., McIntosh, A.R., Rajah, M. N., & Craik, F.I.M. (1998). Neural correlates of
the episodic encoding of pictures and words. *Proceedings of the National Academy of Sciences of the United States of America, 95*, 2703 – 2708.

Greenwald, A.G., Draine, S.C., Abrams, R.L. (1996). Three cognitive markers of
unconscious semantic activation. *Science, 273*, 1699–1702.

Greenwald, A.G., Klinger, M.R., & Liu, T.J. (1989). Unconscious processing of
dichoptically masked words. *Memory and Cognition, 17*, 35–47.

Greenwald, A.G., McGhee, D.E., & Schwartz, J.L.K. (1998). Measuring individual
differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*, 1464 – 1480.

Grenard, J.L., Ames, S.L., Wiers, R.W., Thush, C., Sussman, S., & Stacy, A.W. (2008).
Working memory capacity moderates the predictive effects of drug-related
associations on substance use. *Psychology of Addictive of Behavior, 22*, 426 –
432.

Griffiths, M. D. (2005). Does gambling advertising contribute to problem gambling?
International Journal of Mental Health & Addiction, 3, 15 – 25.

Griffiths, M. (2008). Youth gambling education and prevention: Does it work? *Education and Health, 26*, 23 – 26.

Hermans, D., Baeyens, F., & Eelen, P. (1998). Odours as affective processing context for word evaluation: A case of cross-modal affective priming. *Cognition & Emotion, 12*, 601 – 613.

Hermans, D., Crombez, G., & Eelen, P. (2000). Automatic attitude activation and efficiency: The fourth horseman of automaticity. *Psychologica Belgica, 40*, 3 – 22.

Hermans, D., De Houwer, J., & Eelen, P. (2001). A time course analysis of the affective priming effect. *Cognition & Emotion, 15*, 143 – 165.

Hermans, D., Spruyt, A., De Houwer, J., & Eelen, P. (2003). Affective priming with subliminally presented pictures. *Canadian Journal of Experimental Psychology, 57*, 97 – 114.

Heung, C.M., Rempel, B., & Krank, M. (2012). Strengthening the Canadian Alcohol Advertising Regulatory System. *Canadian Journal of Public Health, 103*, 263 – 266.

Hodgins, D.C., & Makarchuk, K. (2003). Trusting problem gamblers: Reliability and validity of self-reported gambling behavior. *Psychology of Addictive Behaviors, 17,* 244 – 248.

Hodgins, D.C., Peden, N., & Makarchuk, K. (2004). Self-efficacy in pathological gambling treatment outcome: Development of a gambling abstinence self-efficacy scale (GASS). *International Gambling Studies, 4,* 99 – 108.

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, *4*, 162 – 176.

Hofmann, W., Friese, M., & Wiers, R.W. (2008). Impulsive versus reflective influences on health behavior: A theoretical framework and empirical review. *Health Psychology Review, 2*, 111 – 137.

Hofmann, W., Gschwendner, T., Friese, M., Wiers, R. W., & Schmitt, M. (2008). Working memory capacity and self-regulatory behavior: Toward an individual differences perspective on behavior determination by automatic versus controlled processes. *Journal of Personality & Social Psychology, 95,* 962 – 977.

Hofmann, W., Rauch, W., & Gawronski, B. (2007). And deplete us not into temptation: Automatic attitudes, dietary restraint, and self-regulatory resources as determinants of eating behavior. *Journal of Experimental Social Psychology*, *43*, 497 – 504.

Houben, K., Havermans, R.C., & Wiers, R.W. (2010). Learning to dislike alcohol: Conditioning negative implicit attitudes toward alcohol and its effect on drinking behavior. *Psychopharmacology, 211,* 79 – 86.

Houben, K., Wiers, R.W., & Roefs, A. (2006). Reaction time measures of substance-related associations. In R.W. Wiers & A.W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 91 – 104). Thousand Oaks, CA: Sage Publications.

Houben, K. & Wiers, R.W. (2007a). Are drinkers implicitly positive about drinking alcohol? Personalizing the alcohol-IAT to reduce negative extrapersonal contamination. *Alcohol, 42*, 301 – 307.

Houben K. & Wiers, R.W. (2007b). Personalizing the alcohol-IAT with individualized
stimuli: Relationship with drinking behavior and drinking-related problems.
Addictive Behaviors, 32, 2852 – 2864.

Houben, K. & Wiers, R.W. (2008). Implicitly positive about alcohol? Implicit positive
associations predict drinking behavior. *Addictive Behaviors, 33*, 979 – 986.

Houben, K., & Wiers, R.W. (2009). Response inhibition moderates the relationship
between implicit associations and drinking behavior. *Alcoholism: Clinical &
Experimental Research, 33*, 626 – 633.

Jacoby, L.L., & Dallas (1981). On the relationship between autobiographical memory and
perceptual learning. *Journal of Experimental Psychology: General*, 110, 306 –
340.

Jajodia, A. & Earleywine, M. (2003). Measuring alcohol expectancies with the Implicit
Association Test. *Psychology of Addictive Behaviors, 17*, 126 – 133.

Jarvis, B.G. (2010). DirectRT (Version 2010) [Computer Software], New York, NY:
Empirisoft Corporation.

Jones, B. T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and
alcohol consumption. *Addiction, 96*, 57 – 72.

Jones, B.T., & McMahon, J. (1996). A comparison of positive and negative alcohol
expectancy and value and their multiplicative composite as predictors of post-
treatment abstinence survivorship. *Addiction, 91*, 89 – 99.

Jones, B.T., & McMahon, J. (1998). Alcohol motivations as outcome expectancies. In
W.R. Miller & N. Heather (Eds.), *Treating addictive behaviors* (2nd ed., pp. 75 –
92). New York, NY: Plenum Press.

Kambouropoulos, N., & Staiger, P.K. (2001). The influence of sensitivity to reward on

   reactivity to alcohol-related cues. *Addiction, 96*, 1175 – 1185.

Kirsch, I. (1999). Response expectancy: An introduction. In I. Kirsch (Ed.), *How*

   expectancies shape experience (pp. 3 – 13). Washington, DC: American

   Psychological Association.

Klauer, K. C., & Musch, J. (2003). Affective priming: Findings and theories. In J. Musch

   & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in*

   cognition and emotion (pp. 7 – 49). Mahwah, NJ: Erlbaum.

Kramer, D. A., & Goldman, M. S. (2003). Using a modified Stroop task to implicitly

   discern the cognitive organization of alcohol expectancies. *Journal of Abnormal*

   Psychology, 112, 171 – 175.

Kusyszyn, I. (1978). "Compulsive" gambling: The problem of definition. *The*

   International Journal of the Addictions, 13, 1095 – 1101.

Ladouceur, R., Sylvain, C., Boutin, C., LaChance, S., Doucet, C., LeBlond, J., & Jacques,

   C. (2001). Cognitive treatment of pathological gambling. *The Journal of Nervous*

   and Mental Disease, 189, 774 – 780.

Labbe, A.K., & Maisto, S.A. (2011). Alcohol expectancy challenges for college students:

   A narrative review. *Clinical Psychology Review*, 31, 673 – 683.

Lang, A.R., & Michalec, E.M. (1990). Expectancy effects in reinforcement from alcohol.

   In W.M. Cox (Ed.), *Why people drink: Parameters of alcohol as a reinforcer* (pp.

   193 – 226). New York, NY: Gardner Press.

Lewis-Esquerre, J.M., Rodrigue, J.R., & Kahler, C.W. (2005). Development and validation of an adolescent smoking consequences questionnaire. *Nicotine and Tobacco Research, 7*, 81 – 90.

Lorains, F.K., Cowlishaw, S., & Thomas, S.A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys. *Addiction, 106*, 490 – 498.

Marlatt, G. A., & Gordon, J. R. (1985). *Relapse prevention: Maintenance strategies in the treatment of addictive behaviour.* New York, NY: Guilford Press.

May, R.K., Whelan, J.P., Meyers, A.W., & Steenbergh, T.A. (2005). Gambling-related irrational beliefs in the maintenance and modification of gambling behaviour. *International Gambling Studies, 5*, 155 – 167.

McCarthy, D.M. & Thompsen, D.M. (2006). Implicit and explicit measures of alcohol and smoking cognitions. *Psychology of Addictive Behaviors, 20*, 436 – 444.

McKee, S. A., Wall, A., Hinson, R. E., Goldstein, A., & Bissonnette, M. (2003). Effects of an implicit mood prime on the accessibility of smoking expectancies in college women. *Psychology of Addictive Behaviors, 17*, 219 – 225.

McMillen, J., & Wenzel, M. (2006). Measuring problem gambling: Assessment of three prevalence screens. *International Gambling Studies, 6*, 147 – 174.

Moors, A., & De Houwer, J. (2006). Automaticity: A theoretical and conceptual analysis. *Psychological Bulletin, 132*, 297 – 326.

Moreyra, P., Ibanez, A., Saiz-Ruiz, J., & Blanco, C. (2004). Categorization. In J. E. Grant & M. N. Potenza (Eds.), *Pathological gambling: A clinical guide to treatment* (pp. 55–68). Arlington, VA: American Psychiatric Publishing, Inc.

Murphy, S.T. & Zajonc, R.B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology, 64*, 723 – 739.

Oei, T.P.S., & Baldwin, A.R. (1994). Expectancy theory: A two-process model of alcohol use and abuse. *Journal of Studies on Alcohol, 55*, 525 – 534.

Olson, J. M., Roese, N. J., & Zanna, M. P. (1996). Expectancies. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 211–238). New York, NY: Guilford Press.

Ostafin, B.D., Palfai, T.P., & Wechsler, C.E. (2003). The accessibility of motivational tendencies toward alcohol: Approach, avoidance, and disinhibited drinking. *Experimental & Clinical Psychopharmacology, 11,* 294 – 301.

Palfai, T. P., & Ostafin, B. D. (2003). The influence of alcohol on the activation of outcome expectancies: The role of evaluative expectancy activation in drinking behavior. *Journal of Studies on Alcohol, 64,* 111 – 119.

Parkin, A.J., Reid, T.K., & Russo, R. (1990). On the differential nature of implicit and explicit memory. *Memory & Cognition, 18*, 507 – 514.

Paulus, D.L., & Vazire, S. (2009). The self-report method. In R.W. Robins, R.C. Fraley, & R.F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 224 – 239). New York, NY: Guilford Press.

Petry, N. (2005). *Pathological gambling: Etiology, comorbidity, and treatment*. Washington, DC: American Psychological Association Press.

Petry, N. (2006). Should the scope of addictive behaviors be broadened to include pathological gambling? *Addiction, 101*, 152 – 160.

Petry, N., Stinson, F.S., & Grant, B.F. (2005). Comorbidity of DSM-IV pathological

 gambling and other psychiatric disorders: Results from the National

 Epidemiologic Survey of Alcohol and Related Cognitions. *Journal of Clinical*

 Psychiatry, 66, 564 – 574.

Potenza, M.N. (2006). Should addictive behaviors include non-substance-related

 conditions? *Addiction, 101*, 142 – 151.

Rather, B. C., Goldman, M. S., Roehrich, L., & Brannick, M. (1992). Empirical modeling

 of an alcohol expectancy memory network using multidimensional scaling.

 Journal of Abnormal Psychology, 101, 174 – 183.

Reder, L.M., Park, H., & Kieffaber, P.D. (2009). Memory systems do not divide on

 consciousness: Reinterpreting memory in terms of activation and binding.

 Psychological Bulletin, 135, 23 – 49.

Reich, R.R., Below, M.C., & Goldman, M.S. (2010). Explicit and implicit measures of

 expectancy and related alcohol cognitions: A meta-analytic comparison.

 Psychology of Addictive Behaviors, 24, 13 – 25.

Reingold, E.M. & Ray, C.A. (2005). Implicit cognition. In L. Nadel (Ed.), *Encyclopedia*

 of cognitive science. Hoboken, NJ: John Wiley.

Reio, T.G. (2010). The threat of common method variance bias to theory building.

 Human Resource Development Review, 9, 405 – 411.

Roefs, A., Huijding, J., Smulders, F.T., Macleod, C.M., de Jong, P.J., Wiers, R.W., &

 Jansen, A.T. (2011). Implicit measures of association in psychopathology

 research. *Psychological Bulletin, 137,* 149 – 193.

Roehrich, L., & Goldman, M.S. (1995). Implicit priming of alcohol expectancy memory processes and subsequent drinking behavior. *Experimental and Clinical Psychopharmacology, 3*, 402 – 410.

Rohsenow, D. J. (1983). Drinking habits and expectancies about alcohol's effects for self versus others. *Journal of Consulting and Clinical Psychology, 51,* 752 – 756.

Rooke, S.E., Hine, D.W, & Thorsteinsson, E.B. (2008). Implicit cognition and substance use: A meta-analysis. *Addictive Behaviors, 33*, 1314 – 1328.

Rotter, J.B., Chance, J. & Phares, E.J. (1972). *Applications of a social learning theory of personality*. New York, NY: Holt, Rhinehart & Winston.

Sayette, M. A. (1999). Cognitive theory and research. In K.E. Leonard & H.T. Blane (Eds.), *Psychological theories of drinking and alcoholism* (pp. 247 – 291). New York, NY: Guilford Press.

Scott-Sheldon, L.A.J., Terry, D.L., Carey, K.B., Garey, L., & Carey, M.P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors, 26,* 393 – 405.

Seifert, L. S. (1997). Activating representations in permanent memory: Different benefits for pictures and words. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23*, 1106 – 1121.

Shead, N.W., & Hodgins, D.C. (2009). Affect-regulation expectancies among gamblers. *Journal of Gambling Studies, 25*, 357 – 375.

Sher, K.J., Wood, M.D., Wood, P.K., & Raskin, G. (1996). Alcohol outcome expectancies and alcohol use: A latent variable cross-lagged panel study. *Journal of Abnormal Psychology, 105*, 561 – 574.

Sklar, A., & Derevensky, J.L. (2010). Way to play: Analyzing gambling ads for their appeal to underage youth. *Canadian Journal of Communication, 35*, 533 – 554.

Smith, E. C., & Decoster, J. (2000). Dual process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review, 4*, 108 – 131.

Spruyt, A., Hermans, D., De Houwer, J., & Eelen, P. (2002). On the nature of the affective priming effect: Affective priming of naming responses. *Social Cognition, 20*, 227 – 256.

Stacy, A.W. (1995). Memory association and ambiguous cues in models of alcohol and marijuana use. *Experimental and Clinical Psychopharmacology, 3*, 183 – 194.

Stacy, A.W. (1997). Memory activation and expectancy as prospective predictors of alcohol and marijuana use. *Journal of Abnormal Psychology, 106*, 61-73.

Stacy, A.W., Ames, S.L., & Grenard, J. (2006). Word association tests of associative memory and implicit processes: Theoretical and assessment issues. In R.W. Wiers & A.W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 75 – 90). Thousand Oaks, CA: Sage.

Stacy, A. W., Ames, S. L., & Knowlton, B. (2004). Neurologically plausible distinctions in cognition relevant to drug abuse etiology and prevention. *Substance Use & Misuse, 39*, 1571 – 1623.

Stacy, A.W., Leigh, B.C., & Weingardt, K.R. (1997). An individual-difference perspective applied to word association. *Personality and Social Psychology Bulletin, 23*, 229 – 237.

Stacy, A. W., Widaman, K. F., & Marlatt, G. A. (1990). Expectancy models of alcohol use. *Journal of Personality and Social Psychology, 58*, 918 – 928.

Stacy, A.W. & Wiers, R.W. (2010). Implicit cognition and addiction: A tool for explaining paradoxical behavior. *Annual Review of Clinical Psychology, 6*, 551 – 575.

Staiger, P.K., & White, J.M. (1991). Cue reactivity in alcohol abusers: Stimulus specificity and extinction of the responses. *Addictive Behaviors, 16*, 211 – 221.

Stein, K. D., Goldman, M. S., & Del Boca, F. K. (2000). The influence of alcohol expectancy priming and mood manipulation on subsequent alcohol consumption. *Journal of Abnormal Psychology, 109*, 106 – 115.

Stewart, M.J., Stewart, S.H., Yi, S., & Ellery, M. (2014). Predicting gambling behaviour and problems from implicit and explicit positive gambling outcome expectancies. *Under Review.*

Stewart, M.J., Yi, S., Ellery, M., & Stewart, S.H. (2014). An examination of the effects of gambling advertisements on the activation of implicit versus explicit gambling outcome expectancies among regular gamblers. *Under Review.*

Stewart, M.J., Yi, S., & Stewart, S.H. (2014). Effects of gambling-related cues on the activation of implicit and explicit gambling outcome expectancies in regular gamblers. *Journal of Gambling Studies, 30,* 653 – 668.

Stewart, S. H., & Kushner, M. G. (2003). Recent research on the comorbidity of alcoholism and pathological gambling. *Alcoholism, Clinical and Experimental Research, 27*, 285 – 291.

Stewart, S. H., Ramasubbu, C., Ellery, M., Yi, S., Ames, S., Collins, P., & Stewart, M. J. (2014). *The Behavior Outcome Association Task: A novel method for examining automatic positive associations to gambling behavior.* Poster presented at the New Horizons in Gambling Research Conference, Vancouver, BC.

Stewart, S. H., & Wall, A. (2005). *Mood priming of reward and relief gambling expectancies in different subtypes of gamblers*. [Research Report]. Guelph, ON: Ontario Problem Gambling Research Centre.

St-Pierre, R.A., Temcheff, C.E., Gupta, R., Derevensky, J., & Paskus, T.S. (2014). Predicting gambling problems from gambling expectancies in college student-athletes. *Journal of Gambling Studies, 30,* 47 – 60.

Strack, F. & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*, 220 – 247.

Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn and Bacon.

Teeters, J.B., Ginley, M.K., Whelan, J.P., Meyers, A.W., & Pearlson, G.D. (2013). The moderating effect of gender on the relation between expectancies and gambling frequency among college students. *Journal of Gambling Studies.* Advance online publication. doi: 10.1007/s10899-013-9409-2

Thush, C., Wiers, R.W., Theunissen, N., van den Bosch, J., Opdenacker, J., Van Empelen, . . . Feron, F.M.J. (2007). A randomized clinical trial of a targeted prevention to moderate alcohol use and alcohol-related problems in adolescents at risk for alcoholism. *Pharmacology, Biochemistry and Behavior, 86*, 368 – 376.

Thush, C., Wiers, R.W., Ames, S.L., Grenard, J.L., Sussman, S., Stacy, A.W. (2008). Interactions between implicit and explicit cognition and working memory capacity in the prediction of alcohol use in at-risk adolescents. *Drug & Alcohol Dependence, 94*, 116 – 124.

Tolman, E. C. (1932). *Purposive behavior in animals and men*. New York, NY: Century Company.

Toneatto, T. (1999). Cognitive psychopathology of problem gambling. *Substance Use & Misuse, 34*, 1593 – 1604.

Toneatto, T. (2002). Cognitive therapy for problem gambling. *Cognitive and Behavioral Practice, 9,* 191 – 200.

Van de Luitgaarden, J., Wiers, R.W., Knibbe, R.A., & Boon, B.J. (2006). From the laboratory to real-life: a pilot study of an expectancy challenge with heavy drinking young people on holiday. Substance Use & Misuse, 41, 353 – 368.

Wall, A.M., Hinson, R.E., McKee, S.A., & Goldstein, A. (2001). Examining alcohol outcome expectancies in laboratory and naturalistic bar settings: A within-subject experimental analysis. *Psychology of Addictive Behaviors, 15*, 219 – 226.

Weinstock, J., Whelan, J. P., & Meyers, A. W. (2004). Behavioral assessment of gambling: An application of the Timeline Followback Method. *Psychological Assessment, 16,* 72 – 80.

Whelan, J. P., Steenbergh, T. A., & Meyers, A. W. (2007). *Problem and pathological gambling*. Cambridge, MA: Hogrefe & Huber.

Wickwire, E. M., Whelan, J. P. & Meyers, A. W. (2010). Outcome expectancies and gambling behavior among urban adolescents. *Addictive Behaviors, 24*, 75 – 88.

Wiers, R.W., Ames, S.L., Hofmann, W., Krank, & Stacy, A.W. (2010). Impulsivity, impulsive and reflective processes and the development of alcohol use and misuse in adolescents and young adults. *Frontiers in Psychology, 1*, 1 – 12.

Wiers, R. W., Bartholow, B. D., van den Wildenberg, E., Thush, C., Engels, R.C., Sher, K. J., . . . Stacy, A. W. (2007). Automatic and controlled processes and the development of addictive behaviors in adolescents: A review and a model. *Pharmacology, Biochemistry and Behavior, 86*, 263 – 283.

Wiers, R.W., Cox, W.M., Field, M., Fadardi, J.S., Palfai, T.P., Schoenmakers, T., & Stacy, A.W. (2006). The search for new ways to change implicit alcohol-related cognitions in heavy drinkers. *Alcoholism: Clinical and Experimental Research, 30,* 320 – 331.

Wiers, R.W., Eberl, C., Rinck, M., Becker, E., & Lindenmeyer, J. (2011). Re-training automatic action tendencies changes alcoholic patients' approach bias for alcohol and improves treatment outcome. *Psychological Science, 22,* 490 – 497.

Wiers, R.W., Rinck, M., Kordts, R., Houben, K., & Strack, F. (2010). Retraining automatic action-tendencies to approach alcohol in hazardous drinkers. *Addiction, 105*, 279 – 287.

Wiers, R.W. & Stacy, A.W. (2006a). Implicit cognition and addiction. *Current Directions in Psychological Science, 15,* 292 – 296.

Wiers, R. W. & Stacy, A. W. (2006b). *Handbook of implicit cognition and addiction*. Thousand Oaks, CA: Sage Publications.

Wiers, R.W., Stacy, A.W., Ames, S.L., Noll, J.A., Sayette, M.A., Zack, M., & Krank, M. (2002). Implicit and explicit alcohol-related cognitions. *Alcoholism: Clinical and Experimental Research, 26*, 129 – 137.

Wiers, R. W., van de Luitgaarden, J., van den Wildenberg, E., & Smulders, F. T. Y. (2005). Challenging implicit and explicit alcohol-related cognitions in young heavy drinkers. *Addiction*, *100*, 806 – 819.

Williams, R.J., Simpson, R.I. & West, B.L. (2007). Prevention of problem gambling. In G. Smith, D. Hodgins & R. Williams (Eds.), *Research and measurement issues in gambling studies* (pp. 399 – 435). New York, NY: Elsevier.

Wittenbrink, B., Judd, C.M., & Park, B. (1997). Evidence for racial prejudice at the implicit level and its relationship with questionnaire measures. *Journal of Personality and Social Psychology, 72*, 262–274.

Wood, M. D., Sher, K. J., & Strathman, A. (1996). Alcohol outcome expectancies and alcohol use and problems. *Journal of Studies on Alcohol, 57*, 283–288.

Wong, S.S. & Tsang , S.K. (2012). Development and validation of the Chinese Adolescent Gambling Expectancy Scale. *International Gambling Studies, 12*, 309 – 329.

Wulfert, E., Maxson, J., & Jardin, B. (2009). Cue-specific reactivity in experienced gamblers. *Psychology of Addictive Behaviors, 23*, 731 – 735.

Yi, S., & Kanetkar, V. (2010). Implicit measures of attitudes toward gambling: An exploratory study. *Journal of Gambling Issues, 24*, 140 – 163.

Yi, S., Stewart, M.J., Collins, P., & Stewart, S.H. (in press). The activation of reward

versus relief gambling outcome expectancies in regular gamblers: Relations to

gambling motives. *Journal of Gambling Studies.*

Zack, M., & Poulos, C. X. (2006). Implicit cognition in problem gambling. In Wiers, R.

W., & Stacy, A. W. (Eds.), *Handbook of implicit cognition and addiction* (pp. 379
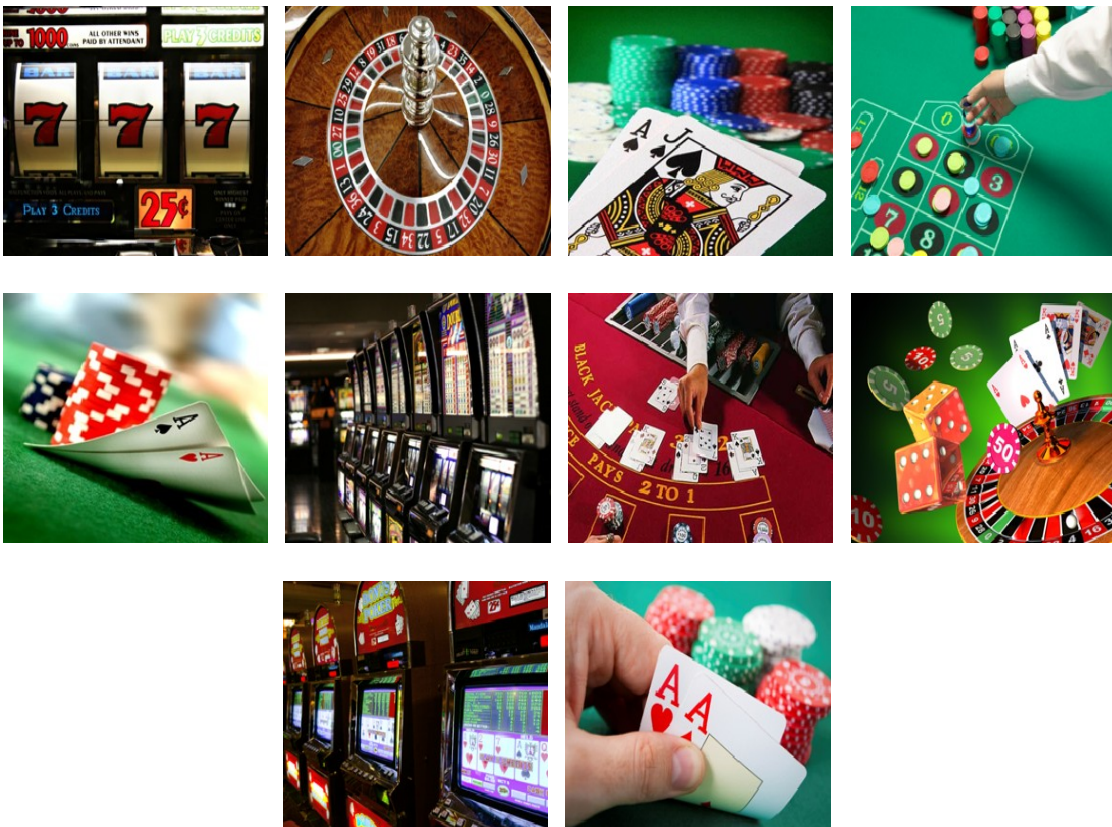
– 391). Thousand Oaks, CA: Sage Publications.

APPENDIX A

Pictures (Primes) Used in the Gambling Outcome Expectancy RT Task

Pictures used during the practice trials:

Gambling pictures used during test trials for both phases of the RT task:

Non-gambling pictures (track & field) used during test trials for both RT task phases:
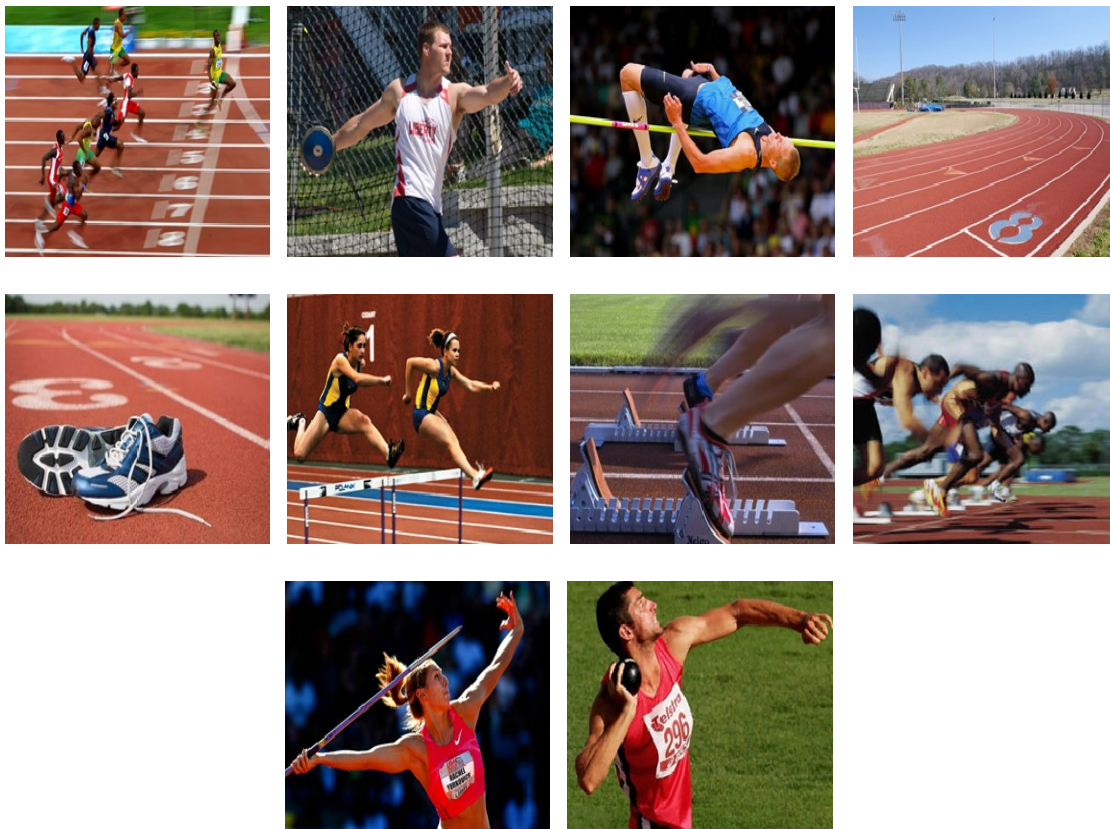
APPENDIX B

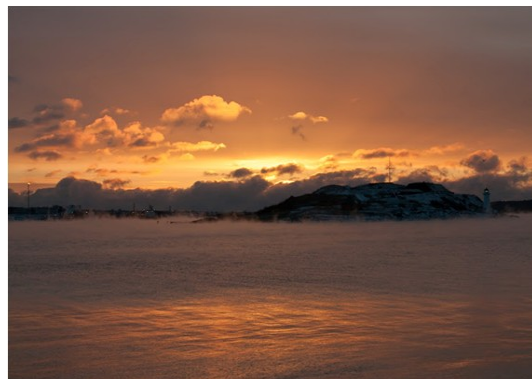Words Used in the Gambling Outcome Expectancy RT Task

Positive Outcome Expectancy Words	Negative Outcome Expectancy Words
Fun	Guilt
Relaxation	Shame
Excitement	Tension
Enjoyment	Confusion
Esteem	Frustration
Acceptance	Anxiety
Winning	Worry
Stimulation	Dissatisfaction
Pleasure	Anger
Satisfaction	Displeasure

Note. For the practice trials, positive expectancy words consisted of: 'amusement' and 'happiness', whereas negative expectancy words consisted of 'boredom' and 'sorrow'.
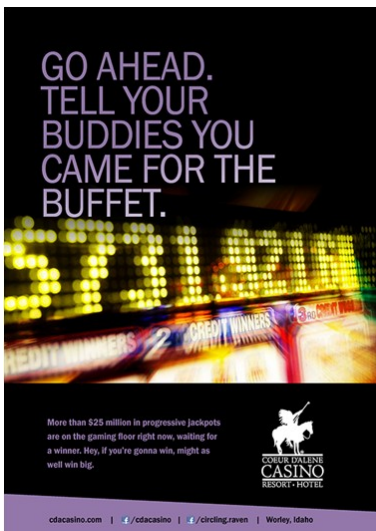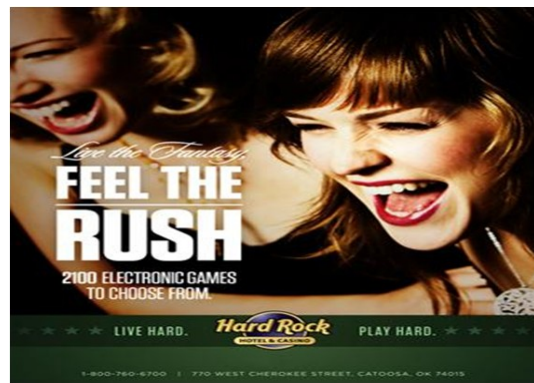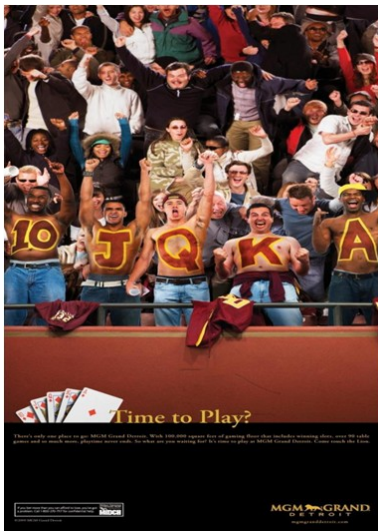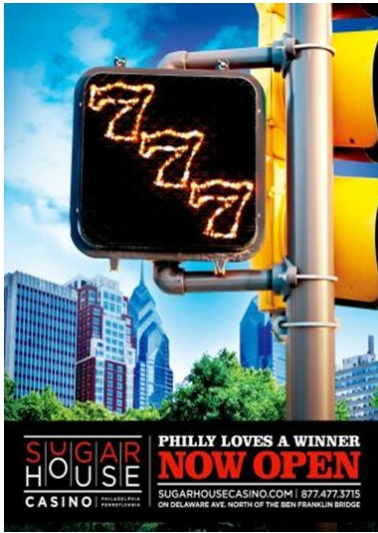
APPENDIX C

Advertisements Used during the Cue Exposure Manipulation

Pictures used during the practice trials:

Gambling advertisements used during the cue exposure manipulation:

Fitness advertisements used during the cue exposure manipulation:

Restaurants advertisements used during the cue exposure manipulation:
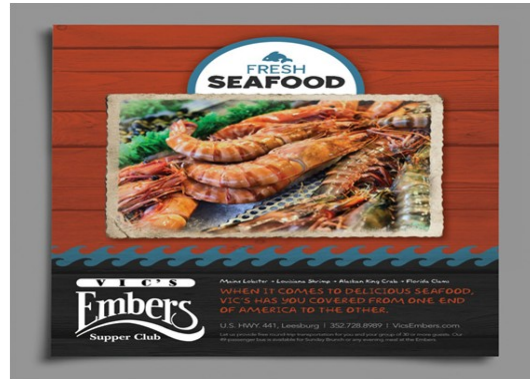
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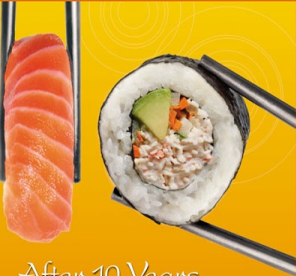
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APPENDIX D

Correlations between Pre-Cue Explicit and Implicit (Positive & Negative) Gambling

Outcome Expectancies and Measures of Gambling Behaviour (Study 3a)

	1	2	3	4	5	6
1. Time spent gambling	-	-	-	-	-	-
2. Money risked gambling	.73**	-	-	-	-	-
3. Positive outcome expectancy RT	.20	.18	-	-	-	-
4. Positive GEQ	.34**	.31*	.20	-	-	-
5. Negative outcome expectancy RT	.00	.01	-.10	.19	-	-
6. Negative GEQ	.16	.40**	-.04	.26*	-.13	-

Note. Time spent gambling and money risked gambling was assessed by the Gambling

Timeline Followback (G-TLFB; Weinstock et al., 2004). The positive and negative

outcome expectancy RTs were each computed by subtracting the log-transformed RTs to

trials involving gambling primes from the log-transformed reaction times involving non-

gambling primes. Positive GEQ = scores on the positive subscale of the Gambling

Expectancy Questionnaire (Gillespie et al., 2007a).

* $p < .05$ ** $p < .01$

Correlations between Post-Cue Explicit and Implicit (Positive & Negative) Gambling

Outcome Expectancies and Measures of Gambling Behaviour (Study 3a)

	1	2	3	4	5	6
1. Time spent gambling	-	-	-	-	-	-
2. Money risked gambling	.73**	-	-	-	-	-
3. Positive outcome expectancy RT	.34**	.32*	-	-	-	-
4. Positive GEQ	.42**	.34**	.23	-	-	-
5. Negative outcome expectancy RT	.16	.14	-.18	.10	-	-
6. Negative GEQ	.12	.36**	-.05	.28*	-.23	-

Note. Time spent gambling and money risked gambling was assessed by the Gambling Timeline Followback (G-TLFB; Weinstock et al., 2004). The positive and negative outcome expectancy RTs were each computed by subtracting the log-transformed RTs to trials involving gambling primes from the log-transformed reaction times involving non-gambling primes. Positive GEQ = scores on the positive subscale of the Gambling Expectancy Questionnaire (Gillespie et al., 2007a).

* *p* < .05 ** *p* < .01

Correlations between Pre-Cue Explicit and Implicit (Positive & Negative) Gambling

Outcome Expectancies and Problem Gambling Severity (Study 3b)

	1	2	3	4	5
1. Problem gambling severity	-	-	-	-	-
2. Positive outcome expectancy RT	.12	-	-	-	-
3. Positive GEQ	.30**	.11	-	-	-
4. Negative outcome expectancy RT	-.09	.01	.08	-	-
5. Negative GEQ	.71**	.16	.38**	-.03	-

Note. Problem gambling severity was assessed by the PGSI from the CPGI (Ferris & Wynne, 2001). The positive outcome expectancy RT was computed by subtracting the log-transformed RTs to trials involving gambling primes from the log-transformed reaction times involving non-gambling primes. Positive GEQ = scores on the positive subscale of the Gambling Expectancy Questionnaire (Gillespie et al., 2007a). ** $p < .01$

Correlations between Post-Cue Explicit and Implicit (Positive & Negative) Gambling

Outcome Expectancies and Problem Gambling Severity (Study 3b)

	1	2	3	4	5
1. Problem gambling severity	-	-	-	-	-
2. Positive outcome expectancy RT	.26**	-	-	-	-
3. Positive GEQ	.34**	.04	-	-	-
4. Negative outcome expectancy RT	.15	.18	.08	-	-
5. Negative GEQ	.71**	.08	.46**	.13	-

Note. Problem gambling severity was assessed by the PGSI from the CPGI (Ferris & Wynne, 2001). The positive outcome expectancy RT was computed by subtracting the log-transformed RTs to trials involving gambling primes from the log-transformed reaction times involving non-gambling primes. Positive GEQ = scores on the positive subscale of the Gambling Expectancy Questionnaire (Gillespie et al., 2007a). ** *p* < .01

APPENDIX E

Study 3a & Study 3b Moderation Analyses Results

Study 3a Moderation Analysis Results

As part of the larger study (Stewart et al., 2013; i.e., Study 1 of this dissertation), participants were randomly assigned to one of two cue exposure conditions: a *casino cue video condition* ($n = 29$) where participants watched a five-minute video clip of typical casino scenes with ambient noise, or a *control cue video condition* ($n = 29$), where participants watched a five-minute video clip of typical track and field scenes with ambient noise.

In order to determine whether cue exposure condition moderated the relationship between the direct and indirect measures of positive gambling outcome expectancies on the one hand and gambling behaviour on the other, three separate regression analyses were performed for each outcome measure (i.e., amount of time spent and money risked gambling). In the first regression analysis, the self-report measure of positive gambling outcome expectancies (GEQ; Gillespie et al., 2007a) was entered into the initial step of the regression and the interaction term (GEQ x condition) was entered as an additional predictor in the second step. In the second regression analysis, the RT measure was entered into the initial step of the regression and the interaction term (RT x condition) was entered as an additional predictor. In the final regression analysis, both the self-report and RT measure were entered into the initial step of the regression and the two-way interaction terms (i.e., GEQ x condition and RT x condition) were entered as additional predictors in the second step. As displayed in the following tables, the interactions with cue exposure were not significant (all $p > .05$) for any of these analyses

on either outcome measure (see Tables 1 – 3 for amount of time spent gambling; see Tables 4 – 6 for amount of money risked gambling). Thus, cue condition did not moderate the raw effect of each measure of positive gambling outcome expectancies on the outcome of interest, nor did not moderate the unique effect of each measure of positive gambling outcome expectancies on the outcome of interest. As such, I collapsed across cue condition when examining the utility of the direct and indirect measures of positive gambling outcome expectancies in predicting the amount of time spent and money risked gambling in the main analyses presented in Study 3a.

Although it is not known why cue condition exposure failed to moderate the relationship between the direct and indirect measures of positive gambling outcome expectancies and gambling behaviour, it may relate to a power issue [i.e., a lack of power to detect a significant moderating effect due to a relatively low sample size ($N = 58$)]. Of course it is also possible that this null result means that activation of positive gambling outcome expectancies (via gambling cue exposure) is not necessary for positive gambling outcome expectancies to be useful predictors of gambling outcomes.

Table 1

Regression 1: Amount of Time Spent Gambling (Study 3a)

	B	t	p	R^2	ΔR^2
Step 1					
Self-report GOE	.34	2.74	.008	.177	.177**
Step 2				Model 1: .177	.177**
				Model 2: .177	.00
Self-report GOE	.43	2.82	.007		
Condition x Self-report GOE	-.02	-.13	.90		

Note. GOE = gambling outcome expectancies

** *p* < .01

Table 2

Regression 2: Amount of Time Spent Gambling (Study 3a)

	B	t	p	R^2	ΔR^2
Step 1					
RT measure of GOE	.34	2.70	.009		
Step 2			Model 1:	.115	.115**
			Model 2:	.119	.004
RT measure of GOE	.30	2.05	.04		
Condition x GOE RT measure	.07	.49	.63		

Note. GOE = gambling outcome expectancies

** $p < .01$

Table 3

Regression 3: Amount of Time Spent Gambling (Study 3a)

	B	t	p	R^2	ΔR^2
Step 1					
Self-report GOE	.36	2.99	.004		
RT measure of GOE	.26	2.12	.04		
Step 2			Model 1:	.239	.239**
			Model 2:	.242	.003
Self-report GOE	.38	2.45	.02		
RT measure of GOE	.23	1.58	.12		
Condition x Self-report GOE	-.03	-.17	.86		
Condition x GOE RT measure	.06	.44	.66		

Note. GOE = gambling outcome expectancies

** $p < .01$

Study 3b Moderation Analysis Results

As part of the larger study (Stewart et al., 2013; i.e., Study 2 of this dissertation),

participants were randomly assigned to one of two advertisement cue exposure

conditions: a *gambling advertisement cue condition* ($n = 51$), where participants viewed

10 gambling advertisements embedded in 10 restaurant advertisements for 3000 ms each,

or a *control advertisement cue condition* ($n = 45$), where participants viewed 10 fitness

advertisements embedded in 10 restaurant advertisements for 3000 ms each.

In order to determine whether cue exposure condition moderated the relationship

between the direct and indirect measures of positive gambling outcome expectancies on

the one hand and problem gambling severity on the other, three separate regression

analyses were performed. In the first regression analysis, the self-report measure of

positive gambling outcome expectancies (GEQ; Gillespie et al., 2007a) was entered into

the initial step of the regression and the interaction term (GEQ x condition) was entered

as an additional predictor in the second step. In the second regression analysis, the RT

measure was entered into the initial step of the regression and the interaction term (RT x

condition) was entered as an additional predictor. In the final regression analysis, both the

self-report and RT measure were entered into the initial step of the regression and the

two-way interaction terms (i.e., GEQ x condition and RT x condition) were entered as

additional predictors in the second step. As displayed in the following tables, the

interactions with cue exposure were not significant (all $p > .05$) for any of these analyses

(see Tables 6 – 9). Thus, cue condition did not moderate the raw effect of each measure

of positive gambling outcome expectancies on problem gambling severity, nor did not

moderate the unique effect of each measure of positive gambling outcome expectancies

on problem gambling severity. As such, I collapsed across cue condition when examining the utility of the direct and indirect measures of positive gambling outcome expectancies in predicting problem gambling severity in the main analyses presented in Study 3b.

Although it is not known why cue condition exposure failed to moderate the relationship between the direct and indirect measures of positive gambling outcome expectancies and problem gambling severity, it may relate to a power issue [i.e., a lack of power to detect a significant moderating effect due to a relatively low sample size ($N =$ 96)]. Of course it is also possible that this null result means that activation of positive gambling outcome expectancies (via gambling cue exposure) is not necessary for positive gambling outcome expectancies to be useful predictors of problem gambling severity.

Table 4

Regression 1: Problem Gambling Severity (Study 3b)

	B	t	p	R^2	ΔR^2
Step 1					
Self-report GOE	.34	3.51	.001		
Step 2			Model 1:	.116	.116**
			Model 2:	.119	.003
Self-report GOE	.36	3.43	.001		
Condition x Self-report GOE	-.06	-.57	.57		

Note. GOE = gambling outcome expectancies

** $p < .01$

Table 5

Regression 2: Problem Gambling Severity (Study 3b)

	B	t	p	R^2	ΔR^2
Step 1					
RT measure of GOE	.26	2.55	.012		
Step 2			Model 1:	.065	.065**
			Model 2:	.065	.00
RT measure of GOE	.30	.95	.35		
Condition x GOE RT measure	-.05	-.16	.88		

Note. GOE = gambling outcome expectancies

* $p < .01$

Table 6

Regression 3: Problem Gambling Severity (Study 3b)

	B	t	p	R^2	ΔR^2
Step 1					
Self-report GOE	.33	3.52	.001		
RT measure of GOE	.24	2.58	.011		
Step 2			Model 1:	.175	.175**
			Model 2:	.175	.001
Self-report GOE	.34	3.22	.002		
RT measure of GOE	.32	1.05	.30		
Condition x Self-report GOE	-.08	-.27	.79		
Condition x GOE RT measure	-.01	.49	.63		

Note. GOE = gambling outcome expectancies

** $p < .01$

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APPENDIX F

The Activation of Reward versus Relief Gambling Outcome Expectancies

in Regular Gamblers: Relations to Gambling Motives

Sunghwan Yi [1]

Melissa Stewart [2]

Pamela Collins [2]

Sherry H. Stewart [2,3]

[1] Department of Marketing & Consumer Studies, University of Guelph, Canada
[2] Department of Psychology & Neuroscience, Dalhousie University, Canada
[3] Department of Psychiatry and Psychology, Dalhousie University, Canada

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

The Activation of Reward versus Relief Gambling Outcome Expectancies in Regular

Gamblers: Relations to Gambling Motives

Gambling outcome expectancies refer to the anticipated outcomes that gamblers

expect will occur from gambling (Stewart & Wall, 2005; Stewart, Yi, & Stewart, 2013).

Previous research on gambling outcome expectancies has predominantly focused on the

valence of expectancies (i.e., positive versus negative). For example, Gillespie,

Derevensky, and Gupta (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, Whelan, and Meyers (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 & 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, Darkes, & Del Boca, 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 images than those with weak gambling outcome

expectancies. The speed of activation of affective state concepts following brief

exposure to gambling 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 & Coventry, 2006; Zack & 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.

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.

Method

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 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 two 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 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 & Wynne, 2001), participants consisted of 3 non-problem gamblers, 6 low-risk gamblers, 32 moderate-risk gamblers, and 9 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 hours ($M = 42$,

SD = 52) gambling over the three months prior to participating in the study. The amount of money participants risked over the three 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 three 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 & 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 with which they had 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 & Wynne, 2001)

indicates that the PGSI has good psychometric properties. The PGSI demonstrated good internal consistency in this study (α = .89).

Gambling motives. The Gambling Motives Questionnaire (GMQ: Stewart & 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 4 (*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). This scale was adapted for gambling from the reward and relief expectancy scales for alcohol used by Birch, Stewart, Wall, McKee, Eisnor, and Theakston (2004) which in turn were drawn from a longer measure developed by Singleton, Tiffany, and Henningfield (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 9 items focused on positive reinforcement or excitement associated with gambling (e.g., "Gambling would make things seem just

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perfect"), while relief gambling outcome expectancies were assessed with 9 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 (α = .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).

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) 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 & Wall, 2005), as well as synonyms of words from these measures. In total, there were 10 reward outcome expectancy words and 10 relief outcome expectancy words used as targets (see Table 3). In addition, 10 gambling and 10 non-gambling (i.e., track and field) pictures, which had been previously used in Stewart and colleagues (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 or non-gambling

(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 1000 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

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.

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Design and Analytic Plan

For the RT measure, we used a 2 (gambling motives group: high or low enhancement [or coping]) by 2 (prime type: gambling versus control [i.e., track and field] images) by 2 (target type: reward versus 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) x 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 ($n = 28$ versus 22, for high versus 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, McGhee, & Schwartz, 1998), values below 300 ms were recoded to 300 ms and those above 3000 ms were recoded to 3000 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 x 2 x 2 (enhancement motives group x prime type x 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 x prime x 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 x 2 x 2 (coping motives group x prime type x 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 x prime x 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 x 2 (enhancement motives group x 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 x 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 = 0.53]. 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 x 2 (coping motives group x 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 x 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 = 0.52)]. 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.

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 & 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, Stewart, O'Connor, Blackwell, & Conrod, 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, Stewart, & Birch, 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, Stewart, & Zack, 2006). Wiers, Houben, Smulders, Conrod, and

Jones (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

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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 & 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 & 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 models of social behaviour, such as reflective-impulsive model (Strack & 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.

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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 & 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, Pagano, Rose, & Margues, 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 & Goldman, 1993; Wiers & 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, Havermans, and Wiers (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.

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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 & 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.

References

Birch, C. D., Stewart, S. H., Wall, A.-M., McKee, S. A., Eisnor, S. J., & Theakstone, J. A. (2004). Mood-induced increases in alcohol expectancy strength in internally motivated drinkers. Psychology of Addictive Behaviors, 18, 231– 238.

Birch, C. D., Stewart, S. H., & Zack, M. (2006). Emotion and motive effects on drug-related cognition. In Wiers, R. W., & Stacy, A. W., Handbook of Implicit Cognition and Addiction (pp. 267-280). Thousand Oaks, CA: Sage Publications.

Birch, C. D., Stewart, S. H., Wiers, R.W., Klein, R. M., MacLean, A. D., & Berish, M. J. (2008). The mood-induced activation of implicit alcohol cognition in enhancement and coping motivated drinkers. Addictive Behaviors, 33, 565 – 581.

Bornovalova, M. A., Gratz, K. L., Daughters, S. B., Hunt, E. D., & Lejuez, C. W. (2012). Initial RCT of a distress tolerance treatment for individuals with substance use disorders. Drug and Alcohol Dependence, 122, 70-76.

Darkes, J., & Goldman, M. S. (1993). Expectancy challenge and drinking reduction: Experimental evidence for a mediational process. Journal of Consulting and Clinical Psychology, 61, 344-353.

De Houwer, J. (2006). What are implicit measures and why are we using them? In Wiers, R.W., & Stacy, A.W. (Eds.). Handbook of implicit cognition and addiction (pp. 11-28). Thousand Oaks, CA: Sage Publications.

Evans, J. St. B. T., & Coventry, K. (2006). A dual-process approach to behavioural addiction: The case of gambling. In Wiers, R. W., & Stacy, A. W., Handbook of Implicit Cognition and Addiction (pp. 29-43). Thousand Oaks, CA: Sage Publications.

Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE

    model as an integrative framework. In M. Zanna (Ed.), Advances in experimental

    social sychology (Vol. 23, pp. 75–109). San Diego, CA: Academic Press.

Fazio, R. H., Jackson, J. R., Dunton, B. C. & Williams, C. J. (1995). Variability in

    automatic activation as unobtrusive measures of racial attitudes: A bona fide

    pipeline? Journal of Personality and Social Psychology, 69, 1013-1027.

Ferris, J. & Wynne, H. (2001). The Canadian Problem Gambling Index: User's manual.

    Canadian Centre on Substance Abuse: Ottawa, Ontario.

Gillespie, M. A. M., Derevensky, J. & Gupta, R. (2007). Adolescent problem gambling:

    Developing a gambling expectancy instrument. Journal of Gambling Issues, 19,

    51-68.

Goldman, M.S., Darkes, J., & Del Boca, F.K. (1999). Expectancy mediation of

    biopsychosocial risk for alcohol use and alcoholism. In I. Kirsch (Ed.), How

    expectancies shape experience (pp. 223 – 262). Washington, DC: APA Books.

Grant, V. V., Stewart, S. H., & Birch, C. D. (2007). Impact of positive and anxious

    mood on implicit alcohol-related cognitions in internally motivated undergraduate

    drinkers. *Addictive Behaviors, 32,* 2226-2237.

Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007).

    Psychometric evaluation of the five-factor Modified Drinking Motives

    Questionnaire-Revised in undergraduates. *Addictive Behaviors, 32,* 2611–2632.

Greenwald, A.G., McGhee, D.E., & Schwartz, J.L.K. (1998). Measuring individual

    differences in implicit cognition: The implicit association test. *Journal of*

    Personality and Social Psychology, 74, 1464 – 1480.

Houben, K., Havermans, R., & Wiers, R. (2010). Learning to dislike alcohol:

Conditioning negative implicit attitudes towards alcohol and its effect on drinking

behavior. Psychopharmacology, 211, 79-86.

Jarvis, B. G. (2010). DirectRT (Version 2010) [Computer Software]. New York, NY:

Empirisoft Corporation.

Marlatt, G. A., Pagano, R. R., Rose, R. M., & Margues, J. K. (1984). Effects of

meditation and relaxation training upon alcohol use in male social drinkers. In

Shapiro, D.H., & Walsh, R.N. (Eds.), Meditation: Classic and Contemporary

Perspectives (pp. 105-120). New York: Aldine.

Shead, N. W., & Hodgins, D. C. (2009). Affect-regulation expectancies among gamblers.

Journal of Gambling Studies, 25, 357-375.

Singleton, E.G., Tiffany, S.T. & Henningfield, J.E. (1995). Development and validation

of a new questionnaire to assess craving for alcohol. Proceedings of the 56th

Annual Meeting of the College on Problems of Drug Dependence, Volume II:

Abstracts. NIDA Research Monograph, 153, 289. Rockville, MD: National

Institute on Drug Abuse.

Stacy, A.W., & Wiers, R. W. (2010). Implicit cognition and addiction: A tool for

explaining paradoxical behavior. Annual Review of Clinical Psychology, 6, 551–

75.

Stewart, S. H., & Wall, A.M. (2005). Mood priming of reward and relief gambling

expectancies in different subtypes of gamblers. Ontario Problem Gambling

Research Centre Final Report. Retrieved from

http://www.gamblingresearch.org/download.php?docid=6460

Stewart, M. J., Yi, S., & Stewart, S. H. (2013). Effects of gambling-related cues on the activation of implicit and explicit gambling outcome expectancies in regular gamblers. Journal of Gambling Studies. Advance online publication. doi: 10.1007/s10899-013-9383-8

Stewart, S. H. & Zack, M. (2008). Development and psychometric evaluation of a three-dimensional Gambling Motives Questionnaire. Addiction, 103, 1110–1117.

Weinstock, J., Whelan, J. P., & Meyers, A. W. (2004). Behavioral assessment of gambling: An application of the Timeline Followback Method. Psychological Assessment, 16, 72-80.

Wickwire, E. M., Whelan, J. P. & Meyers, A. W. (2010). Outcome expectancies and gambling behavior among urban adolescents. Addictive Behaviors, 24, 75-88.

Wiers, R. W., & Kummeling, R. H. C. (2004). An experimental test of an alcohol expectancy challenge in mixed gender groups of young heavy drinkers. Addictive Behaviors, 29, 215-220.

Wiers, R. W. & Stacy, A. W. (2006). Handbook of Implicit Cognition and Addiction. Thousand Oaks, CA: Sage Publications.

Wiers, R. W., Houben, K., Smulders, F. T. Y., Conrod, P. J., & Jones, B. T. (2006). To drink or not to drink: The role of automatic and controlled processes in the etiology of alcohol-related problems. In Wiers, R. W., & Stacy, A. W., Handbook of Implicit Cognition and Addiction (pp. 339-361). Thousand Oaks, CA: Sage Publications.

Zack, M., & Poulos, C. X. (2006). Implicit cognition in problem gambling. In Wiers, R. W., & Stacy, A. W. (Eds.), *Handbook of implicit cognition and addiction* (pp. 379-391). Thousand Oaks, CA: Sage Publications.

Table 1

Summary of hypotheses for the activation of RT-based reward and relief gambling

outcome expectancies (i.e., H1 and H2)

(a) Prediction for individuals with high versus low enhancement motivation (EM) for
gambling

	Reward Targets	Relief Targets
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

	Reward Targets	Relief Targets
High CM Gamblers		
Gambling Prime	>	
Non-Gambling Prime	=	
Low CM Gamblers		
Gambling Prime	=	
Non-Gambling Prime	=	

Table 2

Summary of hypotheses for the endorsement of self-report reward and relief gambling

outcome expectancies (i.e., H3 and H4)

(a) Prediction for individuals with high versus low enhancement motivation (EM) for gambling

	High EM Gamblers	Low EM Gamblers
Reward GOE	>	
Relief GOE	=	

(b) Prediction for individuals with high versus low enhancement motivation (CM) for gambling

	High CM Gamblers	Low CM Gamblers
Reward GOE	=	
Relief GOE	>	

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

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

Table 4

Means and standard deviations 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

Notes: 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 & Zack, 2008).

Table 5

Means and standard deviations 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	*SD*	*M*	*SD*
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

Notes: Means are covariate adjusted for scores on the enhancement motives scale of the GMQ (Stewart & Zack, 2008).

Table 6

Means and standard deviations of self-reported outcome expectancy scores

(a) Comparison of high and low enhancement motive gamblers

	High enhancement motive gamblers		Low enhancement motive gamblers	
	M	SE	M	SE
Reward GOE	37.62 a	2.02	27.06 b	2.02
Relief GOE	27.23	2.09	21.65	2.09

Notes: 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 & Zack, 2008).

(b) Comparison of high versus low coping motive gamblers

	High coping motive gamblers		Low coping motive gamblers	
	M	SE	M	SE
Reward GOE	34.98	1.98	30.09	1.82
Relief GOE	30.26a	2.26	19.49b	2.08

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

APPENDIX G

Stewart, S. H., Ramasubbu, C., Ellery, M., Yi, S., Ames, S., Collins, P., & Stewart, M. J. (2014). *The Behavior Outcome Association Task: A novel method for examining automatic positive associations to gambling behavior.* Poster presented at the New Horizons in Gambling Research Conference, Vancouver, BC.

Conference Abstract Submission

In the Behavior Outcome Association Task (BOAT; Stacy et al., 1997), an implicit measure developed in the substance abuse area, participants are provided with a word or phrase describing a desirable outcome such as "relaxation" or "having fun" and are asked to name the activities that first come to mind. Participants who are more involved with substances are more likely to respond with substance use behaviors to these positive outcome words/phrases, indicating stronger implicit associations between substance use and positive outcomes in memory (e.g., Ames et al., 2006). This task has yet to be used in gambling research. In this study, 95 regular gamblers (mean age = 29.7 years; 68% male) completed a modified BOAT that tested automatic positive outcome associations to gambling. Participants also completed a 90-day Gambling Timeline Followback (G-TLFB; Weinstock et al., 2004) and the Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index (Ferris & Wynne, 2001). BOAT coders showed excellent inter-rater reliability ($r = .955$, $p < .001$). Number of gambling-related responses on the BOAT was correlated with time spent ($r = 0.355$, $p < .001$) and money lost ($r = .374$, $p < .001$) gambling, and with problem gambling severity ($r = 0.517$, $p < .001$), suggesting that gamblers with a stronger tendency to implicitly associate gambling with positive outcomes are also more likely to spend excessive amounts of time and money gambling and to experience more gambling-related harms. Moreover, the relationship between BOAT scores and gambling problems was mediated by a greater time spent (Sobel test statistic = 3.186, $p < 0.005$) and money lost (Sobel test statistic = 3.059, $p < .005$) gambling. Thus, gamblers with a stronger tendency to implicitly associate gambling with positive outcomes spend more time and money gambling which in turn leads to more gambling-related problems.

APPENDIX H

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Hi Sharon,

Along with my co-authors, Sunghwan Yi and Sherry Stewart, I had an article accepted for publication in Journal of Gambling Studies [i.e., Stewart, M.J., Yi, S., & Stewart, S.H. (in press). Effects of gambling-related cues on the activation of implicit and explicit gambling outcome expectancies among regular gamblers. Journal of Gambling Studies. doi: 10.1007/s10899-013-9383-8) and am wishing to include it as part of my doctoral dissertation. If you agree, it would be properly cited in my dissertation.

Please let me know if you require any additional information or have any questions.

Thanks,
Melissa Stewart