

## Beating lady luck: Effects of competitive gambling on opponent likeability and targeted physical aggression

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This study aimed to examine the effects of gambling motives and competitive gambling outcomes on opponent likeability and targeted physical aggression. We hypothesized that (a) losers would perceive their opponents to be less likeable and (b) would be physically more aggressive toward their opponents. Opponent likeability was proposed to mediate the lose-aggression relationship while social gambling motives were proposed to moderate the lose-aggression relationship. Specifically, we expected that losers of competitive gambling situations would engage in greater physical aggression only if they perceived their opponents to be less likeable. In addition, lower perceived opponent likeability would translate into greater targeted physical aggression only if the loser possessed low social motives for gambling. Ninety-eight undergraduates who self-identified mostly as recreational gamblers participated in a competitive gambling game. The Hot Sauce Paradigm was adapted as a measure of targeted physical aggression. Results obtained supported our hypotheses. Potential implications and limitations are discussed.

**Keywords:** Balloon Analogue Risk Task, competitive gambling, Hot Sauce Paradigm, likeability, physical aggression, social gambling motives

Most people have probably entertained the dream of earning a “quick buck” at some point in their lives, which is why gambling is such a popular recreational activity. Generally, gambling is an activity that involves several elements: (a) The outcome of the game is unknown and determined, at least in part, by chance; (b) something valuable (typically money) is at stake; (c) once a bet is made, it is irreversible; and (d) with excessive risk comes diminishing returns and increasing threats. Furthermore, once there is a perceived opponent, the activity is defined as competitive gambling (Blaszczynski, 2013; Champion & Rose, 2012; Problem Gambling Institute of Ontario, 2015).

Gamblers can be broadly classified into three categories: recreational, problem, and pathological. Recreational gamblers gamble within their means and have no problems stopping. They are less invested with their time and money when compared to both problem and pathological gamblers (Biolcati, Passini, & Griffiths, 2015). On the other hand, problem gamblers continue to gamble despite considerable negative consequences (Singapore Institute of Mental Health, 2013). For pathological gambling, the *Diagnostic and Statistical Manual of Mental Disorders*, 5th Edition (American Psychiatric

Association, 2013) has classified it as an addictive disorder (Gambling Disorder) with many symptoms that are similar to substance-use disorders. While both problem and pathological gamblers are more likely to gamble to improve their mood, increase their self-esteem, and chase their losses, as compared to recreational gamblers (Binde, 2012), they still differ fundamentally. Pathological gambling is more extreme and refers to a psychological disorder with a fixed criteria for diagnosis while problem gambling refers to a more general urge to gamble despite negative consequences (Biolcati et al., 2015).

The British Gambling Prevalence Survey (Wardle et al., 2011) has estimated that while only 0.9% of British adults are problem gamblers, 73% of adults have participated in some form of gambling activity. In the United States, estimates of pathological gamblers in the population range from 0.1 to 0.6% (National Opinion Research Center, 1999). In Singapore, the National Council on Problem Gambling (2015) recently reported a 0.7% probable pathological and problem gambling rate, with 44% of the population reporting that they had participated in at least one form of gambling over a 12-month period. These numbers reveal the prevalence of recreational gambling in many countries (Orford, Wardle, & Griffiths, 2013).

### Implications of Gambling

It is likely that gambling is an enjoyable recreational activity to many because it offers a convenient context for socialising and because the social interactional aspect

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of recreational gambling could help in relieving stress and boredom (Basham & Luik, 2011). In addition, gambling poses an intellectual challenge to some players and aids in self-fulfillment by facilitating visions of life transformation after winning the jackpot (Binde, 2012). However, gambling also has been associated with a host of problems such as loss of earned income brought on by recklessness, gambling-related debts (Potenza et al., 2000), decreased work productivity (Grinols, 2004), socioemotional burdens on the gambler's family and friends, and increased engagement in criminal activity (Walker, 2007). Research also has revealed an association between gambling and comorbid psychopathology—the greater the severity of gambling dependency, the higher the risk of mood, anxiety, or substance-use disorders (Parhami, Mojtabai, Rosenthal, Afifi, & Fong, 2014).

Thus, it is clear that while there are certain benefits arising from gambling, there also are many problems. Therefore, it is important to examine the potential negative consequences that gambling might bring. The current research examines how competitive gambling might have negative effects on social relations through affecting an individual's perceptions of the likeability of their opponent. We also explore a major adverse impact of gambling: the perpetration of physical aggression within the competitive gambling context. The current research also focuses on young adults (university students), as past research has demonstrated that the developmental period corresponding to young adulthood represents a time of increased gambling behaviours and heightened vulnerability to gambling-related consequences (Barnes, Welte, Hoffman, & Tidwell, 2009; Nowak & Aloe, 2014; Rodriguez, Neighbors, Rinker, & Tackett, 2015).

### **Competitive Gambling, Aggression and Likeability**

Aggression is defined as deliberate behaviours meant to hurt others (Dodge, Coie, & Lynam, 2006). The extant literature is replete with evidence of the association between problem gambling and acts of aggression toward other people. These could include acts of physical and verbal aggression toward intimate partners (Dowling et al., 2014; Liao, 2008), children (Afifi, Brownridge, MacMillan, & Sareen, 2010), and casino staff (Parke & Griffiths, 2004, 2005a, 2005b). Although an undeniable association between gambling and acts of aggression exists, the exact relationship has always remained ambiguous. To date, we know of no experimental study done to conclusively support and explain a link between gambling and aggression. Although there might indeed be a link between gambling and

aggression, it also is unclear if engaging in a gamble necessarily results in an act of aggression regardless of the outcome of the gamble.

Several studies have hinted at a possible mediator in the relationship between gambling and aggression. In observational studies and interviews of slot machine gamblers (Parke & Griffiths, 2004, 2005a, 2005b), researchers noted different acts of violence, including verbal and physical aggression perpetrated toward the casino staff, fellow gamblers, and the slot machines. The researchers also noted that the losing gamblers often saw the unfortunate victim of their aggression as an opponent (e.g., if gamblers aggressed against other players, it was because they perceived other players as engaging in predatory play that profited from the gamblers' own losses). In explaining the losers' behaviours, they posited the frustration–aggression hypothesis (Dollard, Miller, Doob, Mowrer, & Sears, 1939) as a possible explanation, which states that (a) all acts of aggression are driven by frustration from the inability to achieve a desired goal and conversely, (b) all frustration always leads to some form of aggression. Given that frustration often may be experienced after losing a gamble, it is expected thus that aggression could result from a loss.

However, the proposed explanation by Parke and Griffiths (2004, 2005a, 2005b) seemed to stand in contrast with a longitudinal study conducted by Adachi and Willoughby (2013) to examine the relationship between competitive gambling and overt physical aggression. Interestingly, the researchers found that noncompetitive gambling (e.g., lucky draws), in which there was no perceived opponent involved, did not predict physical aggression over time. However, the frequency of competitive gambling (e.g., poker), in which there was a perceived opponent involved, predicted increased acts of physical aggression. If the frustration–aggression hypothesis was indeed an adequate explanation, acts of aggression should then result from a gambling loss regardless of the nature of the gamble since according to the hypothesis, a loss signifies a failure to achieve the desired goal of winning, thereby potentially leading to feelings of frustration. Thus, in light of the many studies conducted to examine the adverse impact of problem gambling on social relations (e.g., Afifi et al., 2010; Dowling et al., 2014; Liao, 2008), we argue that while the frustration–aggression hypothesis might partially explain aggression in competitive gambles, there could be a better explanation that also accounts for the social relations present in competitive gambling. An explanation rooted in a social context also might explain why Adachi and Willoughby did not find a link between non-competitive gambling and physical aggression.

From the Realistic Conflict Theory (RCT; Campbell, 1958; Sherif, 1966), we posit that the perceived

likeability of the opponent could be a potential explanation. RCT states that intergroup conflict and outgroup prejudice and discrimination arise because of a zero-sum situation, in which only one group wins the coveted resources while the other group loses. Perhaps the most well-known case in research is that of the Robbers Cave (Sherif, Harvey, White, Hood, & Sherif, 1961) in which two groups of boys were put into competition during a summer camp. As a result, hostile attitudes developed on both sides toward the opposing group, which subsequently resulted in fights, insults, theft, and destruction of property, and damaged intergroup relationships. Zajonc and Marin (1967) further suggested that it was not just the presence of competition but also the outcome of the competition that determined subsequent interpersonal attitudes. Specifically, they found that successful teams were more likely to hold positive attitudes toward their opponents while unsuccessful teams were more likely to hold negative attitudes toward their opponents. Furthermore, the link between competition and hostility is not restricted to groups. Individuals also have been found to be equally likely to be affected by competition (DeBerry, 1989; Rabbie, 1998).

Based on findings from past research, the present study thus sought to (a) provide experimental evidence of the link between competitive gambling outcomes and physical aggression directed toward the opponent; (b) examine the differential effects of a gambling outcome (winning vs. losing) on physical aggression; and (c) expand the scope of RCT to gambling, such that losers of a competitive gamble would be more likely to engage in subsequent aggression toward the opponents, and that this lose-aggression relationship would be mediated by the likeability of the losers' opponents.

## Gambling Motives

Not all gambling losses necessarily lead to physical violence, just as not all drinking behaviours cause aggression. It can therefore be useful to examine the reasons behind gambling behaviours to see if gambling motives might provide a buffer against physical aggression. Stewart and Zack (2008) proposed that there are three main motives for gambling: social (e.g., to spice up a social gathering), enhancement (e.g., because of excitement), and coping (e.g., to forget worries). To our knowledge, there has not been any study that has explicitly associated gambling motives with targeted physical aggression. Nonetheless, previous studies have linked gambling motives with other adverse outcomes of gambling. For example, Stewart, Zack, Collins, and Klein (2008) found that gamblers motivated by coping were more likely to partake in different varieties of gambling and to exhibit problem drinking behaviours.

On the other hand, the link between drinking motives and adverse outcomes of drinking has been even more widely studied, and this related field of research might offer some insights. A review of drinking motives (Kuntsche, Knibbe, Gmel, & Engels, 2005) has revealed that enhancement and coping drinking motives were consistently associated with problem drinking and alcohol-related problems. However, the authors of the review also indicated that most people drink for social reasons and that recreational drinkers who were more likely to report having social motives for drinking were less likely to report alcohol-related problems. In addition, Labouvie and Bates (2002) showed that social motives were negatively associated with drinking problems. Thus, it seems that social motives for drinking might serve as protective factors against problems associated with alcoholism, especially among recreational drinkers (Gmel, Labhart, Fallu, & Kuntsche, 2012). Although there has been a relative lack of literature on the relationship between gambling motives and aggression, based on past literature on drinking motives and drinking outcomes, we postulated that a similar relationship would be found for gambling since alcohol abuse and problem gambling are addictive tendencies that share certain similarities, including correlations with traits such as low inhibition and high impulsivity (Bhullar, Simons, & Joshi, 2012). On the basis of these findings, we postulated that social motives would moderate the lose-aggression relationship. Specifically, participants who possess high levels of social motives for gambling might be less likely to physically aggress against opponents after a loss, as compared to those who are less motivated to gamble for social reasons.

## Likeability, Social Motives, and Aggression

Both likeability and social motives have been found to influence the perpetration of aggression. For instance, Salmivalli, Ojanen, Haanpää, and Peets (2005) studied adolescents and found that those who liked their peers more had more social goals and more prosocial behaviours. On the other hand, adolescents who disliked their peers had fewer social goals and were the most aggressive. In the workplace, Kim and Glomb (2010) found a link between victimisation and communion-based personality traits, such that people who were more agreeable and who engaged in more social behaviours were less likely to suffer from interpersonal aggression. In addition, they also found that the same communion-based personality traits moderated the relationship between high cognitive ability and increased chances of victimisation, suggesting that the more social and group-oriented that high-cognitive individuals were, the less likely they would become victimised. Kim and Glomb's

findings have suggested that certain personality attributes such as the agreeableness of an individual and their desire to engage in social behaviours with others could serve as protective factors against aggression. It is plausible that these communion-based traits such as agreeableness and group orientation are linked to how likeable as well as how socially motivated the individuals behave within their communities.

Extrapolating from these findings to the domain of competitive gambling, we postulated that likeability and social motives could interact to predict aggression toward the gambling opponent. Specifically, we examine whether there is a moderated mediation relationship such that lesser likeability of the opponent would translate to greater targeted physical aggression only if one also possessed lower levels of social motives for gambling. Conversely, possessing higher levels of social motives for gambling could act as a protective factor such that losing a gamble would not translate to greater targeted physical aggression, even if the opponent were perceived as less likeable.

### The Present Study

In summary, the following hypotheses were proposed:

**H1:** Losers of a competitive gambling game would find their opponents less likeable, as compared to winners.

**H2:** Losers of a gamble would be physically more aggressive toward their opponents, as compared to winners.

**H3a:** The lose-aggression relationship would be mediated by likeability. Specifically, losers were physically more aggressive than were winners because they would perceive their opponents to be less likeable.

**H3b:** Social motives would moderate the lose-aggression relationship. Specifically, high levels of social motives would decrease the tendency to physically aggress against one's opponent after losing.

**H3c:** The mediating role of likeability on the lose-aggression relationship is moderated by social motives. Specifically, perceived lower likeability of an opponent would only translate to greater targeted physical aggression if one possessed low social motives. Conversely, losers of a gamble who possessed high levels of social motives would not necessarily engage in greater targeted physical aggression even if their opponent were perceived as less likeable.

## Method

### Participants

Ninety-eight university students (35 males, 63 females) took part in this study. The age range of the participants was 19 to 26 years (males:  $M = 22.80$ ,  $SD = 1.68$ ; females:  $M = 21.27$ ,  $SD = 1.26$ ). Participants were recruited from a variety of sources, including recruitment posters, electronic flyers via e-mail, or from psychology courses. There were two inclusion criteria for participants of the study: Participants must have had prior gambling experiences, and they must not be averse to spicy food. Participants were compensated either with partial course credits or an SGD\$10 cash voucher.

Data from 16 participants were excluded from analyses because the participants either failed the suspicion check<sup>1</sup> or submitted incomplete data. The final analyses were conducted on 82 participants (29 males, 53 females) with an age range of 19 to 26 years (males:  $M = 22.66$ ,  $SD = 1.63$ ; females:  $M = 21.21$ ,  $SD = 1.29$ ).

### Measures and Materials

**The South Oaks Gambling Screen.** The South Oaks Gambling Screen (SOGS) is a 20-item tool for assessing participants' gambling involvement and frequency (Lesieur & Blume, 1987). It has been widely used (e.g., Konkolöy & Hodgins, 2014; Locke, Shilkret, Everett, & Petry, 2013) to identify probable problem and pathological gamblers. Sample items include "Do you ever gamble more than you intended to?" For the current sample, the scale was found to be reliable,  $\alpha = .83$ .

**The Gambling Motives Questionnaire.** The Gambling Motives Questionnaire (GMQ) is a 15-item questionnaire that aims to assess the reasons behind gambling behaviours (Stewart & Zack, 2008). It consists of five items, each measuring three motives of gambling: enhancement (e.g., "because it makes you feel good"), social (e.g., "because it makes a social gathering more enjoyable"), and coping (e.g., "because it helps when you are feeling nervous or depressed"). Participants had to answer each item on a Likert scale ranging from 1 (*Almost Never/Never*) to 4 (*Almost Always/Always*). Scores were summed for each motive; the higher the score, the more probable it was that a participant gambled because of that particular motive. The internal consistencies of the three subscales were adequate to good, Enhancement:  $\alpha = .88$ ; Coping:  $\alpha = .86$ ; Social,  $\alpha = .78$ .

**The Balloon Analogue Risk Task.** The Balloon Analogue Risk Task (BART) is a commonly used

behavioural measure of risk-taking and impulsivity (Lejuez et al., 2002). It is a computerised game that involves pumping up virtual balloons to accumulate more money. Past studies have utilised the BART as a measure of risk-taking and impulsivity, and have found that results correlated with self-reports of risky behaviours such as smoking and gambling (e.g., Dislich, Zinkernagel, Ortner, & Schmitt, 2010; Lejuez et al., 2002). The BART was chosen as a simulation of a real-life gambling game because it fulfilled all of the core definitions of gambling: (a) stakes were relatively valuable and wagered upon (virtual currency in exchange for more course credits or a cash voucher of higher value), (b) it was an activity of chance (rates of balloon popping were random and outside of the participants' control), (c) risks were taken (participants had to decide whether to stop or to continue pumping the balloon), (d) the outcome was unknown (participants did not know if they won or lost until after the game was completed), and (e) diminishing returns and increasing threats came with excessive risk (every pump on a balloon trial increased the potential amount that is lost and reduced the relative gain) (Blaszczynski, 2013; Lejuez et al., 2002).

The complete procedure for administering the BART has previously been described by Lejuez et al. (2002). For the purpose of this study, the BART was presented on a computer using Inquisit (Version 3; Millisecond software). Participants were led to believe that if the final amount they earned exceeded that of their opponent's, they would get either 2 course credits instead of 1 (for participants playing for course credit) or a SGD \$10 voucher instead of SGD\$5 (for participants playing for a cash voucher).

**Manipulation check.** Participants completed the Self-Assessment Manikin (SAM), which was programmed and administered via the Inquisit software, to assess their affect in response to their gambling outcome. The SAM is a pictorial assessment of participants' states of valence, arousal, and dominance (Lang, 1980). Participants were asked to indicate their feelings in the three dimensions on a Likert scale of 1 to 9; higher scores on each dimension represented greater happiness, arousal, and dominance, respectively.

**The Hot Sauce Aggression Paradigm.** This procedure involved giving participants the opportunity to determine the amount of hot sauce to be given to their opponent (who was previously described to participants as someone who disliked spicy food). The Hot Sauce Paradigm was selected as the aggression measure in this study because it offered a tangible way to measure the extent of the intent to physically aggress in a relatively easy manner while minimising any potential ethical

concerns of physical or emotional discomfort (Lieberman, Solomon, Greenberg, & McGregor, 1999). In addition, it was easily quantifiable (physical aggression as the amount of hot sauce) and ecologically valid (Ritter & Eslea, 2005) since hot sauce has been observed to be a tool of aggression in the real world (e.g., "Seven hurt in hot sauce attack," 2001).

Physical aggression was operationally defined as the amount of hot sauce allocated to their opponent. Thus, we assumed that the greater the amount of hot sauce given, the greater the participant's intent to overtly aggress against his or her opponent. The weight of the hot sauce given by each participant was measured by a common digital kitchen scale with a 1-g increment.

**The Likeability Scale.** The current study used an adapted five-item version of Reysen's (2005) 11-item Likeability Scale to minimise respondent fatigue. Sample items include "My opponent seems friendly." Participants had to indicate agreement with each of the five items on a Likert scale ranging from 1 (*Very Strongly Disagree*) to 7 (*Very Strongly Agree*). Higher scores indicated greater likeability of their opponent. The internal consistency of the abbreviated scale was good,  $\alpha = .87$ .

## Procedure

Institutional Review Board approval was sought for and given for all methods and procedures used in this study. Informed consent also was obtained from all participants prior to starting the study.

The study used a between-subjects design. Participants were tested in pairs and were randomly allocated to either the "win" or the "lose" condition. To minimise the likelihood that they would make the link between the competitive gambling outcome and the hot sauce task, participants were first told that they were participating in two separate studies: one on the relationship between risk-taking and self-control and the other on the relationship between personality and taste preferences. The entire experiment lasted between 20 and 30 minutes.

Participants were then led to separate rooms where they completed the survey items online via Qualtrics (Provo, UT, USA). Next, participants proceeded to the BART. At this point, the BART programming randomly allocated each participant to either a "win" or a "lose" condition. At the end of the game, the researcher would use his mobile phone to take a screen shot of the participants' total winnings to be shown to their opponent as evidence of who had won or lost the game. Of the initial 98 participants, there were 49 losers and 49 winners. After exclusion of participants who did not finish the

experiment or failed the suspicion check, there were 39 losers and 43 winners.

After knowing their BART results, participants then completed the SAM as a manipulation check and the Likeability Scale.

Next, participants were told that they would proceed to a separate study on personality and taste preferences, which sought to investigate the relationship between personality traits and preferences for various types of food (e.g., sweet, spicy, salty, sour). Participants were first asked to fill up a Taste Preferences Inventory using a sample (their opponent's supposed inventory) as a reference. Importantly, the sample inventory was shown to participants so that the participants were made aware that their opponent disliked spicy food. On a scale of 1 (*Extreme Dislike*) to 7 (*Extreme Liking*), the opponent had purportedly circled "2." By extension, we assumed that the allocation of more amounts of hot sauce to the opponent served as a targeted gesture of physical aggression toward the opponent.

Subsequently, participants were then told that they had been randomly allocated to the control condition so they had to consume a cup of water, but that their opponent was assigned to the experimental condition so their opponent had to consume the tested food. Next, participants were told that because the researcher himself had to be blind to the type and amount of food that was tested that day, participants had to be enlisted to help in packing the food for their opponent. Participants were then taken to a table with an opaque container of the hot sauce (covered with a lid), a disposable spoon, and non-transparent plastic cups with lids. They also were encouraged to first try the food themselves before filling the plastic cup with any amount of food that they desired. In addition, participants were told that they were free to fill up the cup with whatever amount of food they chose, but that their opponent had to finish the entire amount. To minimise demand characteristics and/or social desirability issues, participants were left alone in the room to complete this task. Once they were done, participants were asked to cover the cup with a lid so that the researcher would not be aware of the amount of hot sauce that they had allocated. The procedure listed here was adapted from Ayduk, Gyurak, and Luerssen (2008).

Finally, participants completed a suspicion check<sup>2</sup> and answered some demographic questions. For ethical reasons, all participants were compensated with either two course credits or an SGD\$10 cash voucher regardless of their allocated condition. Throughout the experiment, the participants also did not interact with each other. Thus, the data collected from each participant should be considered as independent from that of other participants.

## Results

### Statistical Analyses

Descriptive statistics and Pearson correlations were first conducted, after which an analysis of variance (ANOVA) was carried out to test H1. An analysis of covariance (ANCOVA) was utilised to test H2 while a series of hierarchical analyses were conducted to test H3a and H3b. Moderated mediation analysis for H3c was conducted via the PROCESS macro (Preacher, Rucker, & Hayes, 2007). A value of  $p < .05$  was used as the criterion for statistical significance. Effect sizes were calculated using Cohen's  $d$ , except for H3a, where percent mediation is a more appropriate approximation of effect size (Preacher & Kelley, 2011). For Cohen's  $d$ , benchmarks of 0.2, 0.5, and 0.8 were used as cutoffs for small, medium, and large effect sizes, respectively (Cohen, 1977).

### Preliminary Analyses

A power analysis using the G\*Power programme (Faul, Erdfelder, Buchner, & Lang, 2009) indicated a total sample of 68 would be needed to detect large effect sizes, Cohen's  $d = 0.8$ , with 90% power, and  $\alpha = .05$ , two-tailed. The current sample size of 82 is therefore adequate, and it is unlikely that our findings could be attributed to a limited sample size.

All variables were checked for missing values and normality. The weight of hot sauce was skewed, as with past studies utilising the hot sauce paradigm (e.g., Lieberman et al., 1999). A  $\log_{10}$  transformation was thus performed, as per the advice of Lieberman et al. (1999). All weights of hot sauce are presented and discussed using their  $\log_{10}$  values hereafter.

Descriptive statistics for the variables of interest were then derived (see Table 1). Pearson correlations also were performed on the variables of interest (see Table 2). Results were largely within expectations. All three gambling motives were significantly correlated with each other, enhancement and coping,  $r(82) = .72$ ,  $p < .01$ ; enhancement and social,  $r(82) = .70$ ,  $p < .01$ ; and coping and social,  $r(82) = .62$ ,  $p < .01$ , indicating that gambling for any one of the motives was positively linked to gambling for any of the other two motives. In addition, the happier participants were after knowing their gambling results, the more dominant they felt,  $r(82) = .37$ ,  $p < .01$ . Finally, opponent likeability was negatively and significantly correlated with the weight of hot sauce given,  $r(82) = -.33$ ,  $p < .01$ .

Eight participants (9.76%) were identified as probable problem gamblers (SOGS  $M = 2.13$ ,  $SD = 0.99$ ) while a further 8 participants (9.76%) were identified as probable

**Table 1 Descriptive Statistics of Variables**

	<i>M</i>			<i>SD</i>			$\alpha$
	Problem and pathological gamblers	Recreational gamblers	Total	Problem and pathological gamblers	Recreational gamblers	Total	
SOGS	4.25	0	0.83	2.57	0	2.02	.83
GMQ – enhancement	5.00	4.44	4.55	2.88	3.74	3.58	.88
GMQ – coping	2.63	2.18	2.27	2.36	2.78	2.70	.86
GMQ – social	7.06	5.09	5.48	3.44	3.31	3.40	.78
Arousal	5.31	4.62	4.76	2.12	2.07	2.09	–
Happiness	6.13	6.27	6.24	2.55	2.21	2.26	–
Dominance	5.63	5.47	5.55	2.47	1.74	1.89	–
Likeability	23.19	22.88	22.94	4.07	4.89	4.72	.87
Weight of hot sauce (Log)	0.48	0.48	0.48	0.47	0.55	0.54	–

Note. GMQ = Gambling Motives Questionnaire; SOGS = South Oaks Gambling Screen.

**Table 2 Pearson Correlations of Variables**

	SOGS	GMQ – enhancement	GMQ – coping	GMQ – social	Arousal	Happiness	Dominance	Likeability	Weight of hot sauce (Log)
SOGS	1	.13	.07	.25*	.15	-.02	.07	-.01	-.04
GMQ – enhancement	.13	1	.72**	.70**	.002	-.13	-.19	-.02	-.07
GMQ – coping	.07	.72**	1	.62**	.04	-.20	-.16	.07	-.10
GMQ – social	.25*	.70**	.62**	1	.14	-.09	-.01	-.02	-.17
Arousal	.15	.002	.04	.14	1	.07	.07	-.12	-.06
Happiness	-.02	-.13	-.20	-.09	.07	1	.37**	.04	-.17
Dominance	.07	-.19	-.16	-.01	.07	.37**	1	.04	-.09
Likeability	-.01	-.02	.07	-.02	-.12	.04	.04	1	-.33**
Weight of hot sauce (Log)	-.04	-.07	-.10	-.17	-.06	-.17	-.09	-.33**	1

Note. GMQ = Gambling Motives Questionnaire; SOGS = South Oaks Gambling Screen.

\* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed.

pathological gamblers (SOGS  $M = 6.38$ ,  $SD = 1.69$ ), indicating that a large majority (66 participants; 80.49%) of the current sample were recreational gamblers who did not report any problems with gambling (SOGS = 0). Kruskal-Wallis tests revealed no differences among the three groups on variables of interest: opponent likeability,  $\chi^2(2) = 0.68$ ,  $p = .71$ ; amount of hot sauce given,  $\chi^2(2) = 0.32$ ,  $p = .85$ ; and social motives,  $\chi^2(2) = 4.23$ ,  $p = .12$ .

### Manipulation Check

A separate independent samples  $t$  test was conducted for each affect dimension, with each dimension (arousal, dominance, happiness) as the test variable and the outcome of the gamble (win or lose) as the grouping variable. As expected, winners felt significantly more aroused, dominant, and happier (see Table 3). This showed that the BART was effective as a simulation of a competitive

gambling game and, more importantly, that the participants believed in the “win” and “lose” outcomes.

### Gambling Outcomes and Likeability

H1 stated that losers would find their opponent less likeable, as compared to winners. An ANOVA was

**Table 3 Mean, SD, *t*, and Cohen's *d* Values of Affective Reactions to Gambling Outcomes**

	Winners		Losers		<i>t</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Arousal	5.23	1.94	4.23	2.15	2.22*	0.49, Small
Dominance	6.21	1.52	4.72	1.96	3.87**	0.85, Large
Happiness	7.56	1.35	4.80	2.19	6.95**	1.52, Large

Note. \* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed.

conducted, with likeability of opponent as the dependent variable and outcome of the gambling game as the fixed factor<sup>3</sup>. Results revealed that losers indeed found their opponents less likeable ( $M = 21.35$ ,  $SD = 0.53$ ), as compared to winners,  $M = 24.38$ ,  $SD = 0.51$ ,  $F(1, 79) = 16.82$ ,  $p < .01$ . The effect size was large, Cohen's  $d = 5.81$ .

Results suggested that the outcome of a gambling game could influence perceptions of likeability of one's opponent. Specifically, losing a competitive gamble would lead to perceptions that one's opponent was less likeable while winning a competitive gamble would lead to perceptions that one's opponent was more likeable. Thus, H1 was supported.

### Gambling Outcomes and Aggression

H2 stated that losers on a gambling game would be physically more aggressive toward their opponent, as compared to winners. An ANCOVA was conducted, with weight of the hot sauce administered as the dependent variable and outcome of the gamble as the fixed factor. Because past studies have shown gender differences in aggression (see Baron & Richardson, 1994), gender was controlled for in the analysis as a covariate.

Results revealed that there was a significant difference in the amount of hot sauce given, with losers giving more ( $M = 0.63$ ,  $SD = 0.09$ ) than did winners,  $M = 0.39$ ,  $SD = 0.09$ ,  $F(1, 77) = 4.19$ ,  $p = .04$ . The effect size was large, Cohen's  $d = 2.90$ .

The results suggested that gambling outcomes had an effect on physical aggression. Specifically, losing a competitive gamble increased the likelihood that one would physically aggress against one's opponent. Thus, H2 was supported.

### Mediating Variable (Likeability)

H3a stated that the lose-aggression relationship would be mediated by likeability. Specifically, losers would be more aggressive than would winners because losers thought their opponent was less likeable.

Since earlier hypothesis tests confirmed the simple regression relationships between losing and likeability as well as between losing and aggression, a hierarchical regression analysis was conducted. In the first block, gender was inserted as a control variable. In the second block, outcome of the gamble was added. In the third block, the mediating variable (likeability) was added. Weight of hot sauce was set as the dependent variable.

Results supported perceived likeability of the opponent as a mediator of the lose-aggression relationship. Gambling outcomes independently predicted both

likeability,  $\beta = .33$ ,  $p < .01$ , and weight of hot sauce given,  $\beta = -.27$ ,  $p = .02$ ; the effect of likeability on weight of hot sauce remained significant after controlling for outcome of the gamble,  $\beta = -.37$ ,  $p = .02$ ; and the effect of the gambling outcome on weight of hot sauce given became nonsignificant after controlling for likeability,  $\beta = -.15$ ,  $p = .21$  (see Figure 1). Likeability as a mediator could account for 28% of the total effect,  $P_M = .28$ . Thus, H3a was supported.

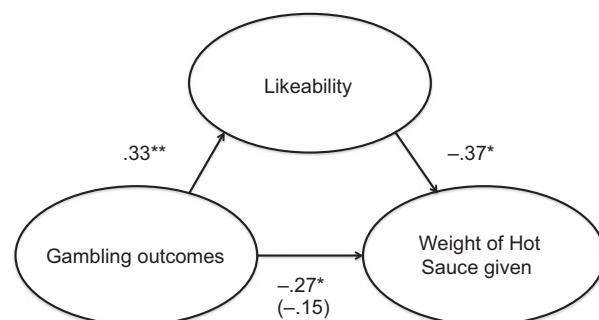
### Moderating Variable (Social Motives)

H3b sought to further elucidate the relationship between losing a competitive gamble and targeted physical aggression by examining a potential moderating variable: social motives.

Consistent with the approach advocated by Baron and Kenny (1986), the moderating variable (social motives) was first centered before being multiplied with the independent variable (i.e., win or lose) to create an interaction term. A hierarchical regression analysis was then conducted. In Step 1, gender was inserted as a control variable. In Step 2, outcome of the gamble and the centered variable of social motives were inserted. In Step 3, the interaction term between outcome of the gamble and the centered social motives was added.

Results indicated that the overall model for social motives was significant,  $R^2 = .19$ ,  $F(1, 76) = 3.46$ ,  $p = .01$ . Gambling outcomes,  $\beta = -.64$ ,  $p = .01$ , but not social motives,  $\beta = -.15$ ,  $p = .07$ , exerted a main effect on the weight of hot sauce given. The interaction also was significant,  $\beta = .71$ ,  $p = .03$ .

The interaction was plotted at conditional values of 1 SD above and below the mean (Cohen, Cohen, West,



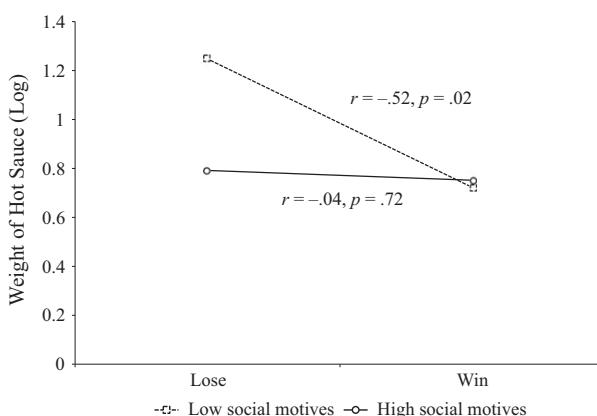
**Figure 1** Standardised regression coefficients for the relationship between gambling outcomes and weight of hot sauce given as mediated by likeability. The figure in parentheses represents the standardised regression coefficient for the relationship between gambling outcomes and weight of hot sauce given, controlling for likeability. \* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed.

& Aiken, 2002). A simple slopes analysis, following Preacher, Curran, and Bauer's (2006) method, was then conducted. Results revealed that the relationship between gambling outcomes and targeted physical aggression was significant if an individual possessed low social motives,  $t = -4.79$ ,  $p = .02$ , but nonsignificant if an individual possessed high social motives,  $t = -0.36$ ,  $p = .72$ . These results suggested that people with low social motives aggressed more after losing, as compared to people with high social motives. On the other hand, the level of targeted physical aggression exhibited by people with high social motives was independent of their gambling outcomes (see Figure 2). Thus, H3b was supported.

### Moderated Mediation

H3c stated that perceived likeability of the opponent and the individual's social motives interacted to predict aggression. Specifically, perceived lesser likeability of the opponent would translate to greater targeted physical aggression only if one possessed low social motives. Conversely, possessing high social motives of gambling could act as a protective factor, such that losing a gamble would not translate to greater targeted physical aggression even if the opponent were perceived as less likeable.

A moderated mediation analysis was carried out via the PROCESS macro (Model 14). This was tested via bootstrapping with 5,000 resamples and estimated using unstandardised coefficients. According to Preacher et al. (2007), there is evidence of an effect if the bias-corrected confidence interval excludes zero. Results indicated that a significant effect of gambling outcomes and likeability on aggression was found for low social motives, coefficient =  $-.26$ , 95% CI  $[-0.47, -0.07]$ , but



**Figure 2** Moderation by social motives for gambling. This figure illustrates the relationship between gambling outcomes and weight of hot sauce given as moderated by social motives for gambling.

not for high social motives, coefficient =  $-.06$ , 95% CI  $[-0.21, 0.05]$ . Therefore, H3c was supported.

### Discussion

The present study investigated the relationship between gambling outcomes and targeted physical aggression in a competitive gambling scenario. Our results indicated that a gambling loss indeed led to greater physical aggression toward the opponent, as compared to a gambling win. Based on the RCT, we also predicted and found experimental support for a causal relationship between gambling losses and reduced opponent likeability. Furthermore, opponent likeability was found to mediate the lose-aggression relationship, such that losers physically aggressed more against their opponent as compared to winners because they found their opponent to be less likeable after a loss. Our findings also found support for social gambling motives as a moderator in the lose-aggression relationship, such that a gambler with low social gambling motives would be more likely to physically aggress against his or her opponent after a loss, as compared to a gambler with higher social gambling motives. In addition, evidence was found for a moderated mediation relationship, in which perceived lower opponent likeability after a gambling loss would only translate to greater targeted physical aggression if one possessed low social gambling motives. On the other hand, losers of a gamble who possessed high levels of social gambling motives would not necessarily engage in greater targeted physical aggression, even if their opponent were perceived as less likeable.

### Theoretical Implications

While past research has consistently demonstrated a relationship between gambling and aggressive behaviours (Afifi et al., 2010; Dowling et al., 2014; Parke & Griffiths, 2004), the studies were either observational or correlational in nature. The current literature on the relationship between gambling and aggressive behaviours is ambiguous as well—little has been said about potential mediators and moderators and whether gambling outcomes had a differential effect on aggression. To our knowledge, the current study is the first to experimentally provide some evidence for and clarify the relationship between competitive gambling and physical aggression. The contribution to the gambling literature is therefore critical because the current study has shown that while engagement in competitive gambling could indeed lead to greater targeted physical aggression against an opponent, the relationship is not straightforward. Much also depends on the outcome of the gamble, the perceived likeability of the opponent, and the

gambler's own social gambling motives. Our findings reveal that it therefore is imprudent to state that competitive gambling always leads to greater physical aggression without due consideration of the aforementioned factors.

Our study makes further theoretical contributions by demonstrating the utility of a well-established theory (RCT) in the context of a competitive gamble. Past research has focused on RCT and its applications in immigrant prejudice (Zárate, Garcia, Garza, & Hitlan, 2004), racial and ethnic prejudice (Brief et al., 2005), and high-status, out-group bias (Echebarria-Echabe & Gude, 2003), but none has attempted to use RCT in a gambling context. Given that the basis of RCT that there is a zero-sum situation in which one loses at the expense of another—is similar to the nature of a competitive gamble, we have expanded the scope of RCT to competitive gambling and established a related concept of likeability as an explanation of the lose-aggression relationship. Thus, our research is among the first to experimentally attempt an explanation of why losers might aggress against an opponent in a competitive gamble.

By establishing likeability as a mediator in the lose-aggression relationship, our research also has provided some clarity to current literature on gambling and aggression. While the frustration-aggression hypothesis continues to be a potentially viable explanation in the lose-aggression relationship (Parke & Griffiths, 2004, 2005a, 2005b), it is not a wholly adequate explanation. Adachi and Willoughby (2013) showed that only competitive gambling (but not noncompetitive gambling) leads to increased acts of physical aggression over time. If the frustration-aggression hypothesis could fully account for the relationship between gambling and physical aggression, then engaging in both noncompetitive and competitive gambles should lead to increased physical aggression. Our research has shown that an alternative explanation of opponent likeability that also takes into account the social relations present in competitive gambles could therefore potentially explain previous inconsistencies in the gambling literature.

Given the relative lack of literature on gambling motives, we have extended past research on the protective role of social motives in drinking behaviours (Biolcati, Passini, & Mancini, 2016) to show that social motives also can play a similar role against physical aggression in a competitive gambling loss. The protective role of social motives also could be viewed from the lens of self-determination theory (Deci & Ryan, 2000). We reasoned that gamblers who have high social gambling motives could see the activity as an interesting pastime that facilitates personal growth and informational feedback, in line with an autonomy orientation

that has been associated with lesser gambling problems (Chantal, Vallerand, & Vallières, 1995; Rodriguez et al., 2015) while gambling for nonsocial motives such as emotional coping corresponds with a controlled orientation that is associated with more frequent and problematic gambling (Rodriguez et al., 2015). Therefore, our research findings have provided a greater nuance to current gambling literature by showing that a competitive gambling loss does not always lead to increased acts of physical aggression. If one were to gamble mainly for social reasons, this would then act as a buffer against possible acts of physical aggression, even if one were to like one's opponent a little less than before.

### **Limitations and Future Directions**

The current study involved largely recreational gamblers who did not report any problems with gambling. Therefore, results should be viewed with caution when drawing potential conclusions about problem and pathological gamblers, whose gambling habits, cognition, and motivations are different from those of recreational gamblers (American Psychiatric Association, 2013; Singapore Institute of Mental Health, 2013). Future research could be focused on problem and pathological gamblers regarding aggressive behaviours after a competitive gambling loss. For instance, the present study already has hinted at a possible difference in gambling motives behind aggressive behaviours for recreational versus problem and pathological gamblers. If parallels are drawn from Kuntsche et al.'s (2005) review of drinking motives, it might be possible that problem and pathological gamblers gamble mainly for reasons of enhancement and coping, and the greater endorsement of both motives could consequently predict a higher incidence of negative outcomes such as physical aggression.

Second, while the current study provided some experimental evidence of the link between competitive gambling and targeted physical aggression, a noncompetitive gambling group was not included in the study. Future research could build on the results of this study to provide a more conclusive relationship between gambling and targeted physical aggression via the inclusion of a noncompetitive gambling group. Given that noncompetitive gambling lacks the social aspect present in competitive gambling, it could be likely that acts of physical aggression would not result from losses made in a non-competitive gamble, as per Adachi and Willoughby (2013)'s findings. However, this would have to be demonstrated experimentally to conclusively state that gambling might lead to physical aggression only if the nature of the gamble is perceived to be competitive.

Third, it might be likely that both frustration and likeability could act as mediators in a competitive gambling

scenario. Although our study has demonstrated that opponent likeability acted as a mediator in the lose-aggression relationship of a competitive gambling scenario, we did not examine experimentally if frustration also could play a role. We thus caution against concluding that opponent likeability is the main or only mediator. As mentioned, likeability as a mediator could account for only 28% of the total effect,  $P_M = .28$ , which indicated a possibility that the other 72% might be explained in part by frustration or a combination of other variables that were not discussed in this study. Future research could (a) examine the differential effects that frustration and likeability could play in their roles as potential mediators of the lose-aggression relationship in a competitive gamble and (b) propose other possible variables to further account for such a relationship. Such variables could potentially include the emotion of anger, sense of injustice, or self-esteem reduction, which were put forth as possible other factors (but yet to be experimentally tested) behind aggressive behaviours of slot-machine gamblers who had lost (Parke & Griffiths, 2005b).

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## Footnotes

<sup>1</sup> These participants had correctly guessed the true intention of the study when prompted to do so.

<sup>2</sup> The suspicion check was carried out via two questions: a closed-ended question of "Do you have any prior knowledge of this study from a past participant?" and an open-ended question of "What do you think the experiment is trying to investigate?" Participants who answered "yes" to the first question and/or correctly guessed the true intention of the study in the second question were excluded from the analyses. Data from 14 such participants were excluded.

<sup>3</sup> Gambling outcomes were dummy coded as "1" for losers or "2" for winners.

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