FULL-LENGTH REPORT

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The effects of alcohol expectancy and intake on slot machine gambling behavior

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Background and aims: Although alcohol intake and gambling often co-occur in related venues, there is conflicting evidence regarding the effects of alcohol expectancy and intake on gambling behavior. We therefore conducted an experimental investigation of the effects of alcohol expectancy and intake on slot machine gambling behavior. *Methods:* Participants were 184 (females = 94) individuals [age range: 18–40 (mean = 21.9) years] randomized to four independent conditions differing in *information/expectancy* about beverage (told they received either alcohol or placebo) and beverage *intake* [actually ingesting low (target *blood alcohol concentration* [BAC] < 0.40 mg/L) vs. moderate (target BAC > 0.40 mg/L; ≈0.80 mg/L) amounts of alcohol]. All participants completed self-report questionnaires assessing demographic variables, subjective intoxication, alcohol effects (stimulant and sedative), and gambling factors (behavior and problems, evaluation, and beliefs). Participants also gambled on a simulated slot machine. *Results:* A significant main effect of beverage intake on subjective intoxication and alcohol effects was detected as expected. No significant main or interaction effects were detected for number of gambling sessions, bet size and variation, remaining credits at termination, reaction time, and game evaluation. *Conclusion:* Alcohol expectancy and intake do not affect gambling persistence, dissipation of funds, reaction time, or gambling enjoyment.

Keywords: alcohol, betting, expectancy, electronic gaming machines, gambling, slot machines

INTRODUCTION

Gambling venues, such as casinos, clubs, and pubs, often provide the opportunity for simultaneous gambling and alcohol consumption, or gambling under the influence of alcohol. Ample evidence attests to the relationship between gambling and alcohol consumption problems. Several studies have, for example, shown a positive association between gambling problems and problems related to alcohol consumption (Barnes, Welte, Tidwell, & Hoffman, 2015; Chou & Afifi, 2011; Griffiths, 1994; Martins, Ghandour, Lee, & Storr, 2010) and results from recent US general population studies show that gambling problems and alcohol dependence are significantly related (Chou & Afifi, 2011) and have high co-occurrence or comorbidity (Barnes et al., 2015). Furthermore, the epidemiological literature suggests that about 73% of pathological gamblers report alcohol dependence over their lifetime (Petry, Stinson, & Grant, 2005).

In terms of how alcohol influences gambling behavior, the self-awareness model (Hull, 1981) proposes that alcohol diminishes people's self-awareness by affecting their processes of encoding. This way, a person's appreciation or self-evaluation of appropriate behavior decreases (Hull, Levenson, Young, & Sher, 1983). Consistent with this theory, alcohol consumption, even if moderate, has been found to negatively influence attention (Steele & Josephs, 1990; Zoethout, Delgado, Ippel, Dahan, & van Gerven, 2011), response inhibition, and flexibility (Easdon & Vogel-Sprott, 2000; Noël, Tomberg, Verbanck, & Campanella, 2010), as well as planning and organization abilities (Easdon & Vogel-Sprott, 2000; Zoethout et al., 2011). Hence, a potential cognitive distortion following inebriation from alcohol consumption could explain how alcohol affects gambling behavior.

Experimental studies have provided some further insights to the link between alcohol consumption and gambling behavior. A recent study on rat gambling suggests that frequent alcohol exposure has debilitating effects on decision-making during gambling task acquisition, and is linked to diminished ability to alter behavior due to feedback (Spoelder et al., 2015). In a recent comparison of pathological gamblers and a control group, evidence is provided that consumption of a moderately intoxicating dose of alcohol increases the rate of double-up betting (Ellery & Stewart, 2014). In another recent experimental study using video-lottery terminals, alcohol consumption

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strongly increased the propensity to gamble (Barrett, Collins, & Stewart, 2015). There is also evidence from a cross-sectional survey that males who drink alcohol when gambling gamble with increased bet size, seek extra money when at a casino, and more frequently incur higher losses than they can pay for (Giacopassi, Stitt, & Vandiver, 1998). Recent evidence from behavioral tracking data analysis also suggests that within-session gambling behavior is more variable in alcohol-serving venues than non-alcohol-serving venues (Leino et al., 2017).

However, some studies have produced contradictory results. Although alcohol consumption is associated with higher bets and faster loss of funds during slot machine gambling, neither main nor interaction effects were found for persistence (Cronce & Corbin, 2010). In another experimental study, no significant effect of alcohol consumption on gambling behavior was found in a comparison of a moderate dose of an alcohol group, a placebo group, and a no-alcohol control group (Breslin, Sobell, Cappell, Vakili, & Poulos, 1999). While the dissimilarities in findings may be attributable to differences in alcohol dosages administered in these studies, evidence regarding the effects of alcohol on gambling behavior is mixed and further studies are required to elucidate how alcohol affects gambling behavior (Ellery & Stewart, 2014).

The preponderance of previous studies compares alcohol and placebo groups on gambling-related variables. This design allows for examination of the effect of beverage (alcohol or placebo) intake on gambling behavior and related variables. However, most previous studies (Barrett et al., 2015; Breslin et al., 1999; Ellery, Stewart, & Loba, 2005; Giacopassi et al., 1998) with one exception (Ellery & Stewart, 2014) have not controlled for alcohol expectancy effects or the combined effects of alcohol intake and expectancy effects on gambling behavior. The absence or poor control of expectancy is a limitation with evidence that alcohol expectancy can alter perception (Bègue, Bushman, Zerhouni, Subra, & Ourabah, 2013). Relatedly, functional magnetic resonance imaging evidence indicates that alcohol expectancy and intoxication produce opposite results on the activation of neurons in the dorsal anterior cingulate cortex and prefrontal areas (Gundersen, Specht, Grüner, Ersland, & Hugdahl, 2008). Moreover, to our knowledge, there is a dearth of knowledge on the combined effect of beverage intake (alcohol or placebo) and information (provided prior to beverage intake: alcohol or placebo) on gambling behavior.

Against this backdrop, the purpose of this experimental study was to simultaneously examine the effect of beverage *intake* [actually ingesting low (target *blood alcohol concentration* [BAC] < 0.40 mg/L) vs. moderate (target BAC > 0.40 mg/L; ≈ 0.80 mg/L) amounts of alcohol] and *information/expectancy* (alcohol or placebo) on gambling behavior. Specifically, we examined: (a) the main effect of information/expectancy (alcohol vs. placebo); (b) the main effect of beverage [low (target BAC < 0.40 mg/L) vs. moderate (target BAC > 0.40 mg/L; ≈ 0.80 mg/L) amounts of alcohol] intake; and (c) the interaction effect of information/expectancy and beverage intake on gambling behavior and gambling evaluation.

We hypothesized that compared with the low alcohol-ingesting groups, the moderate alcohol-ingesting groups will have higher perceived intoxication and slower reaction time. In addition, we predicted that in comparison with the low alcohol-ingesting groups, the moderate alcohol-ingesting groups will place more and larger bets, vary their bet size more, and have lower funds at termination. Furthermore, we expected the moderate alcohol-ingesting groups to indicate a more favorable gambling experience compared with the low alcohol-ingesting groups. Due to the dearth of a strong empirical foundation, we did not make predictions regarding the influence of alcohol expectancy on gambling behavior.

METHODS

Participants

Participants were 184 (females = 94) volunteers. Their ages ranged from 18 to 40 years. Other characteristics of the sample are presented in Table 1.

Instruments/measures

A self-report questionnaire containing the following measures was used in the survey.

Demographics. Demographic information assessed in the survey questionnaire included age, gender, and relationship status.

Gambling problems. A subscale of the Canadian Problem Gambling Index (Ferris & Wynne, 2001), the Problem Gambling Severity Index (PGSI), was used for assessment of problem gambling. The PGSI has a total of nine items regarding gambling problems and the negative effects of gambling. An example item is "Has your gambling caused any financial problems for you or your household?" All the nine items are answered on a 4-point rating scale ranging from "never" (0) to "almost always" (3). Based on the composite score, participants are assigned to one of the four categories: non-problem gambler (a composite score of 0), low-risk gambler (a composite score of 1 or 2), moderate-risk gambler (a composite score ranging between 3 and 7), and problem gambler (a composite score of 8 or higher). In this study, the PGSI yielded a Cronbach's α of .73.

Gambling evaluation. The eight-item Bergen Evaluation of Games Scale (BEGS; Mentzoni, Laberg, Brunborg, Molde, & Pallesen, 2014) was administered to assess the degree to which participants find a game they had played enjoyable. An example item is "All in all, I enjoyed playing the game." Items are rated on a 7-point Likert scale ranging from "completely disagree" (1) to "completely agree" (7). Two items are reverse-scored. We computed a total score by adding the scores on all individual items. In this study, the BEGS yielded a Cronbach's α of .91.

Gambling beliefs. The Gamblers' Beliefs Questionnaire (GBQ; Steenbergh, Meyers, May, & Whelan, 2002) was used in the evaluation of the degree to which participants have cognitive distortions about gambling. This 21-item scale, comprising two subscales [luck/perseverance (13 items, e.g., "If I lose money gambling, I should try to win it back") and illusion of control (eight items, e.g., "I have a 'lucky' technique that I use when I gamble")], is answered on a

Table 1. Characteristics of the study sample by information and beverage condition

Characteristics	IA-GMA ($n = 37$)	IA-GLA ($n = 51$)	IP-GMA ($n = 49$)	IP-GLA ($n = 47$)	Overall ($N = 184$)	Group comparison
	n	n	n	n	n	χ^2
Sex (female)	17	25	28	24	94	$\chi^2(3) = 1.20$, $p = .754$, Cramer's $V = 0.081$
Educational level						$\chi^2(12) = 15.15$, $p = .233$, Cramer's $V = 0.233$
Doctoral	0	0	2	0	2	
Master	10	9	14	15	48	
Bachelor	14	15	8	9	46	
Bachelor's foundation	9	14	14	13	50	
Other	4	13	11	10	38	
Marital status						$\chi^2(9) = 11.15$, $p = .266$, Cramer's $V = 0.143$
Divorced	1	0	0	0	1	
Married	0	0	0	1	1	
Cohabitation	8	8	14	6	36	
Single	28	42	35	40	145	
Living situation						$\chi^2(12) = 11.74$, $p = .467$, Cramer's $V = 0.146$
Partner	7	7	9	6	29	
Parents	2	3	5	2	12	
Shared flat	21	30	25	33	109	
Alone	5	11	9	4	29	
Other	2	0	1	1	4	
Gambling problems (PGSI)						$\chi^2(9) = 9.03$, $p = .435$, Cramer's $V = 0.128$
Non-problem	23	34	30	31	118	
Low risk	8	14	15	15	52	
Moderate risk	5	3	4	1	13	
Problem	1	0	0	0	1	
Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	ANOVA	
Age (years)	21.84 (3.69)	21.82 (2.70)	22.12 (2.91)	22.21 (3.64)	22.01 (3.20)	Range: 18–40; $F(3, 180) = 0.17$, $p = .914$
Working hours (weekly)	5.05 (9.05)	4.71 (7.00)	6.06 (8.65)	5.36 (6.52)	5.30 (7.75)	Range: 0–38; $F(3, 180) = 0.27$, $p = .849$
Gambling loss (past month; NOK)	36.49 (97.64)	44.61 (153.73)	40.51 (167.94)	28.72 (72.79)	37.83 (130.76)	Range: 0–1,100; $F(3, 180) = 0.13$, $p = .943$
Days gambled (past month)	1.62 (5.47)	0.57 (1.19)	0.45 (1.19)	0.51 (1.56)	0.73 (2.73)	Range: 0–30; $F(3, 180) = 1.67$, $p = .176$
Gambling beliefs (GBQ)						
Luck/perseverance	74.46 (12.63)	75.04 (11.53)	76.08 (13.63)	77.20 (11.89)	75.77 (12.38)	Range: 19–91; $F(3, 174) = 0.40$, $p = .756$
Illusion of control	40.41 (10.97)	41.25 (8.59)	41.06 (11.71)	40.36 (10.09)	40.80 (10.27)	Range: 10–56; $F(3, 180) = 0.09$, $p = .966$
Blood alcohol content (mg/L)	0.76^{abd} (0.19)	0.06^{abc} (0.09)	0.71^{bcd} (0.16)	0.07^{acd} (0.09)	0.38 (0.35)	Range: 0–1.15; $F(3, 180) = 362.35$, $p = .000$

Note. IA-GMA: Informed Alcohol-Given Moderate Alcohol; IA-GLA: Informed Alcohol-Given Low Alcohol; IP-GMA: Informed Placebo-Given Moderate Alcohol; IP-GLA: Informed Placebo-Given Low Alcohol; PGSI: Problem Gambling Severity Index; GBQ: Gamblers' Beliefs Questionnaire; NOK: Norwegian Kroner (NOK 1 ≈ US$ 0.2).
Values sharing a superscript on the same row are significantly different ($p = .000$).

7-point Likert scale ranging from “strongly agree” (1) to “strongly disagree” (7). A composite score was computed for each subscale by adding the scores across corresponding items. In this study, Cronbach’s αs were .87 and .86 for luck/perseverance and illusion of control subscales, respectively.

Subjective intoxication. A Visual Analog Scale (VAS; Kushner et al., 1996) was used to assess participants’ degree of intoxication following drink (alcohol or placebo) consumption. Participants indicated their degree of intoxication by placing a mark on a 10-cm line [range: 0 (not at all) to 10 cm (extremely so)]. The distance from 0 mm to a participant’s mark represents his/her VAS score.

Alcohol effects. The Biphasic Alcohol Effects Scale (BAES; Martin, Earleywine, Musty, Perrine, & Swift, 1993) was administered to assess participants’ experiences of the effects of alcohol intake. After beverage consumption, participants indicated the degree to which they feel a set of adjectives applied to them (e.g., elated and, down) on an 11-point scale ranging from “not at all” (0) to “extremely” (10). An index score was computed by adding participants’ scores on all adjectives. In this study, the BAES yielded a Cronbach’s α of .87.

BAC. Following the beverage intake, participants’ BAC was tested using a portable breath alcohol testing equipment: Alcotest 5510 (Dräger, Lübeck, Germany).

Slot simulator. We used the Fat Cat simulation software (Rain Games AS) developed for the University of Bergen’s gambling research purposes. The simulator consists of a video game displayed on a computer screen. It represents a simple slot machine with buttons that can be clicked to place bets, spin the wheel, and terminate a game. A spin lasts 2.8 s. Bets could be varied from 1 to 10 credits and could be reduced or increased by 1 credit increments by pressing a button. It has three parallel reels with a central horizontal payline. Above the reels, a win table is provided, displaying the respective wins for different combinations of matching symbols. Located on both sides of the reels are lights that illuminate as the reels are spinning and when a win is obtained. It also has background noise mimicking a gaming club or casino’s ambiance. The simulator illuminates and plays a lively melody with a win. These effects are absent with a loss. Figure 1 presents a screenshot of the simulator.

Procedure and design

Participants were volunteers recruited primarily during academic lectures at the University of Bergen. The experiment was conducted in a laboratory located at the Faculty of Psychology. When prospective participants arrived in the laboratory, they first completed an informed consent form. Oral confirmation of fasting for about 2 hr prior to arrival in the laboratory was obtained. Females were offered a pregnancy test kit with private rooms for self-testing. Oral confirmation or evidence of a negative pregnancy test on the kit was a prerequisite for further participation in the study.

The amount of alcohol for each participant was calculated using the BAC calculator (Virginia Tech., VA, USA). We used a target BAC of 0.08 g% as the level of intoxication for the moderate alcohol-ingesting conditions as it reliably differentiates between alcohol and placebo effects (Corbin & Cronce, 2007; Fromme, Katz, & D’Amico, 1997). Participants were assigned unique serial numbers and randomized (using www.randomizer.org) to one of the four conditions.

The first condition comprises those *informed* that they were ingesting alcohol and were *given* a moderate amount of alcohol (Informed Alcohol-Given Moderate Alcohol, IA-GMA). Those *informed* that they were ingesting alcohol but were *given* a low amount of alcohol (Informed Alcohol-Given Low Alcohol, IA-GLA) comprised the second condition. Third was those *informed* that they were ingesting a placebo but were *given* a moderate amount of alcohol (Informed Placebo-Given Moderate Alcohol, IP-GMA). The final condition comprised those *informed* that they were ingesting a placebo but were *given* a low amount of alcohol (Informed Placebo-Given Low Alcohol, IP-GLA). They were then allocated laboratory cubicles and completed the first part of the self-report questionnaire that included demographic items, the GBQ, and the PGSI.

While participants completed the baseline questionnaires, drinks were mixed in a room outside the view of both participants and experimenters to blind the participants to the condition (Orne, 1962) and to control for experimenter bias (Rosenthal, 1967). The moderate alcohol beverage contained 45 ml of vodka and 135 ml of tonic water. The low alcohol beverage consisted of 20 ml of gin essence and 150 ml of tonic water. Accordingly, the recipe for the moderate alcohol beverage yielded a drink consisting of approximately 15 ml of alcohol, whereas the low alcohol beverage contained approximately 5 ml of alcohol intended to enhance placebo-information credibility.

After returning the completed questionnaires, participants were served their drinks in disposable cups. They were given a maximum of 20 min to drink their beverages. Each participant’s BAC was tested immediately after beverage intake prior to participating in the simulated gambling task. They were also tested 10 min after beverage intake, and at termination of the gambling task. This procedure resulted in an experimental setup with four different conditions,

Figure 1. Screen display for the Fat Cat slot simulator

based on a 2 × 2 matrix reflecting two between-group factors, each with two levels. Figure 2 presents a framework of the experimental design.

Each laboratory cubicle had a computer with speakers for running the simulation. Each participant was given 200 credits and instructed to play the Fat Cat game for as long as he or she wanted. After playing the game for as many sessions as they wanted, the remaining game credit was registered. Participants then completed the second batch of instruments including the VAS, the BAES, and the BEGS. Debriefing then took place. Participants in the low alcohol-ingesting conditions (IA-GLA and IP-GLA) were informed about the deception and allowed to leave the laboratory.

Participants in the moderate alcohol-ingesting conditions (IA-GMA and IP-GMA) were also informed about the alcohol intake and asked to depart for home advisably using public transport. All participants were informed about their BAC at the debriefing. Prior to testing, participants were informed that they would get to maintain their winnings. After terminating the gambling session, they received Norwegian Kroner (NOK) 150 (≈US$ 17) as compensation for their contribution to the study in addition to their remaining credits in NOK.

Statistical analysis

We relied on BACs from the third measurement (at termination of the gambling task). Using a BAC cutoff score of 0.40 mg/L, six participants in the moderate alcohol conditions (IA-GMA and IP-GMA) displaying unusually low BACs (<0.40 mg/L) were excluded from the analysis. Descriptive statistics were used to determine sample characteristics. Chi-square analysis and one-way between-group analysis of variance (ANOVA) were conducted to examine between-group differences in sample characteristics. The effects of the experiment were analyzed using two-way between-group ANOVA. A previous study has shown an effect size (Cohen's d; Cohen, 1988) for the effect of beverage on, for example, time spent playing of 0.75 (Breslin et al., 1999). Based on this, we estimated that a true effect of at least moderate size ($d = 0.50$) exists, implying a true effect of meaningful magnitude. Thus, an a priori power analysis was conducted based on the G*Power 3.1.7 (Faul, Erdfelder, Buchner, & Lang, 2009). Setting α to .05 (two-tailed), power to .80, and Cohen's d to 0.50 (medium effect size), a minimum of 179 subjects in total were required to detect significant main and interaction effects. Data were analyzed using SPSS version 23.0 (IBM Inc., NY, USA) using a 2 (low vs. moderate alcohol) × 2 [true vs. false (information/expectancy)] design.

Ethics

The study procedures were conducted in line with the Declaration of Helsinki. The Regional Committee for Medical and Health Research Ethics in Western Norway provided ethical approval of the study (2013/119/REK).

RESULTS

Between-group pre-gambling comparison

The four groups did not differ on pre-gambling (demographic variables, subjective intoxication, gambling problems, and alcohol concentration) variables with the exception of BAC [$F(3, 180) = 362.35$; $p = .000$]. Expectedly, the moderate alcohol-ingesting groups (IA-GMA and IP-GMA) displayed higher BAC than the low alcohol-ingesting groups (IA-GLA and IP-GLA) (see Table 1).

Main effect of information/expectancy

There was no significant effect of information/expectancy on subjective intoxication, alcohol effects, number of gambling sessions, bet size, bet size variation, remaining credits, reaction time, and gambling evaluation (see Table 2). These results were robust adjusting for sex.

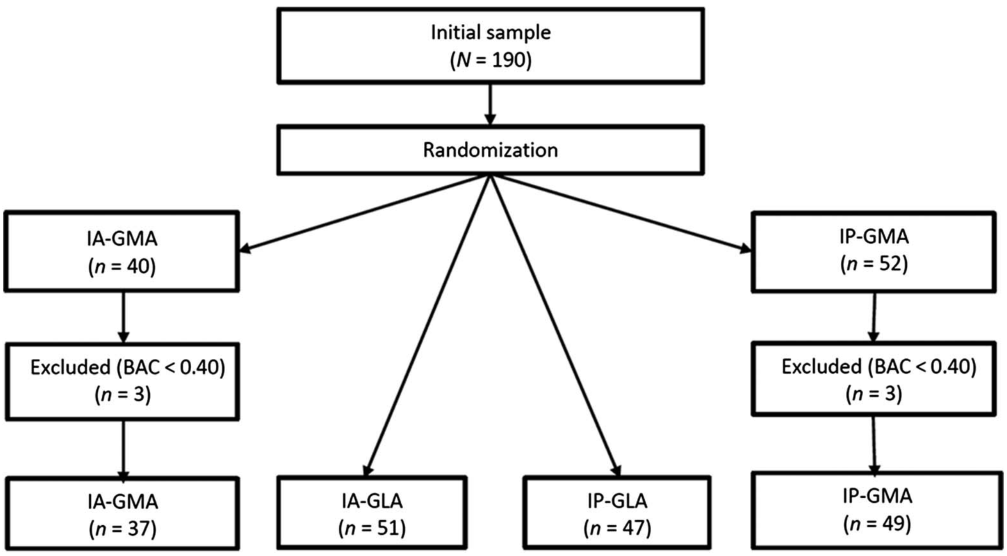

Figure 2. The recruitment and randomization process

Table 2. The effects of information, beverage intake, and their combined effect on study variables

Variable	Range	IA-GMA ($n = 37$) Mean / *SD*	IA-GLA ($n = 51$) Mean / *SD*	IP-GMA ($n = 49$) Mean / *SD*	IP-GLA ($n = 47$) Mean / *SD*	Main effect Information $F(df = 1, 180)$	Main effect Beverage $F(df = 1, 180)$	Interaction effect Information × Beverage $F(df = 1, 180)$
Subjective intoxication (cm)	0–8.7	4.57	2.06	4.24	2.19	0.11[a]	59.70[a,]*	0.61[a]
		2.05	1.95	1.97	1.96			
Alcohol effects (BAES)	3–148	81.46	66.27	81.80	68.81	0.12	11.63*	0.07
		26.06	28.40	28.34	27.90			
Sessions	2–167	67.38	66.63	75.33	71.55	1.11	0.14	0.06
		41.20	37.72	43.66	42.20			
Average bet size	0.50–26.86	4.39	3.71	3.46	3.89	0.71	0.08	1.62
		4.61	1.91	2.57	2.68			
Bet size variation	0–77	16.00	17.20	16.69	17.55	0.04	0.17	0.01
		16.84	17.00	15.60	17.93			
Remaining credits	0–350	122.38	101.55	99.80	110.23	0.33	0.19	1.68
		86.39	82.72	84.10	72.04			
Average reaction time (s)	1.43–166.72	9.73	9.25	12.85	8.03	0.12	0.91	0.61
		19.83	13.32	27.31	9.52			
Gambling evaluation (BEGS)	8–56	29.97	29.16	29.08	28.87	0.11	0.08	0.03
		13.33	11.10	12.32	12.28			

Note. IA-GMA: Informed Alcohol-Given Moderate Alcohol; IA-GLA: Informed Alcohol-Given Low Alcohol; IP-GMA: Informed Placebo-Given Moderate Alcohol; IP-GLA: Informed Placebo-Given Low Alcohol; BAES: Biphasic Alcohol Effects Scale; BEGS: Bergen Evaluation of Games Scale.
[a] $df = 1, 178$.
*$p < .001$.

Main effect of beverage intake

A significant effect of beverage intake was detected for subjective intoxication [$F(1, 178) = 59.70$; $p < .001$] as well as alcohol effects [$F(1, 180) = 11.63$; $p < .001$] as expected. There were no significant effects of beverage intake on the other study variables (see Table 2). The above results were robust controlling for sex.

Interaction effect of information/expectancy and beverage intake

There were no significant interaction effects of information/expectancy and beverage intake on the dependent variables (see Table 2). These results proved robust with adjustment for sex.

DISCUSSION

We conducted an experimental investigation of the effect of beverage intake (low or moderate alcohol) and information/expectancy (alcohol or placebo) on gambling behavior. The moderate alcohol-ingesting groups' display of higher BAC compared with the low alcohol-ingesting groups, as well as the significant main effect of beverage intake on perceived intoxication and alcohol effects are consistent with previous findings (Breslin et al., 1999; Ellery & Stewart, 2014; Gundersen et al., 2008). In addition, the absence of main or interaction effects for gambling persistence, remaining credits at termination, reaction time, and gambling evaluation suggests that alcohol expectancy and intake do not influence the above factors. These results are in contrast to findings from some previous studies (Barrett et al., 2015; Ellery & Stewart, 2014; Ellery et al., 2005; Giacopassi et al., 1998), but in line with findings from others (Breslin et al., 1999; Cronce & Corbin, 2010; Ellery & Stewart, 2014).

Several factors may account for the incongruent findings. First, we compare moderate alcohol intake with low intake rather than a placebo. Theoretically, it is possible that even low alcohol intake affects gambling behavior and that the important behavioral difference exists between moderate alcohol vs. placebo intake, rather than moderate vs. low alcohol intake as observed in this study. Similarly, whereas we used a BAC of 0.08 g% for the moderate alcohol-ingesting conditions, other studies have used differing doses (e.g., 0.06 g%) (Ellery & Stewart, 2014; Ellery et al., 2005). The differences in alcohol dosages administered in previous studies may account for the dissimilarities in findings. Similarly, the paucity, or differences in levels, of expectancy control may also account for the dissimilarities in findings (Ellery & Stewart, 2014) as alcohol expectancy and intoxication produce differing behavioral (Bègue et al., 2013) and neuronal effects (Gundersen et al., 2008).

Between-study differences in sample characteristics may also account for the varying results. Whereas our sample of volunteers comprised novice gamblers (mainly students), other studies have included regular gamblers and alcohol drinkers (Cronce & Corbin 2010), and pathological gamblers (Ellery & Stewart, 2014; Ellery et al., 2005). Again, it is theoretically possible that in student samples, a higher BAC is required to observe any meaningful effect of alcohol intake on gambling behavior. Furthermore, differences in the structural characteristics of simulated gambling tasks, such as the number of paylines (Dixon et al., 2014; Haw, 2008; Livingstone, Woolley, Zazryn, Bakacs, & Shami, 2008), are also a plausible explanation for the dissimilarities in findings.

Strengths, limitations, and future directions

As far as we are aware, this is the first study to examine the effects of alcohol expectancy and use on gambling behavior among novice gamblers. Nonetheless, this study is not precluded from ecological challenges associated with laboratory studies in general and gambling studies in particular, such as the laboratory cubicle-casino ambiance variance and the absence of direct or personal monetary risk or loss (Gainsbury & Blaszczynski, 2011; Lyons, 2006). To enhance ecological validity, future studies in natural gambling environments are recommended. In addition, to reduce the possibility of participant and experimenter bias, we did not include an additional control task or manipulation check (Kidd, 1976). Future studies are encouraged to include other control tasks or manipulation checks to ascertain blindness. Moreover, uniformity of experimental equipment (e.g., simulators) in future studies may facilitate the comparison of experimental findings. Finally, further investigations in this area using diverse methods and samples may provide further elucidation.

CONCLUSION

There is conflicting evidence on the influence of alcohol expectancy and intake on gambling behavior. Our findings show that the expectancy and intake of low or moderate amounts of alcohol do not affect gambling persistence, dissipation of funds, reaction time, and gambling evaluation. Differences between this study and previous ones, such as control for alcohol expectancy, alcohol dosages administered, experimental equipment, and sample type may account for the dissimilarities in findings. Further investigations using diverse methods and samples may provide further elucidation.

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Authors' contribution: SP, RAM, DH, TL, and DS contributed to study concept and design. SP obtained funding. SH and MFG contributed to data collection. DS, TL, and SP contributed to statistical analysis and interpretation of data. SP conducted study supervision. DS, SP, RAM, TL, HM, SH, MFG, and DH contributed to writing.

All authors had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest: The authors declare no conflict of interest.

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