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Crossover Effects of Protective Behavioural Strategies for Drinking on Gambling Consequences Among College Gamblers With Alcohol or Drug Abuse

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Abstract

Protective behavioural strategies (PBS) for drinking are behaviours that individuals engage in to reduce the amount they drink and drinking-related consequences. To date, little is known about associations that PBS might have with other risky behaviours that frequently coincide with drinking, such as gambling. The goal of this study was to examine the associations between three subscales of the Protective Behavioral Strategies Scale (PBSS) and gambling consequences in a college sample of gamblers who also met criteria for alcohol or drug abuse. We hypothesized that engaging in more drinking PBS would be associated with lower levels of gambling consequences. A sample of 316 students (55% female) completed an online survey and met criteria for problematic gambling behaviour (3 or more on the South Oaks Gambling Screen and 1 or more consequences on the Gambling Problem Index). Those endorsing a higher score on the Serious Harm Reduction subscale (but not the Stopping or Limiting Drinking or Manner of Drinking subscales) showed a lower level of lifetime gambling consequences, suggesting a crossover effect. Strategies to reduce serious harm represent a treatment target that could potentially reduce negative consequences associated with both drinking and gambling.

Keywords: gambling, protective behavioural strategies, college students

Résumé

Les personnes aux prises avec des problèmes d'abus d'alcool adoptent des stratégies comportementales de protection pour réduire leur consommation et ses conséquences. À ce jour, on sait peu de choses sur les possibles associations entre ces comportements et d'autres comportements à risque qui coïncident souvent avec l'abus d'alcool, comme le jeu. L'objectif de cette étude était d'examiner les associations entre trois sous-échelles de stratégies comportementales et les conséquences du jeu à l'aide d'un échantillon de joueurs universitaires qui répondaient également aux critères de consommation abusive d'alcool/de drogue. On a émis l'hypothèse que le fait d'adopter des stratégies comportementales à l'égard de la consommation d'alcool diminuerait l'importance des conséquences relatives au jeu. Un échantillon de 316 étudiants sondés en ligne (55% de femmes) a répondu aux critères de comportement de jeu problématique (3 critères ou plus sur le *South Oaks Gambling Screen* [SOGC] et une ou plusieurs conséquences sur l'Indice de jeu excessif [PGSI]). Les personnes qui entrent dans des sous-échelles de réduction importante des méfaits (mais pas les sous-échelles d'arrêt ou de limitation de consommation ou de mode de consommation) ont montré, au fil du temps, une diminution des effets du jeu, ce qui laisse croire à un certain effet de croisement. On aborde dans cet article la portée de cette analyse sur la prévention et l'intervention.

Introduction

Gambling occurs at a high rate on college campuses, with as many as 80% of college students in the United States reporting some gambling experience in their lifetime and 23% reporting gambling on a weekly basis (Barnes, Welte, Hoffman, & Tidwell, 2010; Lesieur & Blume, 1991; Rockey, Beason, Howington, Rockey, & Gilbert, 2005; Winters, Bengston, Door, & Stinchfield, 1998). College is also a period of heightened alcohol use (Wechsler, Lee, Nelson, & Kuo, 2002), and growing research has documented significant co-occurrence of gambling and alcohol use behaviours among college students (Giacopassi, Stitt, & Vandiver, 1998; Hodgins & Racicot, 2013). The relationship between alcohol and impulsivity has been well documented and, not surprisingly (Dick et al., 2010; Pearson, Kite, & Henson, 2012), previous research has indicated that drinking while gambling can increase gambling consequences (Cronce & Corbin, 2010). Interventions aimed at reducing the harm associated with alcohol use (see Carey, Scott-Sheldon, Carey, & DeMartini, 2007 for review) could have a protective effect on gambling outcomes, especially among college gamblers who are affected by substance use problems. However, no study has tested this possibility. To address this gap, we examined whether strategies that students engage in to reduce their risk for problematic drinking are associated with gambling consequences, representing potential “crossover” effects.

Co-occurrence of Gambling and Alcohol Use Behaviours

Both correlational and experimental studies point to significant overlap between gambling and alcohol use behaviours among young adults (Cronce & Corbin, 2010). Data from the National Epidemiologic Survey on Alcohol and Related Conditions indicated that 73% of pathological gamblers also had an alcohol use disorder (Hasin & Grant, 2004). In experimental alcohol administration studies, moderate doses of alcohol have been associated with increased duration of gambling (Ellery, Stewart, & Loba, 2005), greater persistence in the face of progressive losses (Kyngdon & Dickerson, 1999), increased average bet size (Cronce & Corbin, 2010), and shorter latencies between bets, leading to faster loss of funds (Phillips & Ogeil, 2007) and riskier betting behaviour among probable pathological gamblers (Ellery & Stewart, 2014). The exact mechanism underlying the effect of alcohol on gambling behaviour has been less well studied; however, alcohol has been shown to impair decision making as a result of a decreased attention and cognitive processing capacity (e.g., Steele & Josephs, 1990) and a decreased ability to inhibit pre-potent behavioural responses (e.g., Fillmore & Vogel-Sprott, 2000). In theory, impairments in various aspects of cognitive functioning may individually or jointly lead to gambling-related consequences and subsequent psychopathology. For example, gamblers who are cognitively impaired or more impulsive because of the influence of alcohol may be more prone to access additional funds to continue gambling and attempt to recoup losses (i.e., *chasing*). Learning and using drinking protective behavioural strategies (PBS) may reduce the level of cognitive impairment associated with drinking, thereby reducing the negative consequences related to gambling.

Drinking PBS and Gambling Behaviours

Drinking PBS are broadly defined as harm-reduction behaviours used in situations in which individuals drink alcohol within limits, thereby reducing potentially harmful consequences (Martens et al., 2004). Three types of PBS have commonly been examined in the research literature: stopping or limiting drinking (SLD; e.g., planning to not exceed a certain number of drinks), manner of drinking (MOD; e.g., drinking slowly), and serious harm reduction (SHR; e.g., using a designated driver; Martens et al., 2004; Pearson, 2013). Multiple cross-sectional studies have revealed negative associations between general use of PBS and drinking quantity and/or experiencing alcohol-related problems among college students (e.g., Kenney & LaBrie, 2013; Linden, Lau-Barraco, & Milletich, 2013, 2014; Martens et al., 2005; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007). However, when the effects of specific types of PBS are disaggregated, the findings appear to be less consistent (see Pearson, 2013, for review). For example, increased use of SHR strategies has been found to have either no association or a positive association with drinking quantity and both positive and negative associations with drinking problems (Lewis et al., 2012). SLD strategies have been associated with both increased and reduced drinking and problems (Napper, Kenney, Lac, Lewis, & LaBrie, 2014), whereas MOD strategies are inversely associated with both outcomes (Pearson, D'Lima, & Kelley, 2013). These different findings across PBS strategies may be due to the unique motivations

individuals have for engaging in different types of PBS. For example, a student who is already experiencing alcohol-related problems might be more inclined to engage in strategies involving SHR (Lewis et al., 2012). Nonetheless, PBS continue to be examined as a potential protective mechanism for drinking-related problems, and many intervention programs aimed at reducing risky drinking among college students include a PBS component (Larimer & Crouce, 2007).

Few studies have examined drinking PBS in conjunction with other risky behaviours and health outcomes. In a recent study, Gilmore, Stappenbeck, Lewis, Granato, and Kaysen (2015) explored the association between sexual assault history and drinking PBS and found that women who experienced adolescent or adult sexual assault involving incapacitation reported reduced use of all three types of drinking PBS compared with women without such a history. Moreover, women with a history of other types of sexual assaults reported reduced use of the SHR PBS. This study demonstrated initial promise in examining drinking PBS along with other risky behaviours, although such effort has not been extended to the study of gambling behaviours despite the high co-occurrence of gambling and alcohol use among college students. Specifically, most previous studies on alcohol use and gambling behaviours used only traditional measures of drinking behaviour such as quantity of use and did not include drinking PBS (Crouce & Corbin, 2010; Ellery et al., 2005; Kyngdon & Dickerson, 1999). Although recent literature has begun to examine specific protective strategies for gambling behaviours (Lostutter, Lewis, Crouce, Neighbors, & Larimer, 2014), little is known about how other PBS used by students, such as drinking PBS, might also serve as protective factors for gambling. Because drinking PBS has been theorized as an important mechanism that may reduce alcohol use-related harms, greater use of drinking PBS may enable gamblers to be better prepared for situations in which they are likely to engage in impulsive gambling-related decisions under the influence of alcohol.

Scope of the Current Study

The goal of this study was to examine the associations between three types of drinking PBS and gambling consequences in a college sample of gamblers who also met criteria for alcohol or drug abuse. We hypothesized that engaging in more drinking PBS would be associated with lower levels of gambling consequences.

Method

Participants and Procedures

The current sample was taken from a larger study on gambling behaviours among college students who met co-morbid criteria for drug or alcohol abuse. The sampling frame for the larger study included 17,747 randomly selected students at a large West Coast public university located in the United States. Students were recruited between the fall quarter of 2010 and the spring of 2012. Of the 17,747 students invited by email to participate in the research study, 7,028 (40%) completed the screening survey.

This represents a common response rate for studies following similar recruitment procedures (Larimer et. al., 2007; McCabe, Knight, Teter, & Wechsler, 2005; Thombs, Ray-Tomasek, Osborn, & Olds, 2005). Screening measures included demographics and measures of gambling, alcohol or drug use (specifically using a cut-off score to screen in for abuse), and related consequences, but not drinking PBS. Those who scored 3 or more on the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), reported one or more consequences on the Gambling Problem Index (Neighbors, Lostutter, Larimer, & Takushi, 2002), and met abuse criteria for alcohol or drug abuse according to the Alcohol, Smoking, and Substance Involvement Screening Test (WHO ASSIST Working Group, 2002) were eligible for the current study and invited immediately on completing the screening survey to answer questions for the current study. This group of participants who met eligibility criteria were then invited to complete a baseline assessment, which included a drinking PBS measure. This resulted in a final analytic sample of 316 participants in the current study, capturing students who met criteria for both substance abuse and gambling behaviour.

The mean age was 19.94 years ($SD = 1.57$) and 55.1% of participants were female. The ethnic distribution of the sample was 56.5% Caucasian, 28.3% Asian, 1.3% African-American, 8.6% multiracial, and 5.3% identified as other. Students were sent up to eight reminder emails and a phone call to encourage completion. The screening survey took 20-30 minutes to complete and students were paid \$10. All procedures were approved by the university's Institutional Review Board.

Measures

Demographics. Age and sex were assessed at screening. Participants were also asked to classify their gambling behaviour from 0 to 5 where 0 = "I have never gambled in my life" (38.6%), 1 = "I have gambled in the past but I have made the decision not to" (4.5%), 2 = "I infrequently or rarely gamble" (41.7%), 3 = "I am an occasional gambler" (12.0%), 4 = "I am a frequent gambler and my gambling isn't problematic" (2.2%), 5 = "I am a frequent gambler and my gambling might be problematic" (0.9%), and 6 = "I am a frequent gambler and my gambling is problematic" (0.2%).

Screening for substance abuse. The Alcohol, Smoking, and Substance Involvement Screening Test (WHO ASSIST Working Group, 2002) is a well-validated brief screening questionnaire that is often used to detect substance use and abuse problems in the primary care setting. Participants were first presented with a list of substances and were asked to endorse the substance(s) that they have ever used in their lifetime. For each substance endorsed, participants were prompted to report frequencies of urges and usage in the past 3 months and to rate the level of substance use-related problems. Questions assessed the impact of each substance on major responsibilities, the level of concern from others about the use of each substance, and whether the participant has ever tried to quit or cut back use for each substance. A total score was calculated, with higher scores indicating elevated substance use-related risk and impairment. As suggested by previous research on this measure (WHO ASSIST Working Group,

2002), abuse criteria were met for alcohol use with scores above 10 and met for other substances with scores above 4.

Drinking PBS. PBS were assessed by using Martens et al.'s (2005) measure, which contains 18 items comprising three subtypes: Stopping/Limiting Drinking (SLD: seven items), Manner of Drinking (MOD: seven items), and Serious Harm Reduction (SHR: four items). Sample items for the SLD subscale include “determine not to exceed a set number of drinks” and “alternate alcoholic and non-alcoholic drinks.” Sample items for the MOD subscale include “put extra ice in your drink” and “drink slowly, rather than gulp or chug.” Sample items for the SHS subscale include “make sure that you go home with a friend” and “use a designated driver.” Cronbach's α for the overall measure was .86 and the α s for the SLD, MOD, and SHR subscales were .81, .70, and .74, respectively.

Alcohol use. Total drinks per week were assessed by using the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). This questionnaire assesses the typical number of standard drinks (volumes defined as 12 oz. of beer, 10 oz. of microbrew beer, 4 oz. of wine, and 1.5 oz. of 80-proof hard liquor) consumed on each day of a typical week over the last month.

Gambling-related problems. Gambling-related problems were measured in the screening survey by using the Gambling Problem Index (Neighbors et al., 2002). This is a 20-item measure that was developed to assess the severity of gambling problems among college students, with sample questions including “neglected your responsibilities because of gambling” and “tried to cut down or quit gambling.” Participants were asked to respond with the number of times that they have experienced each item, the response options ranging from *never* to *more than ten times*. Participants screened into the study if they positively endorsed any response other than “never” on this measure.

Gambling consequences. Gambling consequences were measured by using the SOGS (Lesieur & Blume, 1987). This screen is a 20-item self-administered questionnaire designed to identify pathological gambling. A score of 5+ on the SOGS has been used to identify probable pathological gamblers, with scores of 3–4 representing at-risk gamblers (Dubé, Freeston, & Ladouceur, 1996). Items were assessed for the past 6 months and for lifetime and included questions about frequency of gambling behaviour, as well as items such as, “Have you felt guilty about the way you gamble or what happens when you gamble?” and “Did you ever claim to be winning money gambling but weren't really? In fact, you lost?” The Cronbach's α for the SOGS in the sample was .82. Only participants with scores of 3 or higher on the screening survey were included in the sample.

Results

Participants reported consuming an average of 18.74 ($SD = 15.59$) drinks per week and reported gambling 20.83 ($SD = 44.90$) times in the past 6 months. Their average

Table 1
Mean, Standard Deviations, and Bivariate Correlations

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Age	19.94	1.57	1.00	0.04**	-0.01	0.11	-0.06	.04**	0.09**	0.06**
2. Sex	0.41	0.50		1.00	-0.01	-0.01	-0.23**	.19**	0.17**	0.12**
3. PBSS – SLD	2.28	0.77			1.00	0.59**	0.40**	-.15*	0.11	0.08
4. PBSS – MOD	2.53	0.63				1.00	0.50**	-.29**	-0.15**	-0.12*
5. PBSS – SHR	3.33	0.83					1.00	-.17**	-0.16**	-0.12*
6. Alcohol use	18.74	15.59						1.00	.29**	.27**
7. SOGS – Lifetime	0.72	1.71							1.00	.86**
8. SOGS – Past 6 months	0.37	1.25								1.00

Note. $n = 315$. PBSS = Protective Behavioral Strategies Scale; SLD = Stopping/Limiting Drinking; MOD = Manner of Drinking; SHR = Serious Harm Reduction; SOGS = South Oaks Gambling Screen.

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

scores on the SOGS were 5.63 ($SD = 2.99$) for lifetime and 3.87 ($SD = 3.02$) for the last 6 months. The average scores for the PBSS subscales were 2.80 ($SD = 0.59$) for MOD, 3.33 ($SD = 0.83$) for SHR, and 2.23 ($SD = 0.74$) for SLD. Of note, these scores are comparable to scores found in the validation study for the PBS (Martens et al., 2007). Bivariate correlations showed that the SHR PBS subscale was inversely associated with both the lifetime SOGS score, $r(314) = -.20$, $p < .01$, and the SOGS score in the past 6 months, $r(314) = -.15$, $p < .05$. The MOD PBS subscale was inversely correlated with the lifetime SOGS score, $r(314) = -.13$, $p < .05$. The SLD PBS subscale was not significantly associated with any SOGS scores.

We used two separate multiple regression models (one for lifetime SOGS and another for SOGS in the past 6 months) to test the hypothesis that drinking PBS are inversely related to gambling consequences. Age, sex, and alcohol use were included as covariates, and the three PBS subscales (SLD, MOD, and SHR) were included as the main predictors. Because of the moderate to high correlations among PBS subscales (see Table 1), we first estimated the two full multiple regression models, and then trimmed the final model by dropping any non-significant predictors. After we controlled for significant covariates, the inverse association between the SHR PBS subscale and the SOGS scores was significant for lifetime SOGS scores and approached significance for SOGS scores in the past 6 months (see Table 2). Contrary to our hypothesis, the PBS subscales SLD and MOD were not related to the SOGS scores. Exploratory follow-up analyses tested whether alcohol use mediated the association between PBS subscales and SOGS scores and none of the mediation effects were significant.

Discussion

The results partially supported our hypotheses in that participants who endorsed a higher level of SHR (but not SLD and MOD) strategies were associated with lower

Table 2
Multiple Regression Model for SHR Predicting South Oaks Gambling Screen (SOGS) Scores for the Past 6 Months and for Lifetime

	SOGS scores for past 6 months					SOGS scores for lifetime				
	<i>b</i>	<i>SE</i>	<i>B</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>B</i>	<i>t</i>	<i>p</i>
Intercept	3.67	1.11		3.32	.00	5.55	1.07		5.21	.00
Sex	0.82	0.43	0.13	1.88	.06	1.13	0.42	0.18	2.73	.00
Alcohol use	0.05	0.02	0.15	2.27	.02	0.05	0.02	0.15	2.24	.03
PBSS – SHR	-0.43	0.25	-0.12	-1.76	.08	-0.52	0.24	-0.15	-2.20	.03

Note. PBSS = Protective Behavioral Strategies Scale; SHR = Serious Harm Reduction.

scores on a lifetime measure of problem gambling. This suggests that there may be some crossover effects of drinking PBS on other risky behaviours such as gambling, although the crossover effects were not equivalent across PBS subscales. Because this sample was obtained by using the baseline data of a study specifically screening for students with a positive history of drinking and gambling, the analytic sample may have a restricted range that reflects a higher risk group than the general student population, as evidenced by their average drink consumption of 18+ drinks per week and overall SOGS scores of 5.63. Thus, students who were able to effectively use drinking PBS to maintain low levels of drinking and gambling consequences may not be fully represented in the current analysis. Of note, the average PBS subscale scores for this sample were comparable to those for samples within the larger college population (Martens et al., 2007). Conversely, students who were engaged in higher levels of drinking may use more drinking PBS to manage their drinking, but the effective use of drinking PBS is conceivably more challenging, given higher levels of alcohol use. Despite these factors, which can attenuate significant associations, the SHR subscale of the PBSS was inversely linked to participants' lifetime gambling consequences, and the parallel association with gambling consequences in the past 6 months also approached significance.

One difference between the SHR and the SLD and MOD PBS is that the SHR strategies can be predetermined, such as planning to go home with a friend, identifying a designated driver, or choosing not to drink, whereas the SLD and MOD strategies tend to be used in the moment, such as alternating alcoholic beverages with water. It is possible that engagement in SHR reflects a higher degree of motivation to avoid negative consequences than does engagement in SLD or MOD, leading to the SHR being the only significant crossover effect for gambling consequences. Alternatively, having a friend or designated driver may increase the chance of peer intervention when participants were at risk for engaging in gambling behaviours, thereby extending a protective effect on gambling consequences. Regardless of the exact mechanism, the current study suggests that implementing harm reduction strategies in one risk area may also impact on other risk areas, which is of particular importance for targeting students who are at elevated risk for multiple

risky behaviours (e.g., drinking and gambling) such as those in this sample. This finding may have implications for clinicians and policymakers alike in deciding how to best use limited time or budgets for cost-effective prevention and intervention. For example, if a clinician has only a very brief session with a college student who has high levels of drinking and gambling, he or she may start with SHR as opposed to SLD or MOD if there is insufficient time to discuss all three types of drinking PBS.

This study has several limitations. First, we used cross-sectional data and so the direction of effects cannot be determined. For example, we cannot rule out the possibility that alcohol use and problematic gambling can influence PBS use. Future research can test this alternative effect or potential bi-directional effects by using prospective data with multiple time points. Second, we used a college student sample and the findings cannot be generalized to other age groups or individuals from the community without replicating the study with those groups. Future studies can expand recruitment to include high-risk community members of different ages, which may provide additional insights into the design of cost-effective prevention and intervention strategies targeting multiple co-occurring risk-taking behaviours. Third, our measures inquired about drinking PBS, alcohol use, and lifetime and past 6-month gambling consequences, which provided initial macro-level associations among these variables. Therefore, respondents' endorsement of drinking PBS may not necessarily refer to the same incident when they engaged in gambling.

Despite these limitations, this study represents an initial attempt to examine crossover effects of drinking PBS on gambling behaviours after controlling for alcohol use. Additional research is needed to understand the micro-level associations between specific PBS usage and engagement in multiple risk-taking behaviours. One possible approach is to use a measurement burst design to collect daily level data to understand the extent to which drinking and gambling co-occur in the same context (e.g., the same evening) and to identify specific mechanisms through which drinking PBS may protect against gambling behaviours (e.g., a specific PBS to reduce problematic alcohol use or gambling). Although our exploratory mediation analyses did not support alcohol use as a mediator, it is important for future research to evaluate these variables longitudinally and to determine whether increased use of PBS may relate to reductions in alcohol use, which in turn leads to reductions in other risky behaviours such as gambling. Moving forward, research could examine the motives behind using specific PBS, as well as mediating mechanisms for crossover effects, to help inform the design of prevention and intervention programs.

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