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A dangerous cocktail: Alcohol consumption increases suicidal ideations among problem gamblers in the general population

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HIGHLIGHTS

- We tested if alcohol consumption increases suicidality among population gamblers.
- Data was obtained from the CCHS Cycle 4.1.
- Alcohol alone did not reliably predict suicidal ideations among low-risk gamblers.
- Greatest odds of suicidality were in problem gamblers who frequently drank alcohol.

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ABSTRACT

The current research examined whether alcohol consumption exacerbates suicidal ideations among gamblers in the general population. While prior research suggests problem gambling severity and excessive alcohol consumption are unique predictors of suicidal behaviors, the extant literature as almost exclusively focused on gamblers in treatment. This represents a significant gap in the literature as less than 10% of gamblers seek treatment. Furthermore, gamblers in treatment are not representative of gamblers in the general population, precluding a simple generalization of research findings. We address this gap using data obtained from the Canadian Community Health Survey (Cycle 4.1) – a cross-sectional national survey that assesses health-related information among the Canadian population. To this end, we conducted a moderation analysis with problem gambling severity as the independent variable, weekly alcohol consumption as the moderator variable and suicidal ideations (in the past 12 months) as the dependent variable. The results found that alcohol consumption alone did not reliably predict suicidal ideation among gamblers who did not gamble problematically. However, as predicted, the odds of suicidal ideation were greatest among problem gamblers who frequently consumed alcohol. Thus, it may behoove policy makers to re-visit the availability of alcohol in gambling venues. Moreover, responsible gambling-oriented education initiatives may be advanced by informing gamblers about the increased risk of suicidal ideations when problematic gambling is combined with frequent alcohol consumption.

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Problem gambling and excessive alcohol consumption share many characteristics. For example, people who gamble excessively and people who consume excessive amounts of alcohol demonstrate higher tolerance than their non-problem counterparts, report withdrawal symptoms in the absence of use, show similar neurological and biological deficits, and experience an array of comparably negative social and psychological outcomes (Błaszczynski, Walker, Sharpe, & Nower, 2008; Leeman & Potenza, 2012; Slutske et al., 2000; Wareham & Potenza, 2010; Wray & Dickerson, 1981). Additionally, the odds of suicide

increase when these disorders co-occur (Newman & Thompson, 2007). This is particularly troubling given the frequent co-occurrence of these disorders in both treatment-seeking gamblers (Crockford & el-Guebaly, 1998) and gamblers in the general populations (Lorains, Cowlshaw, & Thomas, 2011; Petry, Stinson, & Grant, 2005). Consequently, people who engage in both behaviors may be at particular risk for suicidal ideation (and subsequent attempts).

To date, there has been a paucity of research assessing the influence of concurrent gambling and drinking on suicidal ideation. Existing research has found that suicidal ideation is heightened as a result of alcohol consumption among problem gamblers in treatment (e.g. Crockford & el-Guebaly, 1998; Potenza, Steinberg, & Wu, 2005). Much less is known, however, about the relationship between gambling, alcohol consumption and suicidal ideation among gamblers in the general

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population – a population that is known to be different from gamblers in treatment (e.g. Evans & Delfabbro, 2005; Pulford et al., 2009). Understanding whether people who gamble problematically and drink in excess are at increased odds for suicidal ideation may have significant public policy implications. The current research assessed the relationship between drinking and suicidal ideation among gamblers in the general population.

1. Gambling and suicidal ideations

Suicidal ideations (i.e., thoughts of engaging in suicide-related behavior) tend to surface when, among other reasons, people face intense life stressors and lack appropriate coping mechanisms to contend with these stressors (Alberta Health Services, 2009; Leenaars et al., 1998). The risks of suicidal ideations are also increased among those who gamble problematically (Black et al., 2015; Cook et al., 2015; Moghaddam, Yoon, Dickerson, Kim, & Westermeyer, 2015; Petry & Kiluk, 2002). Indeed, rates of suicidal behaviors are high among gamblers in treatment (Australian Productivity Commission, 1999; Ledgerwood, Steinberg, Wu, & Potenza, 2005) as well as gamblers in the general population (Bland, Newman, Orn, & Stebelsky, 1993; Newman & Thompson, 2003). It has been argued (see Battersby, Tolchard, Scurrah, & Thomas, 2006; MacCallum & Blaszczynski, 2003) that the strong association between problem gambling and suicidal ideation is the result of the financial, occupational, and relationship hardships that frequently stem from excessive gambling as well as a pre-occupation with gambling. Such consequences often lead to feelings of hopelessness about the future and a belief that there are no means other than suicide to escape life situations (Lesieur & Custer, 1984; Petry & Kiluk, 2002).

2. Co-morbidity of gambling and alcohol use

Importantly for the present research, U.S. studies have reported that approximately 70% of problem gamblers recruited from treatment centers also meet criteria for alcohol dependence (Cunningham-Williams, Cottler, Compton, Spitznagel, & Ben-Abdallah, 2000), and individuals who gamble problematically are over 20 times more likely to be dependent on alcohol than the general population (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). Alternatively, among adults with substance use disorders, lifetime prevalence of problem gambling is almost 33% (Shaffer & Hall, 2001). The high rates of co-occurrence between problem gambling and excessive drinking may be of particular concern as both uniquely predict suicidal ideations (Newman & Thompson, 2007). In other words, people who gamble and drink in excess may be at an especially high risk of suicidal ideation (see Battersby et al., 2006; Kausch, 2003; Potenza et al., 2005).

The extant literature on the association between gambling and drinking on suicidal ideation, however, has focused almost exclusively on clinical populations. Unfortunately, there is relatively little knowledge on excessive alcohol consumption and its possible influence on suicidal ideation among gamblers in the general population – a rather significant gap in knowledge considering less than 10% of problem gamblers seek treatment for their gambling problems (see Hodgins, Stea, & Grant, 2011). Moreover, there is typically a great deal of time (approximately 5 years) between the moment a gambler experiences her or his first gambling related harm (associated with play) and when they seek treatment (Tavares, Zilberman, Beites, & Gentil, 2001). To the point, there are significant difference between gamblers in treatment and gamblers in the general population that preclude a simple application of findings from the clinical setting to gamblers in the general population.

To put a dark line under the matter, gamblers in treatment differ from gamblers who are not in treatment. For example, problem gamblers in treatment report greater negative consequences as a result of their gambling than gamblers in the general population (Evans & Delfabbro, 2005). These include a significant degradation in financial

power as well as strained family relationships (Evans & Delfabbro, 2005; Pulford et al., 2009; Suurvali, Hodgins, Toneatto, & Cunningham, 2008). Further, Kowatch and Hodgins (2015) found that the more severe the gambling problem, the more likely the gambler was to seek treatment. Indeed, problem gamblers are much more likely to seek treatment when they feel they hit “rock bottom”, which is accompanied by feelings of hopelessness (Evans & Delfabbro, 2005). In other words, problem gamblers in treatment tend to be those facing immense harms as a result of their gambling – more so than gamblers in the general population.

To our knowledge, Hodgins, Mansley, and Thygesen (2006) conducted the only study examining the relationship between gambling, alcohol consumption and suicidal ideation among a non-treatment sample of gamblers. They assessed whether alcohol consumption heightened the risk of suicidal ideation among gamblers recruited from the community. However, they only examined those who met the criteria for problem gambling and who made a quit attempt (i.e., they did not assess gamblers at-risk of developing problems or recreational gamblers). Nonetheless, they found that more than half (51.5%) of the problem gamblers who reported attempting suicide did so while under the influence of alcohol. Thus, there is preliminary support for our contention that alcohol consumption increases the odds of suicidal ideation among problem gamblers in the general population.

3. Overview of the present research

In the current research, we tested whether consumption of alcohol moderates the relationship between problem gambling severity and suicidal ideations (past 12 months). Importantly, we assessed this relationship among a high-risk population – namely participants who reported having ever experienced past suicide attempts. We did so because past suicidal ideations are a potent predictor of future suicidal ideations (Hooper et al., 2015). Data was obtained from the Canadian Community Health Survey (CCHS), a bi-annual cross-sectional national survey that assesses information relating to health status (e.g., mental health and substance use problems) among Canadians. For a detailed description of the sampling procedure and the selection of households, see Statistics Canada (2013).

4. Method

4.1. Sample

The CCHS Cycle 4.1 (2007–2008) contains data from 131,061 Canadians. The CCHS consists of common content (e.g., health utilization; questionnaire modules asked of all participants in all health regions) as well as optional content (e.g., problem gambling severity; questionnaire modules included at the discretion of each health region in Canada). We used this data set because intervening cycles (i.e., cycles between 2007 and 2008 and the time peer-review occurred) did not contain all variables of interest (problem gambling severity, alcohol consumption, and suicidal ideations). It should also be noted that although all participants were Canadian, they all resided in the Province of Ontario. This is because Ontario was the only province (or territory) that opted to collect all variables of interest. Therefore, the sample used in the current research consists of 43,958 residents of Ontario among which 20,371 reported gambling in the past 12 months and 3537 reporting having experienced suicidal ideations in their lifetime.

Of the 20,371 gamblers 1851 reported experiencing suicidal ideation in past year and 1546 participants of these participants completed the measure on alcohol consumption. As such, all subsequent analyses were conducted with the resulting sample of 1546 participants. The sample contained more women (62.8%; $n = 971$) than men (37.2%; $n = 575$). Unfortunately, the CCHS does not ask participants to report their precise age. Instead, they are asked to indicate their age within specified age ranges (which varied in terms of the number of years in

each range). In the interest of brevity, we have further blocked age information into decades (see Table 1 for a summary of the sample's characteristics, including age).

4.2. Measures

4.2.1. Problem gambling severity

Problem gambling severity was assessed using the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI contains items assessing problem gambling behavior (e.g., "have you needed to gamble with larger amounts of money to get the same feeling of excitement?") and consequences of problem gambling (e.g., "have you felt guilty about the way you gamble or what happens when you gamble?"). The PGSI contains nine total items and are anchored on a scale at 0 (never) and 3 (almost always). As such, participant's scores ranged from 0 to a maximum of 27. We kept the scores as a continuous variable (opposed to categorizing the groups) in our moderation analysis.

4.2.2. Daily alcohol consumption

To measure alcohol consumption, participants were first asked, "thinking back over the past week, that is, from [date last week] to yesterday, did you have a drink of beer, wine, liquor, or any other alcohol beverage?" Participants who answered yes were then asked to report the number of drinks consumed for each day of the past week (i.e., "Starting with yesterday, that is [day name], how many drinks did you have on [Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday]?"). To calculate participants' average daily consumption, the CCHS divided total number of drinks in the past week by seven (decimal points were rounded to the nearest whole number).

Table 1

Sample characteristics of gamblers who completed all the variables of interest (gambling, alcohol, and suicidal ideations).

| | N | % |
|--|------|------|
| Total | 1546 | 100 |
| Men | 575 | 37.2 |
| Women | 971 | 62.8 |
| Age | | |
| 15 to 19 years | 86 | 5.5 |
| 20 to 29 years | 267 | 17.3 |
| 30 to 39 years | 307 | 19.9 |
| 40 to 49 years | 335 | 21.7 |
| 50 to 59 years | 325 | 21.0 |
| 60 to 69 years | 147 | 9.5 |
| 70 to 79 years | 61 | 4.0 |
| 80 years or more | 18 | 1.2 |
| Marital status | | |
| Married | 516 | 33.4 |
| Common-law | 165 | 10.7 |
| Widow/sep./divorced | 360 | 23.3 |
| Single/never married | 500 | 32.3 |
| Education level | | |
| Less than secondary | 234 | 15.1 |
| Secondary grad | 252 | 16.3 |
| Other post-secondary | 172 | 11.1 |
| Post-secondary grad | 877 | 56.7 |
| PGSI category | | |
| Non-problem gambler | 1372 | 88.7 |
| Low-risk gambler | 103 | 6.7 |
| Moderate-risk gambler | 41 | 2.7 |
| Problem gambler | 30 | 1.9 |
| Daily alcohol consumption | | |
| 0 | 953 | 61.6 |
| 1 | 332 | 21.5 |
| 5 | 12 | 0.8 |
| 6+ | 33 | 2.1 |
| Suicidal ideations in the past 12 months | 316 | 20.4 |

Note. PGSI = Problem Gambling Severity Index. Categories were derived as follows: 0 (non-problem gambler), 1–2 (low-risk gambler), 3–7 (moderate-risk gambler) and 8+ (problem gambler).

4.2.3. Suicidal ideations (past 12 months)

To assess suicidal ideations, participants were asked, "Have you ever seriously considered suicide or taking your own life?" If participants indicated experiencing suicidal ideations, they were asked whether this had occurred within the past 12 months (yes or no).

4.3. Analytic plan

We first conducted a binary logistic regression with suicidal ideation as the dependent variable and problem gambling severity and daily alcohol consumption entered separately as predictor variables to assess whether problem gambling and alcohol consumption predicted suicidal ideation. Thereafter, problem gambling severity and alcohol consumption were entered simultaneously to assess if the variables of interest predicted suicidal ideations when controlling for each other. Lastly, a moderation analysis was conducted using Hayes and Matthews (2009) MODPROBE macro to determine whether the association between problem gambling severity (predictor) and suicidal ideations (outcome) varies as a function of daily alcohol consumption (moderator). Specifically, we assessed whether problem gambling severity predicts suicidal ideations among participants at low (zero drinks) and high (five drinks) levels of daily alcohol consumption. We chose specific values of our moderator (as opposed to using the traditional ± 1 SD) as the value of one standard deviation was beyond the range of the data (-1.37). More importantly, the values chosen for our moderation analysis had clinical significance. Specifically, zero represented the minimum value of our data set and five indicated participants who engaged in binge drinking on a daily basis. The predictor and moderator were mean centered prior to the analysis.

5. Results

5.1. Binary logistic regression

A binary logistic regression was performed with problem gambling severity and daily alcohol consumption as predictor variables to assess whether gambling severity and alcohol consumption predicted suicidal ideations (See Table 2). The results indicated that daily alcohol significantly predicted suicidal ideations, Wald's $\chi^2(1) = 4.92, p = .027, B = .10, SE = .004, 95\% CI = [1.00, 1.02], OR = 1.01$. However, it did not remain a significant predictor of suicidal ideations when controlling for gambling severity, Wald's $\chi^2(1) = 3.00, p = .084, B = .07, SE = .04, 95\% CI = [.99, 1.16], OR = 1.07$. Conversely, problem gambling severity was a significant predictor of suicidal ideations, Wald's $\chi^2(1) = 12.72, p < .001, B = .09, SE = .02, 95\% CI = [1.04, 1.15], OR = 1.09$ and remained significant when controlling for daily alcohol consumption, Wald's $\chi^2(1) = 8.94, p = .003, B = .08, SE = .03, 95\% CI = [1.03, 1.15], OR = 1.08$. Specifically, higher problem gambling severity resulted in 8% increase in odds of experiencing suicidal ideations.

5.2. Moderation analysis

Next, we conducted a moderation analysis and found a significant interaction between gambling severity and alcohol consumption on suicidal ideation, Wald's $\chi^2 = 5.89, p = .014, B = .08, SE = .03$. Specifically, at low levels of alcohol consumption (i.e., zero drinks) as problem gambling severity increased, so to did the probability of reporting a suicidal ideation, Wald's $\chi^2 = 11.97, p = .001, B = .11, SE = .03, 95\% CI = [.05, .17]$. This was also the case for gamblers at high levels of alcohol consumption, Wald's $\chi^2 = 8.14, p = .004, B = .50, SE = .18, 95\% CI = [.16, .85]$. Importantly, suicidal ideation at low levels of problem gambling severity (PGSI = 0) did not significantly differ as average daily alcohol consumption changed, Wald's $\chi^2 = 2.21, p = .14, B = .06, SE = .04, 95\% CI = [-.02, .14]$. However, at high levels of problem gambling severity (PGSI > 8), Wald's $\chi^2 = 7.05, p = .008, B = .69, SE = .26, 95\% CI = [.18, 1.20]$, the odds of reporting a suicidal ideation

Table 2

A series of binary logistic regressions demonstrating the influence of average daily alcohol consumption, problem gambling severity, and the interaction between average daily alcohol consumption and problem gambling severity on the presence of suicidal ideations.

| Step | Variable | B | SE | Wald's χ^2 | df | p | Exp(B) | 95% CI | |
|------|--|------|------|-----------------|----|-------|--------|--------|-------|
| | | | | | | | | Lower | Upper |
| 1 | Alcohol consumption | .01 | .004 | 4.92 | 1 | .03 | 1.01 | 1.00 | 1.02 |
| 2 | Gambling severity | .09 | .02 | 12.72 | 1 | <.001 | 1.09 | 1.04 | 1.15 |
| 3 | Alcohol consumption | .01 | .006 | 2.59 | 1 | .11 | 1.01 | 1.00 | 1.02 |
| | Gambling severity | .08 | .03 | 8.92 | 1 | .003 | 1.09 | 1.03 | 1.15 |
| 4 | Alcohol consumption | .003 | .007 | .24 | 1 | .63 | 1.00 | .99 | 1.02 |
| | Gambling severity | .04 | .03 | 1.54 | 1 | .22 | 1.04 | .98 | 1.11 |
| | Alcohol consumption \times gambling severity | .01 | .005 | 5.99 | 1 | .01 | 1.01 | 1.00 | 1.02 |

was greatest among those who reported high average daily alcohol consumption (see Fig. 1).

5.3. Supplemental analyses

It is of course possible that other mental health variables may play a role in the presence (or absence) of suicidal ideation. In an aim to reduce endogeneity bias, we reviewed all mental health variables in the data set to see whether any variables could be added as meaningful control variables to address omitted variable bias. To this end, two variables (mood disorders and anxiety disorders) were chosen, as they are known correlates of problem gambling, alcohol consumption, as well as suicidal ideation (Grant et al., 2004; Petry et al., 2005; Rihmer, 2007; Sareen et al., 2005). As such, we re-ran our analyses with these mental health variables as co-variables. Not surprisingly, both mood disorders, $p < .001$, $B = .94$, $SE = .14$, 95% CI = [.66, 1.23], and anxiety disorders, $p = .043$, $B = .32$, $SE = .14$, 95% CI = [.01, .62], were significant predictors of suicidal ideations respectively. Importantly, despite these significant effects, the interaction between problem gambling severity and alcohol consumption on suicidal ideation remained significant, $p = .009$, $B = .01$, $SE = .01$, 95% CI = [.003, .02].

Sex differences in suicidal ideation have also been noted in the literature (Callanan & Davis, 2012; Hawton, 2000). Indeed, women tend to report suicidal ideation more than men (Mościcki, 1994). To test for possible sex effects, we also ran the mediation model with sex as a covariate. Results showed that sex was a significant predictor of suicidal ideations, $p = .016$, $B = -.32$, $SE = .13$, 95% CI = [-.57, -.06]. Importantly, with sex in the equation, the problem gambling severity by alcohol consumption interaction term remained significant, $p = .016$, $B = .01$, $SE = .005$, 95% CI = [.002, .02].

Lastly, to provide a more robust test of the interaction between problem gambling severity and daily alcohol consumption on suicidal ideations, we assessed whether the inclusion/exclusion of our

independent variables had a significant effect on the interaction term. To this end, two separate regressions were conducted. In the first regression, alcohol consumption and the interaction term were regressed on suicidal ideations in the absence of problem gambling severity. In the second regression, problem gambling severity and the interaction term were regressed on suicidal ideations in the absence of alcohol consumption. The results showed that the interaction term remained significant when problem gambling severity was absent from the regression, Wald's $\chi^2 = 11.68$, $p = .001$, $B = .01$, $SE = .004$, 95% CI = [1.01, 1.02]. The interaction term also remained significant when alcohol consumption was absent from the regression, Wald's $\chi^2 = 7.88$, $p = .005$, $B = .01$, $SE = .004$, 95% CI = [1.00, 1.02]. These results provide evidence of the robustness of the hypothesized interaction effect.

6. Discussion

The purpose of the present research was to examine whether alcohol consumption exacerbates suicidal ideations (past 12 months) among gamblers in the general population. The present research expands the existing literature on gambling and suicide by examining the association between problem gambling severity, alcohol consumption and suicidal ideations among a sample of gamblers in the general population and in a high-risk population. The results of the present research suggest that gambling severity uniquely predicted suicidal ideations among gamblers in the general population, even when controlling for the effects of daily alcohol consumption (as well as mood and anxiety disorders). Conversely, daily alcohol consumption did not remain a significant predictor of suicidal ideations when controlling for gambling severity (as well as mood and anxiety disorders). These results suggest that the odds of experiencing suicidal ideations increase as problem gambling becomes more severe. Moreover, alcohol consumption among gamblers high in problem gambling severity further increases the odds of suicidal ideations. However, alcohol consumption does not increase the odds of suicidal ideation among gamblers who are low in problem gambling severity.

6.1. Implications

The results observed in the current research may have implications for how the consequences of gambling and alcohol are explained to the general public. Current educational initiatives on alcohol and gambling have focused predominantly on the effects of alcohol on problematic play (e.g., persistence in the face of loss, betting more than you can afford to lose; Baron & Dickerson, 1999). However, few initiatives have warned gamblers of the personal risks of consuming alcohol. The findings reported herein suggest that it might behoove public health officials to educate gamblers (and problem gamblers more specifically) about the increases risk of suicidal ideations when alcohol consumption is combined with their gambling behavior. Such information may be especially helpful for gamblers who are in the midst of significant financial losses and thus may at greater risk of experiencing suicidal ideations. In a similar light, treatment providers may wish to educate their clients who gamble problematically about the interactive effect of gambling

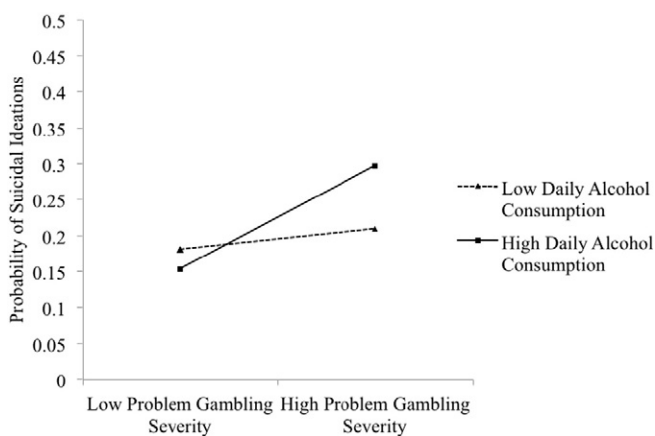


Fig. 1. Simple slopes demonstrating the interaction between problem gambling severity and average daily alcohol consumption on the probability of suicidal ideations in the past 12 months.

and alcohol on suicidal ideation as a means to highlight the gravity of their problems.

Moreover, the results suggest that gambling operators may wish to revisit the issue of alcohol on the gaming floor as well as the presence of gambling games (e.g., electronic gambling machines) in venues that serve alcohol (e.g., bars). Alcohol is ubiquitous on casino floors, with many casinos offering complimentary drinks, in part to keep patrons gambling for longer periods of time. Past research have shown that alcohol leads to an increase in problematic play (i.e., greater financial losses; Ellery, Stewart, & Loba, 2005) and the current findings suggest that problematic gambling combined with alcohol consumption is a dangerous cocktail (at least as it pertained to suicidal ideations). Thus, it may not be advisable to serve alcohol on the gambling floor or provide the opportunity to gamble (e.g., via electronic gambling machines) in drinking establishments given the potential presence of problem gamblers.

6.2. Limitations

Some limitations of the present research should be noted. First, as the aim of the present study was to assess whether alcohol increases the odds of suicidal ideations among gamblers in the general population, the present research cannot speak to causality. That is, it is beyond the scope of the research to determine whether gambling severity and alcohol consumption cause suicidal ideations. Indeed, due to the cross-sectional nature of the design, the results likely suffer from meaningful endogeneity bias. While we attempted to minimize endogeneity bias by controlling for mood and anxiety disorders in our model, there are likely other variables that may have meaningful effects on the relationship between gambling, alcohol and suicidal ideations. Future research would do well to explore such possibilities and more importantly, assess the interaction between gambling and alcohol on suicidal ideations using a prospective design. Given the correlational nature of the results, the findings from the present study should be interpreted with caution.

Second, a portion of the participants in the CCHS survey declined to answer questions regarding their involvement in gambling activities, alcohol consumption and suicidal ideations. The present research cannot determine why participants declined to answer the questions (it is possible they refused due to shame associated with gambling, alcohol, and suicidal ideation; see Wohl & Sztainert, 2011). As such, participants who declined to answer such items may differ systematically from participants who chose to answer the items. This being noted, the nature of the data set and the large sample size in the present research provides sufficient power and confidence in our findings. Third, the present research examined suicidal ideations and not suicidal attempts or suicides. Thus, the results of the present research can only speak to the effects of alcohol on the increased rates of suicidal thoughts among gamblers rather than whether alcohol consumption among gamblers is associated with increased odds of suicide attempts or completed suicides. That said, suicidal ideations are the strongest predictors of attempts (Nock et al., 2008) and thus the results of the present research may have important implications.

Fourth, the majority of the sample (62.8%) consisted of women. Research has noted sex differences in suicidal behaviors (Callanan & Davis, 2012; Hawton, 2000). For example, men are more likely to successfully commit suicide, whereas women are more likely to report suicidal ideations (Mościcki, 1994). Given that the present research only assessed suicidal ideations, the potential implications of the current findings may be especially pertinent for female problem gamblers. That said, the hypothesized moderation model was unaffected when we controlled for sex. Thus, it would appear that the effects of alcohol consumption hold true for both sexes.

Lastly, although the CCHS has numerous strengths (e.g., sampling procedure and general population survey), a survey of this type is limited by how many items can be included on any one topic. For example, a more precise test of our model would have been possible if units of

alcohol per drink were assessed to buttress the daily alcohol consumption measure. It would have also been helpful to have a validated measure of alcohol severity (e.g., the Alcohol Use Disorders Identification Test; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993). This is because the measure included in the survey to assess daily alcohol consumption (i.e., recalled drinking over the past week) may not fully capture participants' drinking habits. Future research assessing the interactive effects of drinking and gambling on suicidal thoughts and behaviors would do well to use more robust measures of these constructs.

7. Conclusion

For some people, gambling can become a problem, leading to an array of physiological, psychological, interpersonal harms — the most severe of which is suicide. Similarly, when alcohol is consumed at problematic levels, a similar series of negative outcomes can occur. Though the literature on gambling and alcohol on suicide is vast, there exists a paucity of research examining the co-morbidity between problem gambling severity, alcohol consumption, and suicide, specifically among gamblers in the general population (who represent the vast majority of gamblers). The results of the research reported herein suggest that alcohol consumption significantly increases the odds of suicidal ideations among problem gamblers. The potential implications should not be understated. Whilst it is possible for gamblers to recover from many of the negative consequences associated with problem gambling, there is no recovery from suicide.

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