Correlates of gambling-related problems among older adults in Ontario

John McCready,[1] Robert E. Mann,[2,3] Jinhui Zhao,[2] & Robert Eves[4]

[1]Healthy Horizons Consulting, 17 Beaufort Road, Toronto, Ontario, M4E 1M6
[2] Department of Public Health Sciences, University of Toronto
[3]Centre for Addiction and Mental Health, Toronto, Ontario
[4]Community Outreach Programs in Addictions (COPA), Toronto, Ontario

Abstract

Although the literature suggests that gambling among older adults is influenced by unique age-related factors, there is little information on the factors associated with the experience of gambling-related problems among older adults. The purpose of this study was to identify the sociodemographic health determinants and mental health-related problems, including alcohol and drug dependence, that are associated with the experience of gambling problems among older adults in Ontario. The research was an exploratory analysis of data from Ontario adults, aged 55 and over, who completed the Canadian Community Health Survey – Mental Health and Well-being, Cycle 1.2 (1,904 males and 2,622 females). Logistic regression analyses were conducted to identify sociodemographic, gambling behaviour, and mental health correlates of the experience of any gambling-related problems, as identified by responses to the Canadian Problem Gambling Index. Being married or living common law and having a higher education level were associated with reduced risk of gambling problems. Among mental health variables, alcohol dependence and any substance dependence significantly increased the odds of reporting a gambling problem. Gambling behaviour measures, such as more frequent gambling, participating in more types of gambling, and spending more on gambling were significant correlates of gambling problems.

Keywords: seniors, older adults, gambling problems, correlates, behavioural factors, sociodemographic factors, mental health factors

Introduction

Some researchers have expressed concern that the older segment of the population, defined here as individuals 55 years of age and older, may be at greater risk of developing gambling-related problems (Korn & Shaffer, 1999; Wiebe, 2002). Many seniors have both the time and the disposable income to gamble, and they may choose gambling as a leisure activity (Munro, Cox-Bishop, McVey, & Munro, 2003). It has been suggested that for older adults with fixed incomes, even small losses can have a significant financial and legal impact (Levens, Dyer, Zubritsky, Knott, & Oslin, 2005). On the other hand, some research studies that have focused on general gambling behaviour in older adults have found that gambling for most older adults is a relatively problem-free recreational activity that provides positive social benefits (Hope & Havir, 2002; Stitt, Giacopassi, & Nichols, 2003; Wiebe, 2000). When older adults in Ontario were asked to identify the benefits of gambling, 33.9% reported that gambling provides a chance for "winning money," 30.7% indicated that it provides "excitement and fun," 29.0% indicated that gambling provides "no benefit," and 20.9% suggested that gambling is an opportunity to "socialize" (Wiebe, Single, Falkowski-Ham, & Mun, 2004).

General population prevalence studies indicate that older adult participation in gambling is lower than that of other adults, but it is clear that the majority of older adults do participate in gambling. Using "a gambling questionnaire," Levens et al. (2005) reported that 69.6% of older primary care patients (over age 65) had participated in at least one gambling activity in the past year. Wiebe et al. (2004) used the Canadian Problem Gambling Index (CPGI) and reported that 83% of adults in Ontario gambled once in the past year and that a similar but somewhat smaller proportion of older adults (73.5%), aged 60 years and older, had participated in some form of gambling in the past 12 months.

Although gambling may be a positive recreational activity for some older adults, it is problematic for a small but significant percentage. Using the South Oaks Gambling Screen – Revised and the NORC DSM-IV Screen for Gambling Problems, Volberg (2003) reported on a survey of 2,750 Arizona residents who were 18 years of age and older. She found that the percentage of problem and probable pathological gamblers in the past year was 2.3% for ages 18 to 34, 2.6% for ages 35 to 54, and 2.1% for ages 55 and over. From a national telephone survey using the Diagnostic Interview Schedule, Welte, Barnes, Wieczorek, Tidwell, and Parker (2002) estimated the overall rate of problem and pathological gambling in the previous year as 3.5%, compared with a rate of 1.2% among residents 61 years of age and older. Schellinck, Schrans, Walsh, and Grace (2002) used the CPGI and conducted a telephone survey of 1,000 New Brunswick adults 55 years of age and older and estimated that 0.6% of the sample could be defined as either a moderate risk or problem gambler in the previous 12 months. Administering the CPGI, Wiebe, Single, and Falkowski-Ham (2001) reported that for Ontario residents aged 60 years and older, an estimated 2.0% experienced moderate problems and 0.1% experienced severe problems in the past 12 months.

Although there is increasing evidence that a subgroup of older adults may be experiencing problems related to gambling, only a small number of studies have assessed factors that might predict gambling problems in that population. A recent review of the literature on older adults and gambling (Munro et al., 2003) found few studies that attempted to identify factors that were associated with problem gambling in older adults. According to Petry (2002), older female gamblers in her study were likely to have begun gambling later in life. Among the treatment-seeking gamblers, slot machine gambling was the most popular form of gambling for the middle and older age groups, particularly for the women. Compared with the middle-aged gamblers, the older gamblers wagered on fewer days, but older female gamblers wagered the greatest amounts in the month prior to treatment entry. Levens et al. (2005) found that at-risk gambling was not significantly associated with gender among older primary care patients. Among the strongest predictors of at-risk gambling behaviour were being a member of a minority race or ethnicity, a patient of a Veterans Affairs clinic, or both. Wiebe et al. (2004) noted that problem gambling among older adults seemed to be associated with more gambling activities, low income, expenditures, and time. They also found that, compared with non-problem older adult gamblers, "at-risk," "moderate problem," and "severe problem" gamblers participated in significantly more casino slot machine or video lottery terminal (VLT) play.

Numerous studies suggest that mental health factors, including substance abuse, are involved in problem gambling. Problem gamblers have been shown to suffer from numerous psychiatric symptoms (Toneatto, 2002). Mental health factors associated with problem gambling include affective disorders, anxiety disorders, depression, suicidal ideation, personality disorders, and substance abuse disorders (Beaudoin & Cox, 1999; Blazczynski & Steel, 1998; Korn, 2000; Raylu & Oei, 2002; Rosenthal, 1992; Specker, Carlson, Edmonson, Johnson, & Marcotte, 1996; Spunt, Dupont, Lesieur, Liberty, & Hunt, 1998; Toneatto, 2002; Toneatto & Millar, 2004). However, little evidence is available on the association of problem gambling with mental health problems in the senior population. Petry (2002), in a sample of treatment-seeking older adults, found that when controlling for gender, older age was associated with fewer alcohol and drug problems. Levens et al. (2005) examined a sample of older adults in primary care clinics and found that the strongest correlates of at-risk gambling behaviour included being a binge drinker and having current post-traumatic stress disorder symptoms. At-risk gambling was not significantly associated with current or past depressive symptoms or cigarette smoking, and at-risk gambling was just as likely to occur among those with mild-to-moderate cognitive impairment as it was among those without impairment.

Although an increasing body of evidence identifies predictors of gambling-related problems in the general population, much less information is available on correlates of gambling problems in the senior population. Nevertheless, there are important indications that gambling problems are present in this age group and may be a particular concern because of the restricted incomes and co-occurring physical and mental health issues that

seniors face. The purpose of this study was to examine the sociodemographic, behavioural, and mental health factors that are associated with the experience of any gambling problems in a sample of older adults in Ontario.

In this study, we have not restricted our consideration to only those who have clinically significant gambling problems, but instead we examined correlates of the experience of *any* problems related to gambling, as has been done by other investigators (e.g., Marshall & Wynne, 2003; Wiebe et al., 2004). Although this approach means that our results will not be specific to correlates of clinically significant gambling problems, it has the benefit of increasing the relevance of this work for early stage understanding and prevention of gambling problems (Korn & Shaffer, 1999).

Methods

Research design

We conducted a cross-sectional analysis of the Ontario segment of the Canadian Community Health Survey – Mental Health and Well-being, Cycle 1.2 (CCHS, Cycle 1.2; Marshall & Wynne, 2003; Statistics Canada, 2003). This large national survey is unique in that it has captured data on gambling and problem gambling by using the CPGI (Ferris & Wynne, 2001; Wynne, 2003), as well as measures of mental health disorders and problems, including alcohol and drug dependence.

Data source

The CCHS, Cycle 1.2, is a cross-sectional survey that collects information related to mental health and well-being for the Canadian population (Statistics Canada, 2003). For the first time, the CCHS, Cycle 1.2 included questions on gambling. The CCHS, Cycle 1.2 targeted persons aged 15 years or older who are living in private dwellings in the 10 provinces. Residents of the three territories, persons living on Indian Reserves or Crown lands, clientele of institutions, full-time members of the Canadian Armed Forces, and residents of certain remote regions were excluded from this survey. The CCHS, Cycle 1.2 covered approximately 98% of the population aged 15 years or older in the 10 provinces. From the Ontario sample of 13,184 personal respondents, all 4,526 respondents aged 55 years and older in Ontario were abstracted for this study. The use of this age limit to identify older adults is consistent with other recent studies (Schellinck et al., 2002; Volberg, 2003), although different ages to define older populations have been used by other investigators (e.g., Wiebe et al., 2001).

The selection strategy was designed to consider user needs, cost, design efficiency, response burden, and operational constraints (Béland, Dufour, & Gravel, 2001). Data collection took place between May 2002 and December 2002, a period of 7 months. The CCHS, Cycle 1.2 questionnaire was administered by using computer-assisted interviewing. A total of 48,047 households in Canada were selected to participate in the

CCHS, Cycle 1.2. Of these selected households, a response was obtained for 41,560, resulting in an overall household-level response rate of 86.5%. Among these responding households, 41,559 individuals (one per household) were selected to participate, from whom a response was obtained for 36,984. This response number resulted in an overall person-level response rate of 89.0%. At the national level, this response rate yielded a combined response rate of 77.0% for the CCHS, Cycle 1.2. The combined response rate in Ontario was 73.4%. Further information on the sampling strategy and characteristics of the sample can be found in Statistics Canada reports (Statistics Canada, 2003). The measures of gambling and problem gambling were drawn from the CPGI (Ferris & Wynne, 2001; Wynne, 2003). For the first time, the CCHS, Cycle 1.2 included the CPGI and produced the first national gambling and problem gambling survey data. Participants were asked how often in the past year they had participated in 13 types of gambling activities (instant win or scratch tickets, lottery tickets, bingo, card games or board games, VLTs outside of casinos, video lottery or slot machines at casinos, participation in other casino gambling, Internet or arcade gambling, horse racing on or off track, sports lotteries, speculative investments, games of skill, and any other forms of gambling). The response options for gambling frequency were (1) daily, (2) between 2 and 6 times per week, (3) about once a week, (4) between 2 and 3 times a month, (5) about once a month, (6) between 6 and 11 times a year, (7) between 1 and 5 times a year, and (8) never, don't know, or refused. The number of different types of gambling activities in which the respondent participated was coded into four categories: one or two, three, four, or five or more.

The amount of money spent on gambling activities was assessed by a question that asked: "In the past 12 months, how much money, not including winnings, did you spend on all of your gambling activities?" The response choices were: "$1-50," "$51-100," "$101-250," "$251-500," "$501-1,000," and "more than $1,000." The ratio of the amount of money spent on gambling activities to household income was derived from the amount of money spent on gambling activities and total household income. The ratio was classified into three categories: less than 1%, 1% but less than 2%, and 2% or more.

Problems with gambling were assessed with the CPGI (Ferris & Wynne, 2001; Wynne, 2003). The CPGI includes nine questions that assess two domains of problem gambling: (a) problem gambling behaviour and (b) consequences of that behaviour for the individual or others. These nine questions are referred to as the Problem Gambling Severity Index (PGSI) and they are scored to determine problem gambling severity. Each question on the PGSI has four response options: never = 0; sometimes = 1; most of the time = 2; and almost always = 3.

The experience of any gambling problems was assessed on the basis of responses to the PGSI. In the analyses reported here, measures of gambling problems were recoded to form a measure of "any gambling problem," defined as experiencing any problem resulting from gambling. Any individual receiving a score of 1 or more on the PGSI fell

into this group, whereas those with scores of 0 were considered gamblers who reported no gambling-related problems in the analysis.

Demographic variables included in this study were health region, age, sex, marital status, education level completed, country of birth, immigration status, employment status over the past year, and income in the past year. Household income was grouped into one of four categories on the basis of total household income and the number of people living in the household:

1. Lowest income included a household income of less than $15,000 for one or two people, less than $20,000 for three or four people, and less than 30,000 for five or more people.
2. Lower middle income included a household income of $15,000 to $29,999 for one or two people, $20,000 to $39,999 for three or four people, and $30,000 to $59,999 for five or more people.
3. Upper middle income included a household income of $30,000 to $59,999 for one or two people, $40,000 to $79,999 for three or four people, and $60,000 to $79,999 for five or more people.
4. Highest income included a household income of more than $60,000 for one or two people and more than $80,000 for three or more people.

The mental disorders, conditions, or problems included in the CCHS, Cycle 1.2 were derived from the *Diagnostic and Statistical Manual of Mental Disorders*, third revised and fourth editions (DSM-III-R and DSM-IV) developed by the American Psychiatric Association (1987 and 1994, respectively). The derived variables in this analysis are summary measures indicating the presence in the previous 12 months of the following problems: major depressive disorder, suicide thoughts, mania disorder, panic disorder, social phobia, agoraphobia, any selected disorder (whether or not the respondent experienced any of the mental disorders in the past 12 months assessed by the CCHS), any mood disorder, any anxiety disorder, any substance dependence, alcohol dependence, and any eating disorder.

Statistical analyses were completed by using SPSS software (Version 12). Analyses were performed on the weighted data so that the estimates produced from survey data were representative of the population. This method was necessary because the CCHS, Cycle 1.2 is based on a complex design, with stratification, multiple stages of selection, and unequal probabilities of selection of respondents. The weight variable in the CCHS, Cycle 1.2 public file was rescaled so that the average weight was equal to 1. This rescaled weight was used for the analyses.

Logistic regression analysis provided odds ratios and 95% confidence intervals (CIs) as estimates of relative risk of any gambling and gambling problem for demographic and mental health variables while adjusting for the potential confounding effects of age and sex (Hosmer & Lemeshow, 2000; Kleinbaum, 1994). For these analyses, non-gamblers

and gamblers for whom data were missing were excluded, leaving a total sample of 2,177 gamblers for analysis. All statistical tests were two-tailed. Results were considered significant at $p \leq .05$. Model fit was evaluated using the model chi-square (Hosmer & Lemeshow, 2000; Pampel, 2000).

Results

Table 1 presents the demographic characteristics of the sample. As can be seen, the Toronto region accounted for the largest proportion of the sample at 20.4%, and the Northern region contributed the smallest proportion at 8.1%. Slightly more than half (53.7%) of the sample was female. Most of the sample (68%) was married and most were not immigrants. About one third of the sample had less than secondary education, almost 40% had some form of post-secondary education, and about one fourth had secondary school or some post-secondary education. About one third had a job in the past year, and over half reported not being employed. About 10% fell into the low income category, 62.4% fell in the two middle income categories, and almost 30% fell into the highest income category.

The large majority of gamblers reported experiencing no problems resulting from gambling. Among the 2,177 gamblers who provided a valid response to the PGSI, a total of 151, or 6.9%, reported experiencing any problems related to gambling. The relationships between demographic factors and the experience of any gambling problem among senior gamblers aged 55 years and older is summarized in Table 2. The demographic measures included were age, sex, health region, education, marital status, employment status, household income, country of birth, and immigrant status. Simple odds ratios are reported, followed by odds ratios adjusted for age and sex (except for the analyses for age, which controlled for sex only, and for sex, which controlled for age only). Here, non-gamblers and gamblers with missing gambling problem data were not included in the analyses. Thus, the sample size available for these analyses was reduced in comparison to the previous analyses of gambling behaviours.

No significant influence of age, sex, health region, job status, household income, country of birth, and immigrant status was observed. There was a significant association between education and any gambling problem ($\chi^2_{(3df)} = 15.90$, $p < .001$). The prevalence of experiencing any gambling problem was 9.2% among those with less than secondary school education, 5.4% among those with secondary school education, 3.8% among those with some post-secondary school education, and 4.3% among those with post-secondary school education. The adjusted odds ratios of experiencing any gambling problem suggested that there was a 51% lower risk of gambling problems among seniors with secondary school education than among seniors with less than secondary school education. There was also a 63% lower risk of experiencing any gambling problem among seniors with some post-secondary school education and those with post-secondary school education than among seniors with less than secondary school education.

Married gamblers were less likely to report gambling problems (5.3%), whereas single gamblers were more likely than the other groups to have experienced gambling problems (10.4%). Although the chi-square analysis did not suggest a significant association between marital status and gambling problem ($\chi^2_{(3df)} = 5.58$, $p = .134$), the adjusted odds ratio of 1.75 (95% CI: 1.09-2.80) and 2.18 (95% CI: 1.02-4.65) of experiencing any

Table 1

Demographic characteristics of Ontario senior adults aged 55 years or older in the CCHS 1.2 sample, 2002 (total n = 4,526)

Characteristics	N[a]	%[b]
Health region		
South West	640	13.3
Central South	608	10.4
Central West	641	15.1
Central East	648	17.9
Toronto	652	20.4
East Ontario	677	14.9
North Ontario	660	8.1
Sex		
Male	1904	46.3
Female	2622	53.7
Marital status		
Married	2371	68.0
Common-law	89	2.3
Widowed/separated/divorced	1795	4.8
Single	265	4.4
Immigrant status		
Yes	1282	36.3
No	3209	63.7
Education		
Less than secondary school	1721	35.3
Secondary school	807	19.0
Other post-secondary	295	6.4
Post-secondary	1675	39.3
Job status over past year		
Job throughout past year	915	32.6
Without job	2022	56.8
Had job part of year	315	10.5
Total household income		
Lowest income	601	9.5
Lower middle income	1139	24.5
Upper middle income	1440	37.9
Highest income	876	28.2

[a]*N* is the number of unweighted cases, and sample size for some variables does not total full sample size due to exclusion of data with missing values. [b]Percentage is calculated based on weighted cases.

Table 2
Demographic measures and experiencing gambling problems among senior gamblers aged 55 years and older in Ontario, 2002 (n=2,177)

Demographic variable	*N* [a]	% [b,c]	Unadjusted OR (95% CI) [b]	Adjusted OR (95% CI) [b,d]
Age group				
55-59	491	6.8	1.00	1.00
60-64	466	8.3	1.22 (0.74-2.02)	1.23 (0.74-2.03)
65-69	373	6.0	0.85 (0.47-1.53)	0.85 (0.47-1.53)
70-74	359	4.8	0.70 (0.36-1.33)	0.70 (0.36-1.33)
75-79	252	3.2	0.43 (0.17-1.07)	0.42 (0.17-1.07)
80+	236	5.0	0.74 (0.32-1.70)	0.74 (0.32-1.70)
Sex				
Male	915	7.7	1.00	1.00
Female	1262	6.4	0.97 (0.66-1.43)	1.02 (0.69-1.50)
Health region				
South West	291	6.2	1.00	1.00
Central South	284	8.4	1.32 (0.64-2.71)	1.29 (0.62-2.66)
Central West	294	5.8	0.89 (0.42-1.86)	0.87 (0.41-1.84)
Central East	318	4.8	0.76 (0.37-1.58)	0.72 (0.34-1.50)
Toronto	306	5.4	0.85 (0.43-1.69)	0.86 (0.43-1.69)
East Ontario	343	4.7	0.74 (0.35-1.58)	0.71 (0.33-1.52)
North Ontario	341	9.6	1.56 (0.75-3.25)	1.51 (0.72-3.16)
Education**				
Less than secondary school	806	9.2	1.00	1.00
Secondary school	398	5.4	0.56 (0.33-0.95)*	0.49 (0.20-0.84)*
Other post-secondary	154	3.8	0.42 (0.17-1.05)	0.37 (0.15-0.94)*
Post-secondary	807	4.3	0.43 (0.27-0.69)***	0.37 90.23-0.59)***
Marital status				
Married	1200	5.3	1.00	1.00
Common-law	52	7.7	1.52 (0.53-4.30)	1.48 (0.52-4.22)
Widowed/separated/divorced	798	7.5	1.44 (0.92-2.23)	1.75 (1.09-2.80)*
Single	124	10.4	2.19 (1.03-4.67)*	2.18 (1.02-4.65)*
Job status over past year				
Job throughout past year	487	7.2	1.00	1.00
Without job	1001	5.7	0.77 (0.49-1.20)	0.80 (0.48-1.35)
Had job part of year	189	9.0	1.22 (0.66-2.27)	1.20 (0.64-2.24)
Household income				
No income/less than $15,000	589	6.7	1.00	1.00
$15,000-30,000	636	7.9	1.21 (0.75-1.95)	1.23 (0.75-1.99)
$30,000-49,999	420	4.3	0.64 (0.34-1.18)	0.56 (0.29-1.06)
$50,000-79,999	234	7.7	1.15 (0.62-2.15)	1.01 (0.52-1.98)
$80,000+	120	2.5	0.31 (0.08-1.41)	0.27 (0.07-1.00)
Country of birth				
Canada	1605	6.9	1.00	1.00
Other	558	4.7	0.67 (0.43-1.03)	0.68 (0.44-1.06)
Immigrant				
Yes	553	4.6	1.00	1.00
No	1612	6.8	1.49 (0.96-2.30)	1.46 (0.94-2.27)

[a]*N* = # of unweighted cases. [b]Calculated on the basis of weighted cases; CI=conf. interval; OR=odds ratio. [c]Percentage experiencing any gambling problem. [d]Adjusted for age & sex. Note: χ^2 or Wald test: *p <.05. **p <.01. ***p <.001.

gambling problem for marital status suggested that there was a 75% higher risk of experiencing any gambling problem among widowed, separated, or divorced gamblers and a 118% higher risk of experiencing any gambling problem among single gamblers compared with married gamblers.

We examined the impact of several different measures of gambling behaviour or involvement in gambling behaviour on the likelihood of experiencing any gambling problems. Table 3 presents the impact of participating in various types of gambling behaviour on the experience of any gambling problems. For these analyses, we were able also to look at the frequency of participation in gambling behaviours for those which were most common.

Instant win tickets, lottery tickets, bingo, cards or board games, and VLTs at casinos were the gambling types most engaged in within Ontario. A significant relationship was found between experiencing any gambling problem and instant win tickets ($\chi^2_{(4df)} = 43.05$, $p < .001$), lottery tickets ($\chi^2_{(4df)} = 54.71$, $p < .001$), bingo ($\chi^2_{(2df)} = 80.78$, $p < .001$), cards or board games ($\chi^2_{(2df)} = 21.50$, $p < .001$), and VLTs at casinos ($\chi^2_{(2df)} = 156.26$, $p < .001$). In comparison to gamblers who reported no participation in the specific gambling activity, significantly higher rates of experiencing any gambling problem were seen among those who reported spending money on instant win tickets at least once a month or more often, purchasing lottery tickets at least once per week or more often, and playing VLTs at casinos at least once per month or more often, after controlling for age and sex. The risk of experiencing any gambling problem among seniors also increased with increasing frequency of each of these types of gambling. Also, in comparison to gamblers who reported no participation in the specific gambling activity, significantly higher rates of experiencing any gambling problem were seen among those who reported playing bingo at least once per month or more often, and those who reported playing cards or board games at least once per month or more often. One noteworthy observation was that gamblers who reported playing VLTs at casinos at least once per month, in comparison with gamblers who reported no participation in VLTS at casinos, were 29.27 times more likely to report experiencing one or more problems related to gambling.

There were also significantly higher rates of experiencing any gambling problem among those who spent money on VLTs outside casinos ($\chi^2_{(1df)} = 11.43$, $p < .001$), other games at casinos ($\chi^2_{(1df)} = 47.94$, $p < .001$), live horse racing ($\chi^2_{(1df)} = 34.83$, $p < .001$), sports lotteries ($\chi^2_{(1df)} = 10.44$, $p < .001$), and other forms of gambling ($\chi^2_{(1df)} = 5.65$, $p = .017$). However, there was not a significant relationship between experiencing any gambling problem and Internet or arcade gambling ($\chi^2_{(1df)} = 0.81$, $p = .366$), speculative investments ($\chi^2_{(1df)} = 0.00$, $p = .993$), and games of skill such as pool, golf, bowling, or darts ($\chi^2_{(1df)} = 1.01$, $p = .313$).

The values of the adjusted odds ratios of any gambling problem for the less frequent types of gambling suggested that there was a 271% higher risk of experiencing any

Table 3
Frequency of gambling activities and experiencing any gambling problem among senior gamblers aged 55 and over in Ontario, 2002 (n=2,177)

Type of gambling	*N*[a]	%[b,c]	Unadjusted OR (95% CI)[b]	Adjusted OR (95% CI)[b,d]
Instant win tickets ***				
Never	1203	4.5	1.00	1.00
1 to 11 times per year	450	3.4	0.72 (0.38-1.36)	0.71 (0.37-1.35)
1 to 3 times per month	216	10.8	2.57 (1.44-4.56)**	2.50 (1.40-4.45)**
1 time per week	194	11.4	2.72 (1.54-4.77)***	2.74 (1.55-4.83)***
2 times or more per week	113	16.1	3.99 (2.21-7.20)***	4.06 (2.22-7.41)***
Lottery tickets ***				
Never	351	4.0	1.00	1.00
1 to 11 times per year	776	2.9	0.74 (0.35-1.57)	0.71 (0.34-1.51)
1 to 3 times per month	307	4.3	1.14 (0.49-2.63)	1.12 (0.48-2.61)
1 time per week	460	8.6	2.34 (1.17-4.67)*	2.42 (1.20-4.87)*
2 times or more per week	283	14.9	4.33 (2.19-8.55)***	4.42 (2.21-8.86)***
Bingo ***				
Never	1902	4.8	1.00	1.00
1 to 11 times per year	119	6.0	1.24 (0.48-3.17)	1.30 (0.50-3.34)
Once per month or more	156	26.2	7.08 (4.35-11.52)***	7.94 (4.79-13.17)***
Cards/board games ***				
Never	1903	5.3	1.00	1.00
1 to 11 times per year	160	9.6	1.83 (0.95-3.40)	1.78 (0.96-3.33)
Once per month or more	114	16.9	3.60 (1.94-6.67)***	4.26 (2.26-8.05)***
VLTs at casinos ***				
Never	1354	2.7	1.00	1.00
1 to 11 times per year	766	9.6	3.91 (2.51-6.09)***	3.85 (2.47-6.02)***
Once per month or more	57	45.5	30.33 (15.10-60.91)***	29.27 (14.50-59.09)***
VLTs outside casinos ***				
Never	2125	5.8	1.00	1.00
At least once	52	18.2	3.55 (1.59-7.89)***	3.71 (1.65-8.36)**
Other games at casinos ***				
Never	2064	5.1	1.00	1.00
At least once	113	22.2	5.37 (3.20-9.01)***	5.41 (3.18-9.20)***
Internet/arcade gambling				
Never	2169	6.1	1.00	1.00
At least once	8	14.3	1.55 (0.11-20.41)	1.33 (0.10-17.62)
Live horse racing ***				
Never	2000	5.1	1.00	1.00
At least once	176	16.8	3.70 (2.31-5.92)***	3.70 (2.31-5.95)***
Sports lotteries ***				
Never	2116	5.8	1.00	1.00
At least once	61	15.6	3.04 (1.50-6.15)**	2.82 (1.35-5.86)**
Speculative investments				
Never	2049	6.1	1.00	1.00
At least once	125	6.1	0.98 (0.46-2.07)	0.92 (0.43-1.96)
Games of skill				
Never	2102	6.0	1.00	1.00
At least once	75	9.0	1.62 (0.69-3.77)	1.63 (0.69-3.84)
Other forms of gambling **				
Never	2087	5.8	1.00	1.00
At least once	90	12.2	2.36 (1.20-4.66)*	2.16 (1.10-4.31)*

[a]*N* = # of unweighted cases. [b]Calculated on the basis of weighted cases; CI=conf. interval; OR=odds ratio. [c]Percentage experiencing any gambling problem. [d]Adjusted for age & sex. Note: χ^2 or Wald test: *p <.05. **p <.01. ***p <.001.

gambling problem among senior gamblers who spent money on VLTs outside casinos, a 441% higher risk on other games at casinos, a 270% higher risk on live horse racing, a 182% higher risk on sports lotteries, and a 116% higher risk on other forms of gambling at least once in the past year than that among those who did not spend money on VLTs outside casinos, other games at casinos, live horse racing, sports lotteries, and other forms of gambling. The unadjusted and adjusted odds ratios provided similar results for these gambling behaviours.

Table 4 presents the relationship between experiencing any gambling problem and numbers of gambling activities reported, money spent on gambling, and proportion of income spent on gambling. A significant association was found between experiencing any gambling problem and the number of different types of gambling activities among senior gamblers in Ontario ($\chi^2_{(1df)} = 129.68$, $p < .001$).

Table 4
Number of gambling activities, money spent on gambling, percentage of household income spent on gambling, and experiencing any gambling problems among senior gamblers aged 55 years and older in Ontario, 2002 (n=2177)

	N[a]	%[b,c]	Unadjusted OR (95% CI)[b]	Adjusted OR (95% CI)[b,d]
Number of gambling activities* **				
One to two types	1453	1.8	1.00	1.00
Three types	380	12.3	7.86 (4.59-13.46)***	7.64 (4.45-13.10)***
Four types	183	16.9	11.15 (6.12-20.31)***	11.08 (6.07-20.23)***
Five or more types	156	18.7	12.69 (6.91-23.29)***	12.08 (6.54-22.30)***
Money spent on gambling* **				
$1 to $50	286	0.9	1.00	1.00
$51 to $100	259	2.2	2.18 (0.41-11.57)	2.26 (0.42-12.03)
$101 to $250	319	3.2	3.31 (0.75-14.65)	3.59 (0.81-15.94)
$251 to $500	221	10.4	11.49 (2.80-47.06)**	14.29 (3.64-59.05)***
$501 to $1000	152	22.1	28.54 (7.08-114.97)***	36.87 (9.03-150.54)***
>$1000	144	37.3	60.24 (15.17-239.14)***	74.34 (18.39-298.82)***
Percentage income spent on gambling* **				
Less than 1%	882	3.7	1.00	1.00
1% to less than 2%	191	20.5	6.57 (3.84-11.25)***	7.41 (4.27-12.84)***
2% or more	192	34.1	13.32 (7.87-22.54)***	15.86 (9.17-27.44)***

[a]*N* = # of unweighted cases. [b]Calculated on the basis of weighted cases; CI=conf. interval; OR=odds ratio. [c]Percentage experiencing any gambling problem. [d]Adjusted for age & sex. Note: χ^2 or Wald test: *p <.05. **p <.01. ***p <.001.

The rate of experiencing any gambling problem increased with the number of gambling activities from 1.8% for those who played one to two types, 12.3% for those who played three types, 16.9% for those who played four types, and 18.7% for those who played five or more types. The adjusted odds ratios of experiencing any gambling problem suggested that seniors who participated in three, four, or five or more types of gambling were 7.64 times, 11.08 times, and 12.08 times, respectively, more likely to report experiencing any gambling-related problem than were those who participated in one or two types of gambling.

A significant association was found between experiencing any gambling problem and amount of money spent on gambling activities ($\chi^2_{(5df)} = 177.09$, $p < .001$). The adjusted odds ratios indicated that senior gamblers spending $251 to $500, $501 to $1000, and more than $1000 experienced any gambling problem 14.29 times, 36.87 times, and 74.34 times, respectively, as much as those who spent $1 to $50 on gambling. Similarly, a significant association was found between experiencing any gambling problem and percentage of total household income spent on gambling ($\chi^2_{(1df)} = 134.85$, $p < .001$). The adjusted odds ratios suggested that senior gamblers who spent 1% but less than 2% of their total household income on gambling and those who spent 2% or more of their total household income on gambling experienced any gambling problems 7.41 times and 15.86 times, respectively, as much as those who spent less than 1% of their total household income on gambling.

We examined the relationship between experiencing any gambling problem and 12-month mental health measures (see Table 5). No significant association was found between experiencing any gambling problem and experience of major depressive disorder, suicidal thoughts, social anxiety, any selected disorder, any mood disorder, any anxiety disorder, and any eating disorder. Not enough cases were found for analyses of mania disorder, panic disorder, or agoraphobia. A significant association was found between experiencing any gambling problem and any substance dependence ($\chi^2_{(1df)} = 7.79$, $p < .05$) and alcohol dependence ($\chi^2_{(1df)} = 11.44$, $p < .001$). The adjusted odds ratio of 6.51 (95% CI: 1.13-37.36) for experiencing any gambling problem with any substance dependence suggested that there was a significantly higher risk of experiencing any gambling problem among those who met the criteria for any substance dependence than among those who failed to meet the criteria. The adjusted odds ratio of 3.88 (95% CI: 1.65-9.10) for experiencing any gambling problem with alcohol dependence suggested that there was a significantly higher risk of experiencing any gambling problems among those who met the criteria for alcohol dependence than among those who failed to meet the criteria. Thus, whereas alcohol and substance abuse problems were strong correlates of gambling problems, other mental health problems were not in these analyses. However, it is important to note here that for many of these mental health problems, the small number of cases restricts confidence in the results.

Table 5
Mental health problems (past 12 months) and experiencing any gambling problem among senior adults aged 55 years and older in Ontario, 2002 (n=2,177)

Mental health problem	*N*[a]	%[b,c]	Unadjusted OR (95% CI)[b]	Adjusted OR (95% CI)[b,d]
Major depressive disorder				
No	2107	6.0	1.00	1.00
Yes	61	9.3	1.53 (0.59-4.00)	1.53 (0.58-4.01)
Suicidal thought				
No	2131	6.0	1.00	1.00
Yes	45	8.6	1.52 (0.47-4.91)	1.52 (0.47-4.94)
Social anxiety				
No	2128	6.1	1.00	1.00
Yes	31	7.7	1.15 (0.25-5.30)	1.15 (0.25-5.30)
Any selected disorder				
No	1961	5.9	1.00	1.00
Yes	114	8.8	1.59 (0.78-3.22)	1.54 (0.75-3.13)
Any mood disorder				
No	2097	6.0	1.00	1.00
Yes	64	8.9	1.59 (0.63-3.99)	1.58 (0.62-3.97)
Any anxiety disorder				
No	2038	6.1	1.00	1.00
Yes	53	3.6	0.59 (0.14-2.41)	0.55 (0.13-2.24)
Any substance dependence**				
No	2157	6.0	1.00	1.00
Yes	9	33.3	7.52 (1.33-42.51)*	6.51 (1.13-37.36)*
Eating disorder				
No	2140	6.0	1.00	1.00
Yes	30	13.8	2.49 (0.85-7.29)	2.31 (0.78-6.85)
Alcohol dependence**				
No	2122	5.8	1.00	1.00
Yes	46	19.4	4.06 (1.76-9.36)***	3.88 (1.65-9.10)**

[a]*N* = # of unweighted cases. [b]Calculated on the basis of weighted cases; CI=conf. interval; OR=odds ratio. [c]Percentage experiencing any gambling problem. [d]Adjusted for age & sex. Note: χ^2 or Wald test: *p <.05. **p <.01. ***p <.001.

Discussion

The results of this work provide some valuable perspectives on the experience of gambling problems among Ontario seniors. Two demographic factors had a significant impact on the risk of experiencing any gambling problems after controlling for age and gender in logistic regression analyses. For marital status, singles and those who were widowed, separated, or divorced had moderately larger odds ratios compared with those who were married. We find it interesting that other studies have found conflicting evidence on the effects of this variable (McNeilly & Burke, 2000; Zaranek & Chapleski, 2005). Increasing education was associated with lower risks of experiencing any gambling problems. A growing body of evidence indicates that a variety of health

problems have important social determinants. For example, life expectancy is related to education, family resources, and so on (e.g., Evans, Barer, & Marmor, 1994; Frank & Mustard, 1994). Our data suggest that the experience of gambling problems among seniors, like other areas of health, has important social determinants. Increasing education and being married or living with another person significantly reduces the chances of experiencing gambling-related problems. Thus, efforts to improve the health of the population by focusing on the social determinants of health are likely to have the additional benefit of reducing the experience of gambling problems among seniors. It is also worth noting here that, as people age, life events that affect these determinants, such as death of a spouse, retirement, and relocation, may occur more frequently. Future research might usefully examine the implications of these changes for gambling problems and their prevention among older adults.

The logistic regression analyses identifying potential mental health correlates of the experience of any gambling problems showed that substance dependence and alcohol dependence were significantly associated with that experience. Both relationships appeared to be robust, with odds ratios of about 4 for alcohol dependence and nearly 7 for any substance dependence. These findings are in agreement with the findings of other studies, which demonstrate substantial comorbidity between gambling problems and alcohol or drug problems (Feigelman, Wallisch, & Lesieur, 1998; Korn, 2000; Raylu & Oei, 2002; Rosenthal, 1992; Specker et al., 1996; Spunt et al., 1998; Toneatto, 2002).

The finding that other mental health measures were not associated with experiencing gambling problems is in contrast to some other studies that have suggested that depression, emotional distress, and suicidal thoughts are related to risk of experiencing gambling problems (Marshall & Wynne, 2003; Toneatto, 2002). Several factors might account for these differences. In the present research, we have focused on the experience of any problems related to gambling, whereas other studies have considered individuals with more severe gambling problems, which may increase the strength of the association in the sample. Additionally, the trends in our results suggested that a larger sample size may have been needed to detect these effects.

It was clear in these analyses that more frequent participation in gambling activities among seniors was significantly associated with increased risk of experiencing any gambling problems. This association was particularly striking for VLT or slot machine gambling in casinos, where individuals who reported participating in this activity once a month or more were 29 times more likely to report experiencing any gambling problem in the past year than were those who reported not participating in this activity. Similarly, increasing expenditures on gambling were associated with an increased likelihood of problems. Individuals in the two highest spending categories ($501 to $1000 and over $1000) were 37 times and 74 times, respectively, more likely to experience any gambling-related problems compared with those who spent between $1 and $50. Individuals who spent 2% or more of their income on gambling were 16 times more

likely to report experiencing any gambling problems in comparison to those who spent less than 1% of their income.

Evidence presented here and by others (e.g., Wiebe et al., 2004) indicates that more frequent gambling and higher amounts spent on gambling are associated with a higher likelihood of experiencing any gambling problem. The increased risk associated with more frequent participation and higher spending is substantial and merits additional investigation. We observed previously (McCready, Mann, Zhao, & Eves, 2005) that a larger proportion of seniors fall into the highest gambling spending categories and that, on some gambling activities, a higher proportion of seniors fall into the most frequent participation categories. These observations may call into question suggestions that seniors are at relatively low risk for developing gambling problems, and instead may indicate that seniors may be at higher risk for developing gambling problems in at least some measures. These observations and the association of gambling problems with alcohol and substance dependence point to the need for additional research on gambling and gambling problems among seniors.

Although the results of this research are of substantial interest, several limitations must be kept in mind when considering them. First, because gambling, gambling problems, and other variables are measured at the same time, the causal relationship among these variables cannot be determined. Nevertheless, the study has established several significant relationships among gambling, gambling problems, sociodemographic factors, and mental health variables in the Ontario senior population. Second, the data involve self-reports and are therefore subject to self-report bias. Self-report data may underestimate the true rate of behaviours, including gambling (Adlaf, Paglia, & Ivis, 1999), and result in conservative prevalence estimates. A third concern is non-response bias. The response rate of 73.4% (in Ontario) for this study may be considered excellent for a survey of this nature, but it means that slightly more than 25% did not agree to participate, and agreement to participate may be related to the variables of interest in this research. A fourth concern is the excluded population in the survey. The survey is based on a target population of households with telephones, and excludes those in prisons, hospitals, and military establishments, as well as transient populations, such as the homeless. Bias caused by such non-coverage may affect the results. For example, recent evidence suggests that the prevalence of problem gambling in prison populations is high (Abbott, McKenna, & Giles, 2005). However, if the size of the excluded group is small relative to the total population (i.e., households without a telephone only account for 1.4% in Ontario households in 1991; Statistics Canada, 1992), the bias is usually minimal (e.g., Trinkoff, Ritter, & Anthony, 1990). Keeping these limitations in mind, the results provide some important perspectives on gambling and gambling problems among Ontario seniors, and more research to identify and understand gambling-related problems in this important population is clearly needed.

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For correspondence: John McCready, Healthy Horizons Consulting, 17 Beaufort Road, Toronto, Ontario, M4E 1M6, John.McCready@HealthyHorizonsConsulting.com.

Contributors: John McCready was responsible for oversight of all the work reported here and had primary responsibility for conceptualization of the work and manuscript preparation. Robert E. Mann was involved in all aspects of the work, including conceptualization, planning the analyses, and preparing the manuscript. Jinhui Zhao had primary responsibility for data analyses and was involved in planning the analyses and manuscript preparation. Robert Eves was involved in conceptualization of the work, planning the analyses, and preparation of the manuscript.

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John McCready, PhD, is a researcher and consultant with Healthy Horizons Consulting. John is particularly interested in public health strategies and policies, health promotion and capacity building, and participatory planning and programming.

Robert E. Mann, PhD, is a senior scientist at the Centre for Addiction and Mental Health and an associate professor in the Department of Public Health Sciences at the University of Toronto. His research interests include the nature of substance abuse problems and the effects of alcohol and drugs on health and traffic safety.

Jinhui Zhao, MSc, received his master's degree in epidemiology from the University of Toronto and is a data analyst at the Center for Addictions Research of British Columbia, University of Victoria. His research interests are in the epidemiology of substance use.

Robert Eves, MSW, is the executive director of Community Outreach Programs in Addictions (COPA), a Toronto agency offering innovative community-based services to older adults experiencing problems related to substance use. Robert holds a master's degree in social work from the University of Toronto and a bachelor's degree from Queen's University. He has worked for over 10 years in the field of addictions and has a wide range of experience in community program development and management, as well as addictions counselling.