

## A Population-Based Study of the Association Between Pathological Gambling and Attempted Suicide

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The association between pathological gambling and attempted suicide was examined using data from a prevalence study conducted in Edmonton, Alberta, Canada. The sample size was 7,214, the questionnaire was the Diagnostic Interview Schedule, and diagnoses were made on a lifetime basis according to DSM-III criteria. Logistic regression analysis was performed, with attempted suicide as the dependent variable. The odds ratio for pathological gambling was statistically significant (odds ratio = 4.91; 95% confidence interval = [1.41,17.1]) when major depression was the only comorbid mental disorder in the model. As terms for additional mental disorders were included, pathological gambling ceased to be statistically significant. It was concluded that a history of pathological gambling is associated with previous attempted suicide, and that the association may be due to a common factor—"mental illness."

Excesses in gambling lead to a number of well documented and serious consequences. These include loss of financial stability (Ladouceur, Dube, & Bujold, 1994), interpersonal difficulties (Beaudoin & Cox, 1999; Bland, Newman, Orn, & Stebelsky, 1993; Ladouceur et al., 1994), substance abuse (Rosenthal, 1992; Ramirez, McCormick, Russo, & Taber, 1983), and criminal involvement (Bland et al., 1993; Blaszczynski, McConaghy, & Frankova, 1989;

Ladouceur et al., 1994; Meyer & Fabian, 1993).

While most individuals gamble from time to time, problem or pathological gambling affects a much smaller segment of the general population. Bland et al. (1993) reported a lifetime prevalence rate of DSM-III pathological gambling of 0.4% among adults in Edmonton, Canada. In Québec City, Canada, the rate of problem gambling among high school students was estimated to be 2.6% (Ladouceur, Boudreault, Jacques, & Vitaro, 1999), with a corresponding value for college students of 2.8% (Ladouceur et al., 1994). Males showed higher rates than females in all three of these studies, with ratios ranging from 2:1 to 10:1. Cusack, Malaney, and DePry (1993) reported that the prevalence of pathological gambling is increasing in the United States. No such data are available for Canada, although Canadian trends tend to mirror those in the United States.

Sullivan (1994) indicated that many gamblers consider suicide to be a solution to

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their gambling problems. In keeping with this, case reports have shown a link between gambling and suicide (Clement, 1993; Kezwer, 1995; Lester & Jason, 1989; McCormick, Russo, Ramirez, & Taber, 1984), but other studies have shown mixed results. For example, Ladouceur et al. (1999) found that pathological gambling among teenagers was associated with drug and alcohol use, poor grades, and delinquency, but not with suicidal behavior. Holmes, Mateczun, Lall, and Wilcove, (1998) found that the absence, not the presence, of a history of gambling was associated with suicidal behavior. Beaudoin and Cox (1999) did not find excessively high rates of suicidal behavior among gamblers seeking treatment. On the other hand, Frank, Lester, and Wexler (1991) surveyed members of Gamblers Anonymous and found higher than expected rates of suicidal behavior. Furthermore, the presence of suicidal behavior was associated with more serious levels of gambling. Many of these studies have methodological weaknesses and so it is not possible to apply their findings to the general population with any confidence. The primary issue here is that those who have been chosen for study based on their membership in a particular subgroup, like Gamblers Anonymous or those seeking treatment, are likely to differ from gamblers in the general population who have not sought this form of involvement.

The few ecological studies conducted to date have shown that geographic areas associated with a significant gambling presence have higher than expected suicide rates. Campbell, Simmons, and Lester, (1998) found that parishes in the state of Louisiana that displayed high per capita spending on lotteries showed greater increases in the suicide rate over the time period of their survey. In an important study, Phillips, Welty, and Smith (1997) found higher than expected suicide rates in the three most significant gambling centers in the United States (Las Vegas, Reno, and Atlantic City). These researchers noted that this cannot be entirely attributed to the possibility that gaming centers attract suicidal individuals, as suicide rates were high for both the visitors to these locations and

their residents. A powerful finding was that the suicide rates rose in Atlantic City after the introduction of gambling to that city.

The balance of the evidence, then, appears to suggest a meaningful association between problem gambling and suicide. Given this, it may very well be that the connection is accounted for in large part by mental illness, which is strongly associated with both of these social problems. The evidence that pathological gambling is associated with mental disorders has been recently reviewed by Crockford & el-Guebaly (1998). McCormick et al. (1984) found that 76% of pathological gamblers seeking treatment had suffered from major depression, and a number of other investigators also have found gamblers to have an elevated prevalence of mental disorders (Blaszczynski & McConaghy, 1988; Zimmerman, Meeland, & Krug, 1985). Beaudoin and Cox (1999) have observed that many pathological gamblers seeking treatment report that gambling is a way to alleviate dysphoric mood. This is in line with the significant implication of depression in gambling behavior, and is perhaps similar to the "medication of depression" explanation for alcohol abuse, which is reported to be high among gamblers. In the study by Bland et al. (1993) cited above, a lifetime diagnosis of pathological gambling was positively associated with a lifetime diagnosis of dysthymia, obsessive-compulsive disorder, antisocial personality disorder, mania, major depression, phobic disorder, and panic disorder; however, only for dysthymia, obsessive-compulsive disorder, and antisocial personality disorder were the associations statistically significant.

The strong association between completed suicide and mental disorder is well known. Lönnqvist (2000) recently reviewed 11 psychological autopsy studies and found the proportion of completed suicides displaying evidence of a psychiatric disorder to range from 81% to 100%, with depression being a major contributor. A study conducted in Edmonton found that, among suicide attempters, 65% were diagnosed with a mental disorder during either their initial visit or a repeat visit to the emergency department (Thomp-

son et al., 2001). In community studies using a subset of the Bland et al. (1993) data, attempted suicide was found to be associated with all of the diagnoses under study (Dyck, Bland, Newman, & Orn, 1988; Thompson & Bland, 1995); schizophrenia, mania, major depression, and dysthymia all showed odds ratios over 15.0; and phobic disorder, panic disorder, obsessive-compulsive disorder, and antisocial personality disorder produced odds ratios ranging from 4.9 to 14.9.

The number of studies devoted to pathological gambling is surprisingly small, and most, while provocative, are limited in their generalizability. Thus, a need exists for a community-based study that is applicable to the general population and which addresses the question of the association between pathological gambling and attempted suicide, taking into account comorbid mental disorders.

## METHODS

Data for the present study came from two surveys of mental disorders conducted in Edmonton during 1983–1990. The surveys used identical methods which have been described in detail elsewhere (Bland et al., 1993; Newman & Bland, 1998; Orn, Newman, & Bland, 1988). Briefly, residents of Edmonton were sampled using a two-stage procedure. First, addresses were chosen from a computerized residential list using systematic sampling. Next, one occupant per household was chosen at random with the aid of a selection grid. Institutions, such as hospitals and long-term care facilities, were not included in the sampling frame of the survey. To be eligible for the study, a subject had to be 18 years of age or older and a usual occupant at the address. No proxy interviews or substitutions were permitted.

Data were collected by trained nonclinician interviewers using version III of the Diagnostic Interview Schedule (DIS) (Robins, Helzer, Croughan, & Ratcliff, 1981). For the present study, the variables considered were attempted suicide, age (18–34, 35–54, 55+), sex, pathological gambling, major de-

pression, panic disorder, drug abuse/dependence, alcohol abuse/dependence, antisocial personality disorder, and phobic disorder (simple phobia, social phobia, or agoraphobia). Psychiatric disorders were diagnosed using DIS diagnostic software and DSM-III criteria (American Psychiatric Association, 1980). According to the DSM-III, antisocial personal disorder is an exclusion for pathological gambling; that is, the diagnosis of pathological gambling cannot be made if gambling is due to antisocial personal disorder. It is not possible to make this determination based on DIS data and so exclusions were not used when diagnosing pathological gambling, and likewise for the other DIS/DSM-III disorders considered. An advantage of this approach to DIS data, which is the usual practice in prevalence studies based on the DIS, is that it permits the assessment of comorbidity. All DIS/DSM-III diagnoses considered here refer to lifetime prevalence; that is, had the disorder occurred in the past or was it present at the time of the interview.

There are five questions in the DIS that are used to make a diagnosis of pathological gambling. First there is a screening question, "Have you ever gambled or bet?" If the subject answers "No" or "Only once," no further questions are asked about gambling. If the answer is "Yes," the DIS continues as follows: "Have you ever thought you gambled too much?" "Have you ever been unable to pay your bills because of gambling or betting?" "Have you ever had trouble at home or at work because of gambling or betting?" and "Have you ever borrowed or stolen money so that you could gamble?" The DIS/DSM-III algorithm for diagnosing pathological gambling emulates the approach taken in the DSM-III. In the section on major depression, the DIS asks "Have you ever attempted suicide?" The response to this question was used to define the study variable on lifetime history of attempted suicide.

Survey weights were constructed to account for household size and to post-stratify to the age and sex distribution of the combined Edmonton census populations for 1981 and 1986. Except where indicated, all analy-

ses are based on weighted data. Analyses were carried out using SUDAAN (Shah, Barnwell, & Bieler, 1996), a statistical package specifically designed for the analysis of complex survey data. Logistic regression was performed with lifetime history of attempted suicide as the dependent variable and with statistical significance ( $p < .05$ ) determined using the Wald test.

## RESULTS

For the two surveys combined, the sample size was 7,214 and the response rate was 71.8%. As shown in Table 1, almost two thirds (60.9%) of the sample was female, and just under one half (49.0%) were in the 18–34 age group. There were 30 cases of pathological gambling, giving an overall (weighted) prevalence rate of 0.46%. Based on the Mantel-Haenszel test, there was a statistically significant difference in prevalence according to sex ( $p = .004$ ,  $df = 1$ ), but not according to age ( $p = .22$ ,  $df = 2$ ). However, a test for linear trend in age was statistically significant ( $p = .03$ ,  $df = 1$ ).

Table 2 gives crude odds ratios for the association between pathological gambling and the remaining study variables. Based on the 95% confidence intervals, pathological gambling is associated with attempted suicide, being male, drug abuse/dependence, antisocial personality disorder, phobic disorder,

and alcohol abuse/dependence. There is little evidence for an association between pathological gambling and age, major depression, and panic disorder. Note that it is not possible to determine from the data for this study, which is cross-sectional, whether the preceding associations are causal in nature. Accordingly, the odds ratios should be interpreted only as measures of association. In particular, it would be incorrect to infer from Table 2 that pathological gambling increases the risk of attempted suicide. Also shown in Table 2 are crude odds ratios for the association between attempted suicide and the remaining study variables. Based on the 95% confidence intervals, there is an association for each of the variables under consideration. Consistent with the published literature, females, younger individuals, and persons with any of a range of mental disorders are more likely to have attempted suicide (Dyck et al., 1988).

Table 3 gives the logistic regression model with attempted suicide as the dependent variable, and with the remaining study variables (except for panic disorder) as independent variables. (For the model that included panic disorder as well, the statistical algorithm would not converge, presumably due to sparse data problems or multi-collinearity.) As can be seen, all the independent variables under consideration are associated with attempted suicide, except for pathological gambling ( $p = .37$ ). Also shown in Table 3 is the model with pathological gambling, age,

**TABLE 1**  
*Lifetime Prevalence Rate of Pathological Gambling*

Characteristic	Sample Size (unweighted, %)	Number of Cases (unweighted)	Prevalence Rate (SE) <sup>1</sup> (weighted, %)
Total	7,214 (100)	30	.46 (.09)
Sex			
male	2,819 (39.1)	20	.71 (.16)
female	4,395 (60.9)	10	.22 (.07)
Age group			
18–34	3,535 (49.0)	11	.31 (.10)
35–54	2,079 (28.8)	10	.63 (.20)
55+	1,600 (22.2)	9	.60 (.20)

<sup>1</sup>Standard error

**TABLE 2**

*Crude Odds Ratios for the Lifetime Prevalence of Pathological Gambling and Attempted Suicide, for Selected Variables (Weighted)*

Variable	Odds Ratio (95% confidence interval)	
	Pathological Gambling	Attempted Suicide
Attempted suicide		
yes	3.95 (1.34, 11.62)	—
no	1	—
Pathological gambling		
yes	—	3.95 (1.34, 11.62)
no	—	1
Age		
18–34	1	
35–54	2.02 (.85, 4.81)	3.72 (2.40, 5.75)
55+	1.93 (.79, 4.69)	3.30 (2.08, 5.22)
Sex		
male	3.32 (1.56, 7.05)	1
female	1	2.22 (1.70, 2.91)
Major depression		
yes	1.90 (.76, 4.74)	12.86 (10.07, 16.40)
no	1	1
Panic disorder		
yes	1.55 (.22, 11.21)	9.88 (6.54, 14.92)
no	1	1
Drug abuse/dependence		
yes	4.52 (1.93, 10.58)	6.04 (4.57, 7.99)
no	1	1
Antisocial personality disorder		
yes	16.22 (7.61, 34.55)	5.52 (3.83, 7.94)
no	1	1
Phobic disorder		
yes	2.99 (1.12, 7.96)	5.36 (4.04, 7.11)
no	1	1
Alcohol abuse/dependence		
yes	7.42 (3.49, 15.79)	3.62 (2.85, 4.59)
no	1	1

sex, and major depression as the only independent variables. In this model, pathological gambling reaches statistical significance ( $p = .014$ ), but as terms for additional mental disorders are added to the model, the statistical significance of pathological gambling progressively declines.

## DISCUSSION

We have presented evidence from a community-based prevalence study that pathological gambling and attempted suicide are associated, a finding that is consistent with earlier ecological and clinical studies. Con-

**TABLE 3**  
*Final and Complete Logistic Regression Models, with Lifetime Prevalence of Attempted Suicide as Dependent Variable (Weighted)*

Variable	Odds Ratio (95% confidence interval)	
	All Independent Variables <sup>1</sup>	Selected Independent Variables
Intercept	.003 (.002, .005)	.005 (.003, .008)
Pathological gambling		
yes	1.87 (.48, 7.20)	4.91 (1.41, 17.07)
no	1	1
Age		
18–34	2.22 (1.38, 3.55)	3.41 (2.17, 5.36)
35–54	2.23 (1.38, 3.62)	2.70 (1.69, 4.33)
55+	1	1
Sex		
male	1	1
female	3.34 (2.37, 4.70)	1.85 (1.39, 2.45)
Major depression		
yes	8.07 (6.16, 10.58)	11.44 (8.89, 14.71)
no	1	1
Drug abuse/dependence		
yes	2.70 (1.79, 4.05)	—
no	1	—
Antisocial personality disorder		
yes	2.50 (1.43, 4.40)	—
no	1	—
Phobic disorder		
yes	2.53 (1.76, 3.63)	—
no	1	—
Alcohol abuse/dependence		
yes	2.60 (1.82, 3.72)	—
no	1	—

<sup>1</sup>Excluding panic disorder; see text.

vergence of findings from investigations using different methodologies, each having its own strengths and weaknesses, provides corroborative evidence of a connection between these two behaviors. Assuming that pathological gambling and attempted suicide are indeed associated, an important question arises: Is there a causal link? Being cross-sectional in nature, the data for our study do not permit a rigorous examination of causal hypotheses. The DIS includes questions on the age of onset of mental disorders and, in theory, this information could be used to determine the time course of the phenomena

under consideration. Unfortunately, age of onset as determined by the DIS data has been shown to be of questionable reliability and validity (Newman & Bland, 1998), and so age of onset data were not examined here.

The mental disorder with the largest odds ratio in all logistic regression models was major depression. It is tempting to speculate that the financial and emotional consequences of excessive gambling place the individual at increased risk of depression and hopelessness, both of which are regarded as major risk factors for suicide (Beck, Kovacs, & Weissman, 1975). The logistic regression

model in Table 3 that has major depression as the only comorbid mental disorder shows a strong association between pathological gambling and attempted suicide. As remarked above, as terms for additional mental disorders are added to the model, this association ceases to be of statistical significance. This suggests that the commonality spanning suicidal behavior and

gambling lies in the presence of "mental disorder." According to this explanation, mental disorder would precede both forms of problem behavior, rather than, say, gambling leading to depression, which in turn might lead to attempted suicide. We now need to turn to research that can test such explanations of the gambling-suicidal behavior association.

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