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The Comorbidity of Problem Gamblers in

Northwestern Ontario

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Abstract

Problem gamblers often exhibit additional, addictive behaviours in addition to gambling. Rates of other disorders, including depression and substance use, are much higher in problem gamblers than in the general population. The present study examined data from all clients receiving treatment for addiction in Thunder Bay from 2003 till mid 2006. It was found that 73.9% of gambling clients had a comorbid substance addiction. A distinction was also found between two subgroups of problem gamblers – those who presented with gambling as their primary problem, and those who presented with another disorder as their primary problem and reported gambling to be a secondary problem. The demographic profiles of these two groups differed: clients with gambling as the primary problem were significantly more likely to be female, widows or widowers, employed or on retirement income, older, better educated and without any legal problems. The rate of substance comorbidity in the primary gamblers was only 20.6%, indicating that failure to differentiate primary from secondary gamblers results in an overestimate of substance comorbidity for those clients who have primarily a gambling problem.

The Comorbidity of Problem Gamblers in

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Problem Gambling, otherwise known as pathological gambling, compulsive

gambling, and disordered gambling is the term used to identify individuals who meet the

diagnostic criteria of pathological gambling according to the *Diagnostic and Statistical*

Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR, American

Psychiatric Association, 2000). Individuals who meet this criteria experience gambling

related problems that significantly interfere with their daily functioning (Petry, 2005).

Problem gamblers often put marriages, friendships and family relationships at risk, lose

their homes or jobs, and may even resort to criminal activity to support their gambling

habits (Petry). It should be no surprise that there is a relationship between problem

gambling and higher rates of suicide ideation, suicide attempts, spousal abuse and divorce

(Petry, Stinson & Grant, 2005). The social ramifications of problem gambling include

job losses and disruptions, debt and bankruptcy, and arrests and incarcerations (Larimer,

Lostutter & Neighbors, 2006) and are estimated to be $5 billion annually in the United

States (Petry, Stinson & Grant). Furthermore, problem gamblers have also been found to

show increased physical and mental health problems compared to the general population

(Erickson, Molina, Ladd, Pietrzak & Petry, 2005). Some of these physical symptoms

include fatigue, insomnia, minor respiratory ailments, intestinal distress, migraine

headaches, high blood pressure and cardiovascular disease (Larimer, Lostutter &

Neighbors). Prevalence of this impulse control disorder has been estimated to range from

1% to 3% (Crockford & el-Guebaly, 1998). These estimates however, have recently

been on the rise due to the legalization, availability and accessibility of new forms of

gambling (Dell'Ossa, Allen & Hollander, 2005), specifically led by an unprecedented expansion in casinos (Stinchfield, Kushner & Winters, 2005). The City of Thunder Bay, for example, opened its doors to a new casino August 30th, 2000. Since then the casino has seen an average of over 3000 visitors daily (Ontario Lottery Gaming Commission [OLGC], 2006). The prevalence rate of problem gamblers in Ontario is approximately 3.8%, a number expected to rise for reasons mentioned above, as well as the increasing concerns regarding internet gambling (OLGC, 2001). Adding to the concern is that few pathological gamblers ever seek treatment. This adds to the challenge of finding a truly effective treatment program for gamblers (Petry, 2005).

Comorbidity

Comorbidity is the co-occurrence of two or more disorders. The disorders can occur independently, which is known as *lifetime comorbidity* or at the same time, which is referred to as *current comorbidity* (Petry, 2005). Among psychiatric disorders, the most commonly studied relationships involve the dual disorders, or the associations between substance use disorders and psychotic, anxiety and mood disorders (Westphal & Johnson, 2003). There have been few studies which examined problem gambling among clients in substance abuse outpatient treatment settings, although some attention has been given to the co-occurrence of addictive disorders in help-seeking problem gambler populations (Collins, Skinner & Toneatto, 2005). It is important for primary care providers to develop a better understanding of problem gambling as gambling disorders have been linked to numerous physical and mental disorders (Morasco, vom Eigen & Petry, 2006). Evidence exists from research conducted with problem gamblers that

individuals with comorbid disorders have more severe disabilities than those without comorbid disorders (Hodgkins, Peden & Cassidy, 2005).

Despite being in its infancy, there have been numerous studies focused on the comorbidity of problem gambling, including general population surveys and studies of clinical samples which have shown a high rate of comorbidity between mental health disorders and pathological gambling (Hodgkins, Pedin & Cassidy, 2005). The strongest and most consistent findings have been for substance abuse and to a more limited extent, mood disorders (Crockford & el-Guebaly, 1998). Specifically, pathological gamblers who seek help for gambling also show significantly higher incidences of depression, bipolar, anxiety and substance use disorders than control populations (Dell'Osso, Allen & Hollander, 2005). A literature review by Crockford and el-Guebaly of over 60 publications found that substance use disorders, including alcohol and drugs have estimated lifetime prevalence rates of 25% to 63% among pathological gamblers, with consistent prevalence rates being approximately 50% (Westphal & Johnson, 2003). Conversely, among substance use disorder patients, there are reports of up to 30% as being classified as problem gamblers (Langenbucher, Bavly, Labouvie, Sanjuan & Martin, 2001). According to Dell'Osso, Allen and Hollander (2005), this hardly comes as a surprise as the core psychopathological features of gambling include impulsivity, compulsive drives, urges, pleasure seeking, decreased judgment and addictive features such as withdrawal symptoms. In fact, when comparing problem gamblers with non-problem gamblers within a substance use sample, problem gamblers were found to differ in at least four aspects: 1) hyperactivity and disregard for rules and norms in childhood,

2) current heavier substance use, 3) greater social consequences of use and 4) more impulsivity and anti-sociality (Langenbucher et al.).

Researchers agree that there is a strong relationship between alcohol use and gambling, but the relationship between gambling and other disorders is somewhat more ambiguous. A recent study by Petry, Stinson and Grant (2005) provides an overview of the state of research dealing with the comorbidity of problem gambling. The authors of this study completed a review of several general population surveys that found a relationship between gambling and drug use disorders. One large survey of 7214 adults from Edmonton, Alberta, Canada found that drug use was four times higher among pathological gamblers than non-pathological gamblers. They also reviewed two studies that evaluated the relationship between problem gambling and affective disorders. One study by Bland, Newman and Orn (1993) found an increase in affective disorders but not in major depression while the other by Cunningham-Williams, Cottler and Compton (1998) did find that major depression was more prevalent in problem gamblers. Petry et al. (2005) also found evidence from several smaller scale studies, linking problem gambling and anxiety disorders. Cunningham-Williams et al. (1998) conducted a survey in which problem gamblers had a prevalence rate for phobias of 14.6%, significantly higher than the prevalence rate for non-gamblers of 9.5%. Bland et al. (1993) found that gamblers were more likely to have an anxiety disorder and agoraphobia (26.7% and 13.3%, respectively) compared to non-gamblers (9.2% and 2.4%, respectively). These results suggest that problem gamblers are significantly more likely to have phobias and anxiety disorders. Petry et al. (2005) summarized that the relationship between substance

use disorders and gambling is indeed a strong one and more research is required to clarify the relationship between gambling and other disorders.

There are several important reasons for exploring the issue of gambling comorbidity further; the first and most important being that pathological gamblers with comorbid substance abuse are more difficult to treat than those without it (Nathan, 2003). Researchers widely accept that the presence of a second or multiple disorders may affect treatment outcomes (Petry, Stinson & Grant, 2005). A second reason is to formulate the etiological association between pathological gambling and other disorders. Winters and Kushner (2003) summarized three possible outcomes of such a formulation: 1) Pathological gambling can directly cause a comorbid disorder. For example, a person may begin to abuse a substance such as alcohol in order to cope with the problem gambling. 2) A comorbid disorder could directly cause pathological gambling, which could occur when a person uses a substance such as alcohol to become intoxicated, and in their state of intoxication decides to gamble. 3) Another factor may serve as a common cause of both pathological gambling and the comorbid disorder. That is, there may be a third variable which assumes that gambling and the disorder are unrelated, that may cause both the gambling and the other disorder. The manner in which merely gambling and drinking for example can progress to a comorbid disorder of problem gambling and alcohol abuse is presently not well understood. However, as with other forms of comorbidity, there are most likely multiple factors which contribute to the problem, with specific combinations of these factors varying across individuals (Zack, Stewart, Klein, Loba & Fragopoulos, 2005).

Patients comorbid for problem gambling and other substance use disorders may differ from patients with only substance use disorders. These differences can involve the consequences of substance abuse, and also the psychiatric comorbidity (Langenbucher et al., 2001). Gambling presenting as a secondary, comorbid disorder may require different and specialized treatments to accompany treatment of the primary, presenting problem (Petry, 2005). Acquiring such knowledge would contribute to finding effective treatments for individuals with comorbid gambling problems. Thus far, studies of treatment outcomes of gamblers are sparse, with even less information available about how comorbidity influences outcomes (Petry). Since there are no empirically validated treatments for individuals with concurrent gambling, substance use and psychiatric disorders (Collins, Skinner & Toneatto, 2005), studying the prevalence, etiology and increasing our understanding of the comorbidity of gambling is the first, logical step to designing an effective treatment.

Profiling

Problem gambling is generally associated with younger age, males, minority status, and lower socioeconomic status (Morasco, vom Eigen & Petry, 2006). Problem gamblers who are older tend to have a different profile than their younger counterparts as they have more problems with employment, but fewer problems in legal, social and substance abuse (Erickson, Molina, Ladd, Pietrzak & Petry, 2005). Older gamblers also report fewer drug and alcohol problems than younger gamblers (Kausch, 2004), while rates of psychiatric conditions are equivalent, with depression being the most frequently reported disorder in both groups (Erickson et al., 2005).

The profile of a problem gambler is similar to that of a substance abuse client. They usually develop during adolescence or early adulthood, and can either increase or decrease in intensity. Some may go on to suffer severe problems, while others may go through a natural recovery (Petry, 2006). Petry (2006) also noted that motivation is an important factor for either a problem gambler or a substance use client in recovery. Treatment providers have recognized these similarities and as a result, have made attempts to adopt substance use treatments such as the 12-Step, motivational and cognitive-behavioural therapies and pharmacotherapies for problem gamblers (Petry, 2005). While some of these treatments have had success in the treatment of problem gamblers, it should be noted that such treatments are also used successfully in the treatment of a numerous disorders (Petry, 2006).

Types of gamblers

Another issue concerning the treatment of problem gamblers with a comorbid disorder arises when the type of client is considered. That is, current treatment strategies are targeting mostly individuals who present themselves for treatment. These individuals usually have more severe symptoms, or have comorbid, multiple disorders (Petry, Stinson & Grant, 2005). Further compounding the problems is that fewer than 10% of problem gamblers seek any treatment (Erickson et al, 2005). A problem gambler with a comorbid disorder then would be expected to present more often with the comorbid disorder as the primary or presenting problem with the problem gambling as secondary to that disorder. These individuals will likely differ in profiles, conditions, severity and best course of treatment from the individuals who present with gambling as their primary problem.

Different subsets exist among gamblers which differ in underlying profiles, pathology, onset (Blaszczynski & Nower, 2002) and subsequently, best possible treatment methods (Ibáñez et. al., 2003). According to Blaszczynski and Nower, it would be more effective to consider the possibility that within gamblers there exists subgroups of gamblers. Blaszczynski and Nower thus developed a pathways model of gamblers, based on the notion "that the quest to impose one theoretical model to apply equally and validly to all pathological gamblers is a misguided venture" (p. 487). They also note that there have already been attempts to classify gamblers, with groupings including "problem", "at-risk", "in-transition", "disordered", "excessive", "social", and "recreational" being just some of the terms intended to differentiate between groups of gamblers. Their model, a pathways model of gamblers, attempts to combine biological, personality, development, cognitive, learning theory and environment factors which results in the creation of three groups of gamblers.

The first group is the "behaviourally conditioned problem gamblers" who develop problems with gambling through conditioning, bad decisions, and distorted cognitions surrounding the possibility of winning. They are characterized by engaging in chasing losses, abuse of alcohol and show high levels of depression and anxiety as a result of their financial problems stemming from gambling, yet they do not exhibit signs of major premorbid psychopathology, substance abuse, impulsivity or disorganized behaviours.

The second group is similar to the first group, but will present with premorbid anxiety and/or depression problems, a history of poor coping and problem solving skills, and significant, negative experiences dealing with family and life events, leading to a vulnerability to gambling addiction. This group is thus termed the "emotionally

vulnerable problem gamblers" and they use gambling as an emotional escape or to control their affective states and meet certain psychological needs. This group will also show higher levels of comorbidity, specifically with depression, anxiety and alcohol dependence.

The third and final group is the "antisocial impulsivist problem gamblers". This group also exhibits the vulnerability to gambling addiction, but also possesses additional disorders of impulsivity and antisocial personality. Consequently, this group experiences broader and more serious effects of problem gambling including substance abuse, suicidal ideation, irritability, and criminal behaviour unrelated to their gambling problems.

Blaszczynski and Nower (2002) conclude that "from a clinical perspective, each pathway contains different implications for choice of management strategies and treatment interventions" (p. 496). The existence and grouping of gamblers has been tested and evidence to validate at least two of the groupings exist; the emotionally vulnerable and the antisocial impulsivists, while the third group, the behaviourally conditioned, may be more difficult to include in studies as their gambling is less severe and they are thus less likely to seek treatment (Ledgerwood & Petry, 2006).

The present study

This study examined comorbidity in gamblers who received treatment for gambling addiction in Thunder Bay from 2003 till mid 2006. In addition to examining rates of comorbidity for substance addiction or mental health problems, a number of demographic features were also examined. Data were obtained from the Catalyst data system, which contains a wealth of information about each client. The purpose of this

study was to assess the rates of comorbidity in this population, and to examine the data for relationships that may aid our understanding of underlying variables that play a role in gambling comorbidity.

<div align="center">Method</div>

Participants

Participants were individuals who entered a treatment program at St Joseph's Addiction Treatment Center in Northwestern Ontario and were admitted between 2003 and mid-2006. Individuals enter the program due to a variety of addictions. Each individual entering the program is initially screened using a standardized, paper-based questionnaire which is unique to the treatment center. Participants ranged from age 13 to 88 (Mean age = 35.3, *SD* = 14.66) and consisted of 1072 females and 1671 males. Participants remained completely anonymous throughout the study.

Apparatus

The data obtained by the initial screening was inputted and stored into a system called *Catalyst*. Clients are entered into the system through an identifying number, allowing them to remain completely anonymous. Catalyst is a database maintained by the Center for Addiction and Mental Health (CAMH) and tracks the following upon admission and registration:

a) Demographics including gender, birth date, preferred language, ethnic heritage, marital status, education, country of residence, and legal status.

b) Health related variables including pregnant status, hearing impairment, mobility impairment, visual impairment, development handicap, and psychiatric disorder.

c) Substance use variables including substances used in the past, 1st presenting problem substance, 2nd presenting problem substance, 3rd presenting problem substance, frequency of substance use, gambling problem, and non-medical injection drug use.

d) Treatment intervention including referral source(s) and date, conditions of treatment, county of service site, and re-admission.

Data collected at the time of discharge is as follows:

a) Discharge circumstance including referrals made during service, reason for discharge, drug therapy used, and fee for service.

b) Type of service provided including outpatient counseling, residential treatment, supportive housing, intensive day/evening treatment, and detoxification.

c) Amount and duration of services including number of sessions and hours attended total number of days in residence, and the total number of days in program.

Procedure

Permission to access the data was granted by Lakehead University Research Ethics Board and the St Joseph's Hospital Ethics committee. Once the data were received, the Microsoft Excel spreadsheet was converted into a Statistical Package for the Social Sciences (SPSS) spreadsheet using a converter tool included with SPSS.

Upon inspection of the data, it was found that many clients had multiple rows of data, a row for each date admitted. Only the original admission data was used in the analysis, and any subsequent rows were deleted for each client. If a client had multiple rows with at least one indicating a gambling problem, then the first row that indicated a gambling problem was kept, and any others deleted. The final dataset included a total of

2743 unique rows of data, one for each client. Any blank, unknown or uncertain responses were excluded or treated as missing from analyses.

Analyses

The data were analyzed using SPSS and included several phases. The first phase assessed rates of comorbidity in gamblers by measuring frequencies of mental health disorders, substance abuse, history of hospitalization and history of mental health problems.

The next phase of data analysis compared gamblers to non-gamblers. This involved analysis of 418 clients who indicated gambling as a problem against the rest of the clients in the dataset. To do this, Chi-square tests were used, with pairwise Chi-squares used as post-hoc tests followed by modified Bonferroni corrections (Howell, 2002) where necessary. Bi-serial correlations were also used when appropriate.

The final phase of data analysis separated the group of gamblers into two groups: those with gambling as the primary problem for being at the treatment center, and those having gambling as a secondary problem. These two groups were then compared.

Results

Comorbidity

The primary purpose of this study was to examine comorbidity in the 418 gambling clients. When first admitted to the treatment center, clients were asked to indicate which substances they have addiction problems with. Opportunity was given for the clients to indicate more than one problem by listing each substance as the first presenting problem (PPS1), the second presenting problem (PPS2) and so on, up to five presenting problems. Alcohol was the most common substance among gamblers with

63.2% of gamblers experiencing problems with alcohol. Cannabis also caused

considerable trouble among gamblers with 34.2% reporting marijuana as a presenting

problem. Cocaine was the only other substance to cause more than 10% of the clients

problems (12.0%). No substance problems were reported by 26.17% of the clients. These

results are presented in Table 1.

Table 1

Substances Presenting Problems in Gamblers

	PPS1	PPS2	PPS3	PPS4	PPS5	Total	% of 418
Alcohol	193	53	14	2	2	264	63.2
Cannabis	57	72	11	2	1	143	34.2
Cocaine	20	15	14	1	0	50	12.0
Prescription Opioids	9	8	17	7	0	41	9.8
Tobacco	4	16	5	1	0	26	6.2
Hallucinogens	1	2	12	3	1	19	4.5
Benzodiazepines	2	5	3	0	1	11	2.6
Amphetamines	1	1	5	1	2	10	2.4
Crack	5	3	1	0	0	9	2.2
Over-the-counter Codeine	1	3	1	0	1	6	1.4
Ecstasy	0	0	2	1	1	4	1.0
Glue	0	2	0	0	0	2	.05
Heroin/Opium	1	1	0	0	0	2	.05
Other Psychoactive Drugs	1	0	0	0	1	2	.05
None	109	0	0	0	0	109	26.1

A number of gambling clients also had comorbid mental health problems, with some having multiple mental health disorders. The database *Catalyst* stored diagnosis information of up to two mental health diagnoses for each client. A number of gamblers had a history of mental health diagnoses with 12.6% being diagnosed in the last 12 months, and 23.2% being diagnosed with a mental health disorder at some point in their lifetime. In terms of total numbers, major depressive disorder was the most comorbid with gambling, with a total of 53 clients presenting both a gambling and depressive disorder. Several other comorbid disorders were found in gamblers, but at lower rates including ADD/ADHD/Disruptive Behaviour Disorder, Anxiety Disorder and Bipolar Affective Disorder with rates of 2.9%, 2.6% and 2.6%, respectively. Table 2 is a summary of this, with Diagnosis 1 showing the first presenting disorder, and Diagnosis 2 showing a secondary, comorbid disorder if present. Several disorders such as eating disorders and borderline personality disorders had very low rates among gamblers.

Comparison of Gamblers to Other Addiction Clients

The other clients were found to have 4.7% not addicted to any substances while 26.1% of gamblers did not have addictions to other substances. The rates of mental health problems in gambling clients were compared to those of other addiction clients. There was no significant difference between gamblers and non-gamblers in mental health diagnoses in the last 12 months, $\chi^2(1, N = 1710) = .183, p = .669$. There was also no significant relationship for mental health diagnoses in their lifetime and clients gambling status, $\chi^2(1, N = 1727) = .3.50, p = .062$. This indicates that gamblers and non-gamblers showed similar diagnoses rates.

Table 2

Mental Health Disorders in Gamblers

	Diagnosis 1	Diagnosis 2	Total	% of 418
Major Depressive Disorder	46	7	53	12.7
ADD/ADHD/Disruptive Behaviour Disorder	12	0	12	2.9
Bipolar Affective Disorder	9	2	11	2.6
Anxiety Disorder	7	4	11	2.6
Post Traumatic Stress Disorder	2	2	4	1.0
Schizophrenia	3	0	3	0.7
Substance Abuse	2	0	2	0.5
Borderline Personality Disorder	1	0	1	0.2
Eating Disorders	1	0	1	0.2
Obsessive Compulsive Disorder	1	0	1	0.2
Panic Disorder without Agoraphobia	1	0	1	0.2
Narcissistic Personality Disorder	0	1	1	0.2
Paranoid Personality Disorder	0	1	1	0.2

There was no significant relationship between prior hospitalizations in the last 12 months and whether or not a client had a gambling problem, $\chi^2(1, N = 1808) = 1.77, p = .184$. There was also no significant relationship between prior hospitalizations in a client's lifetime and their gambling status, $\chi^2(1, N = 1764) = .194, p = .660$. This indicates that gamblers showed similar rates of hospitalization as other clients. Gambler hospitalization rates for the last 12 months and lifetime were 4.4% and 12.6%, respectively.

Additional comparisons between the gambling clients ($N = 418$) and those with other addiction problems ($N = 2103$) are presented below.

Gender

There was a significant difference in gender between the groups, $\chi^2(1, N = 2521) = 4.22, p < .05$. Females accounted for 37.7% in the other addictions group, significantly less than the 43.1% in the gambling group. These results are summarized in Table 3.

Table 3

Gamblers versus Other by Gender

	Total	% Non-Gamblers	% Gamblers
Males	1548	62.3	56.9
Females	973	37.7	43.1

Age

There was a significant difference in age between the groups, $t(2518) = -4.58, p < .001$. The gambling group was older (Mean age $= 38.76, SD = 15.18$) than the non-gambling group (Mean age $= 35.21, SD = 14.30$). A point bi-serial correlation showed a general linear increase indicating that as age increased, the percentage of clients who were gamblers also increased, $r = .100, p < .001$. This trend can be seen in the last column of Table 4.

Education

There was a significant difference in education between the groups, $\chi^2(4, N = 2399) = 11.60, p < .05$. Most of the clients did not complete a secondary education (59.86%), and only 3.88% had at least some university education. A significant point bi-serial correlation found that as education increased, so did the percentage of gamblers, $r =$

.159, $p < .001$. Those who indicated some higher education, "Some Community College" or "Some University" had higher rates of problem gamblers (21.7% and 18.3%, respectively). The results are summarized in Table 5.

Table 4

Gamblers versus Other by Age

	Total by Age	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
13-19	436	17.29	368 (84.40)	68 (15.60)
20-29	544	21.58	480 (88.24)	64 (11.76)
30-39	554	21.98	476 (85.92)	78 (14.08)
40-49	540	21.42	438 (81.11)	102 (18.89)
50-59	300	11.90	224 (74.67)	76 (25.33)
60-69	99	3.92	80 (80.80)	19 (19.20)
70+	47	1.86	36 (76.60)	11 (23.40)

Table 5

Gamblers versus Other by Education

	Total by Education	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
Some Primary	270	11.25	230 (85.2)	40 (14.8)
Some Secondary	1166	48.60	981 (84.1)	185 (15.9)
Completed Secondary	378	15.76	323 (85.4)	55 (14.6)
Some Community College	492	20.50	385 (78.3)	107 (21.7)
Some University	93	3.88	76 (81.7)	17 (18.3)

Legal Status

Significant differences were found between the two groups in their legal status, $\chi^2(5, N = 2324) = 34.23, p < .001$. Most of the clients overall had no problem with the law (73.7%), with 73.5% of non-gamblers having no problem and gamblers having a slightly higher rate of 74.8% with no problem. Gamblers showed a higher rate of incarceration (7.6%) than non-gamblers (3.2%). Gamblers however, had a lower rate of clients awaiting trial or sentencing (5.1%) compared to non-gamblers (10.8%). Probation rates were very similar for gamblers and non-gamblers (11.2% and 12.2%, respectively). Young offenders (under 18 years of age) in our sample ($N = 203$) had 19.7% reporting with a gambling problem. These results are summarized in Table 6.

Relationship Status

There was a significant difference between the two groups and their relationship status, $\chi^2(3, N = 2317) = 17.72, p = .001$. Slightly more than half (54.7%) of the total clients were single (never married), with only 26.3% being currently married, partnered or common-law. Non-gamblers were much more likely to be widows or widowers (74.5%) compared to gamblers (25.5%). The gambling group did however, have higher rates of being separated or divorced (20.3%) compared to the non-gambling group (14.9%). The results are summarized in Table 7. Post hoc tests using pairwise chi squares with modified Bonferroni correction showed that the single (never married) clients had significantly lower rates of gamblers than either married/partnered/common-law, separated or divorced, or widow/widower clients.

Table 6

Gamblers versus Non-Gamblers by Legal Status

	Total by Legal Status	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
Parole	9	0.4	6 (60.0)	4 (40.0)
Incarcerated	92	4.0	62 (67.4)	30 (32.6)
No Problems	1713	73.7	1419 (82.8)	294 (17.2)
Probation	279	12.0	235 (84.2)	44 (15.8)
Awaiting Trial or Sentencing	228	9.8	208 (91.2)	20 (8.8)
Young Offender	203	8.0	163 (80.3)	40 (19.7)

Note: Young Offender Status was not exclusive from other Legal Status

Table 7

Gamblers versus Non-Gamblers by Relationship Status

	Total by Relationship Status	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
Married, Partnered or Common-Law	669	26.3	536 (81.7)	133 (19.9)
Separated or Divorced	402	15.8	313 (77.9)	89 (22.1)
Single (Never married)	1392	54.7	1192 (85.6)	200 (14.4)
Widow or Widower	55	2.2	41 (74.5)	14 (25.5)

Employment Status

Employment status was not significantly different between the two groups, $\chi^2(4,$ $N = 2296) = 9.06, p = .06$. Overall, 40.0% of the clients were unemployed, 26.5% were employed either full-time or part-time, 19.2% were students or training and 2.9% were retired. Groups with the highest percentages of gamblers were those who were either

retired (21.2%) or employed (20.2). Only 14.8% of gamblers were not in the labour force

or unemployed. These results are summarized in Table 8.

Income Source

      There was a significant difference between the two groups in their income source,

$\chi^2(8, N = 2077) = 28.94, p < .001$. Almost an equal number of clients indicated being

employed (24.8%) as having no income source (22.1%). These results are summarized in

Table 9. Table 9 shows the sources of income for gamblers. The three highest

percentages of gamblers were those with retirement income, disability insurance and

employment. In contrast, gamblers were least common in those who received their income

from Ontario Works or the Ontario Disability Support Program.

Table 8

Gamblers versus Non-Gamblers by Employment Status

	Total by Employment Status	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
Retired	66	2.9	52 (78.8)	14 (21.2)
Employed full-time or part-time	608	26.5	485 (79.8)	123 (20.2)
Disabled (not working)	263	11.5	219 (83.3)	44 (16.7)
Student/training	440	19.2	371 (84.3)	69 (15.7)
Not in labour force or unemployed	919	40.0	783 (85.2)	136 (14.8)

Table 9

Gamblers versus Non-Gamblers by Income Source

	Total by Income Source	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
Retirement Income	65	3.1	48 (73.8)	17 (26.2)
Disability Insurance	96	4.6	73 (76.0)	23 (24.0)
Employment	515	24.8	404 (78.4)	111 (21.6)
Other	164	7.9	136 (82.9)	28 (17.1)
Family Support	230	11.1	191 (83.0)	39 (17.0)
Employment Insurance	90	4.3	75 (83.3)	15 (16.7)
None	460	22.1	391 (85.0)	69 (15.0)
Ontario Works	322	15.5	287 (89.1)	35 (10.9)
Ontario Disability Support Program	135	6.5	121 (89.6)	14 (10.4)

Year First Admitted

There was a significant difference between the two groups in the year they were first admitted to the treatment center, $\chi^2(3, N = 2545) = 80.03, p < .001$. These results are presented in Table 10. Post-hoc comparisons were conducted using pairwise Chi-squares with a modified Bonferroni correction. It was found that 2004 had both the highest number of overall clients (961), and that the percentage of gamblers in 2004 was significantly higher than any other year. The percentage of gamblers in the year 2005 was also significantly higher than in 2003 and in 2006.

Table 10

Gamblers versus Non-Gamblers by Year First Admitted

	Total by Year First Admitted	% of Total N	N of Non-Gamblers (%)	N of Gamblers (%)
2003	417	16.4	381 (91.4)	36 (8.6)
2004	961	37.8	722 (75.1)	239 (24.9)
2005	692	27.2	575 (83.1)	117 (16.9)
2006	475	18.7	429 (90.3)	46 (9.7)

Gambling as a Primary versus Secondary Problem

While many gamblers presented for treatment with gambling as a primary problem ($N = 138$), others initially presented for treatment of a different addiction or mental health problem ($N = 280$). Analyses were conducted to determine whether these two groups were different.

Substance Abuse

Of the clients with gambling as the primary addiction, 79.4% did not have any substance addictions, compared to only 4.3% of the group with gambling as a secondary addiction. These differences were significant, $\chi^2(14, N = 418) = 243.03, p < .001$. Figure 1 is an illustration of the percentages of substances used by each group, including only substances that had at least 10 instances of abuse. Clients who indicated problems with more than one substance had each substance counted separately in Figure 1.
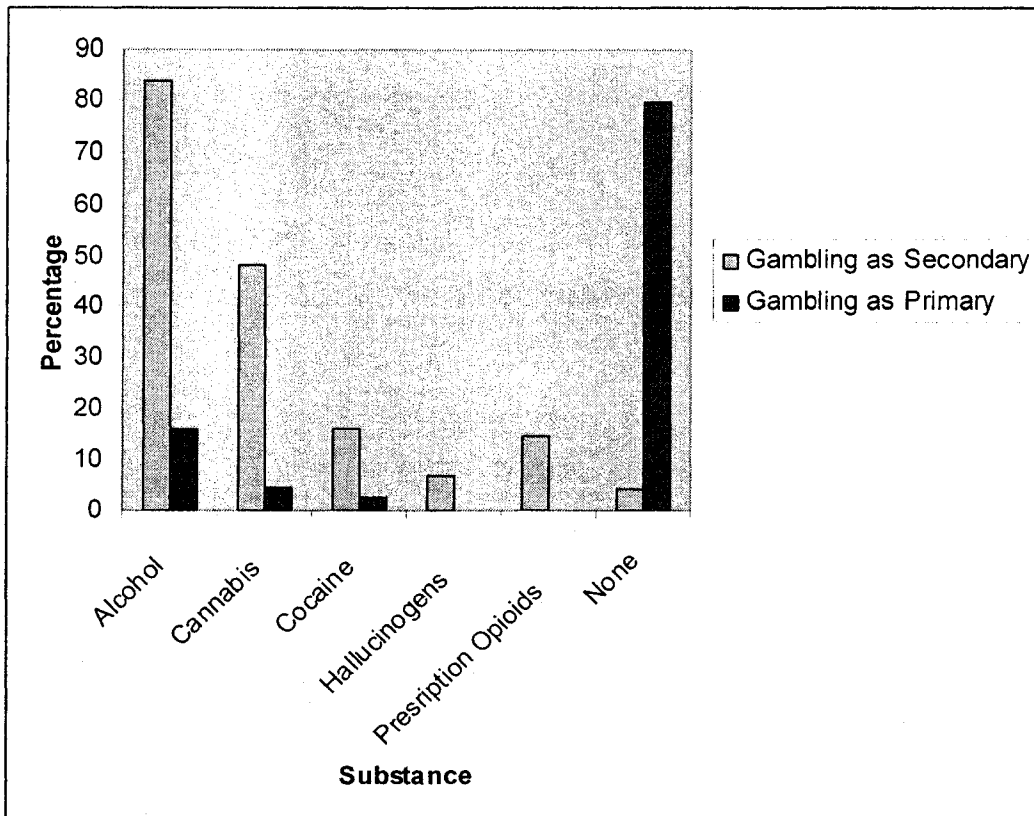
Figure 1. Substances Used by Clients with Gambling as a Primary Versus Secondary

Problem

Mental Health Diagnoses

The presence of a mental health diagnosis in the last 12 months, and in the client's

lifetime did not show any significant differences between the two groups, as seen in Table

11 and Table 12. In the last 12 months 12.0% of gambling clients have been diagnosed

with a mental health disorder. This percentage rises to 23.0% in gamblers when looking at

mental health diagnoses over their lifetime. Whether clients presented with gambling as

the primary or secondary problem did not show any significant differences in their mental

health diagnoses.

Table 11

Percentage of Gamblers by Mental Health Diagnoses in the Last 12 months

	Total by Mental Health Diagnoses	% w/ Gambling as Primary Problem	% w/ Gambling as Secondary Problem
No	192	80.8	77.8
Yes	50	19.2	22.2

Table 12

Percentage of Gamblers by Mental health Diagnoses in Their Lifetime

	Total by Mental Health Diagnoses	% w/ Gambling as Primary Problem	% w/ Gambling as Secondary Problem
No	146	60.3	60.3
Yes	96	39.7	39.7

Disorder Diagnoses

The two groups did show significant differences in which disorders were present $\chi^2(3, N = 74) = 19.66, p < .001$. The list of disorders was numerous, but only disorders that presented themselves in at least 10 clients were included in the analysis and Table 13. Clients with ADD, ADHD, or Disruptive Behaviour Disorder never presented with gambling as the presenting problem. Anxiety disorders showed an 81.8% rate of gambling as the primary problem, while major depressive disorder had a 64.2% rate of gambling as the primary problem. Post hoc comparisons using pairwise Chi-squares with a modified Bonferroni correction showed that ADD/ADHD/Disruptive Behavior Disorder clients were less likely to have gambling as a primary problem than either the Anxiety Disorder clients or the Major Depressive Disorder clients.

Table 13

Percentages of Diagnoses of Gamblers by Disorder

	Total	% w/ Gambling as Primary Problem	% w/ Gambling as Secondary Problem
ADD/ADHD/Disruptive Behaviour Disorder	12	0	100.0
Anxiety Disorder	11	81.8	18.2
Bipolar Affective Disorder	11	37.5	62.5
Major Depressive Disorder	53	64.2	35.8

Gender

The results showed that there were more males ($N = 238$) than females (N = 180) who came to the addictions center with a gambling related problem. There was however, significantly more females (44.4%) than males (24.4%) with gambling as the primary problem, $\chi^2(1, N = 418) = 18.68, p < .001$. So although there was a higher number of males overall who presented with gambling as a problem, there were still more females who presented with gambling as the primary problem. For the majority of males (75.6%), gambling was secondary to another problem. These results are summarized in Table 14.

Table 14

Percentage of Gamblers by Gender

	Total by Gender	% of 418	% w/ Gambling as Primary Problem	% w/ Gambling as Secondary Problem
Males	238	56.9	24.4	75.6
Females	180	43.1	44.4	55.6

Relationship Status

There was a significant difference in relationship status between types of gambler (primary vs. secondary), $\chi^2(4, N = 418) = 56.36, p < .001$. Most of the gamblers in our sample were single (never married) clients whom were most likely to have gambling as the secondary problem (84.3%). Separated or divorced clients also presented less often with gambling as the primary problem (42.0%). Clients who are married, partnered or in a common-law relationship, or who were married, but are now widows or widowers were more likely to have gambling as the primary problem (52.1% and 64.3%, respectively). Post-hoc comparisons were conducted using pairwise Chi-squares with a modified Bonferroni correction. The single (never married) clients were significantly less likely to have gambling as a primary problem, compared to all of the other groups. The other groups did not significantly differ from each other. These results are summarized in Table 15.

Table 15

Percentage of Gamblers by Relationship Status

	Total by Relationship Status	% of 418	% w/ Gambling as Secondary Problem	% w/ Gambling as Primary Problem
Single (Never Married)	197	47.1	84.3	15.7
Separated or Divorced	88	21.1	58.0	42.0
Married/Partnered/Common-Law	117	28.0	47.9	52.1
Widow or Widower	14	3.3	35.7	64.3

Income Source

There was a significant relationship between Income Source and type of gambler (primary vs. secondary), $\chi^2(11, N = 418) = 106.56, p < .001$. Clients receiving retirement income were most likely to show gambling as a primary problem (73.7%). Clients who were employed or on disability insurance were also more likely to show gambling as the primary problem (60.0% and 56.5% respectively). Clients least likely to show gambling as the primary problem were those receiving family support (7.7%), no income (13.0%), Ontario Works (16.2%), Ontario Disability Support (25.0%) and Employment Insurance (43.8%). These results are summarized in Table 16.

Table 16

Percentage of Gamblers by Income Source

	Total by Income Source	% of 418	% w/ Gambling as Secondary Problem	% w/ Gambling as Primary Problem
Retirement Income	19	4.5	26.3	73.7
Employment	115	27.5	40.0	60.0
Disability Insurance	23	5.5	43.5	56.5
Employment Insurance	16	3.8	56.3	43.8
Ontario Disability Support Program	16	3.8	75.0	25.0
Ontario Works	31	7.4	83.8	16.2
None	77	18.4	87.0	13.0
Family Support	39	9.3	92.3	7.7

Age

The age of clients with gambling problems ranged from age 16 to 87. Clients with gambling as the primary disorder (Mean age = 48.51, *SD* = 13.08) were significantly older than clients with gambling as a secondary disorder (Mean age = 33.96, *SD* = 13.78), $t(416) = -10.50, p < .001$.

The percentage of gamblers with gambling as the primary problem tended to increase with age. Gambling as a primary problem at the lowest age group is 1.5%, and increases throughout the age groups, hitting 90.9% at the highest age group. A point bi-serial correlation found that this was indeed a significant correlation, $r = .451, p < .001$. See Table 17 and Figure 2 for an illustration of this.

Table 17

Percentage of Gamblers by Age Groups

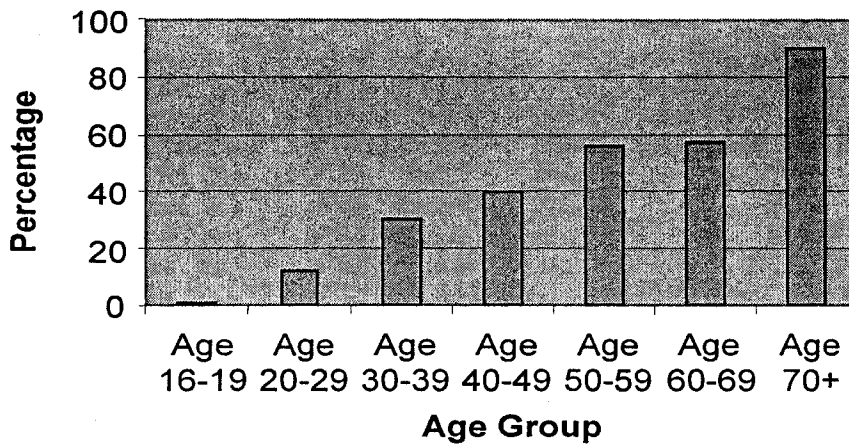|	Total by Age	% w/ Gambling as Secondary Problem	% w/ Gambling as Primary Problem
Aged 16-19	68	98.5	1.5
Aged 20-29	64	87.5	12.5
Aged 30-39	78	69.2	30.8
Aged 40-49	102	59.8	40.2
Aged 50-59	76	43.4	56.6
Aged 60-69	19	42.1	57.9
Aged 70+	11	9.1	90.9

Figure 2. Primary Gamblers by Age Groups

Year First Admitted

A significant relationship existed between the year a client was first admitted and the gambling type (primary vs. secondary), $\chi^2(3, N = 418) = 14.52, p < .05$. The total number of clients admitted to the treatment center for gambling problems saw a spike in 2004 when there was a total of 226 clients presenting with problem gambling. Yet data from 2006 showed gambling as the primary problem 46.7% of the time, almost doubling the 25.2% in 2004. Post-hoc tests showed that 2004 had significantly lower rates of primary problem gamblers than either 2005 or 2006. The rest of the years were not significantly different from each other. These results are summarized in Table 18.

Table 18
Percentage of Gamblers by Year First Admitted

	Total Number of Gamblers	% w/ Gambling as Secondary Problem	% w/ Gambling as Primary Problem
2003	36	63.9	36.1
2004	226	74.8	25.2
2005	111	57.7	42.3
2006	45	53.3	46.7

Note: 2006 does not include a full year of data

Education

A significant relationship existed between education and whether a client had gambling as a primary or secondary problem, $\chi^2(4, N = 404) = 89.54, p < .001$. That is, gambling was significantly more likely to be the primary problem in those who completed some community college (64.5%) or who had some postsecondary education (64.7%). There is a complete reversal for clients with an education level of high school or lower, as their rates point towards gambling as a secondary problem. Clients who are more educated then, show much higher rates of gambling as the primary problem than those with less education. A point bi-serial correlation showed that this increase in primary gamblers as education increased was significant, $r = .430, p < .001$. The results are summarized in Table 19, and illustrated in Figure 3.

Table 19

Percentage of Gamblers by Education

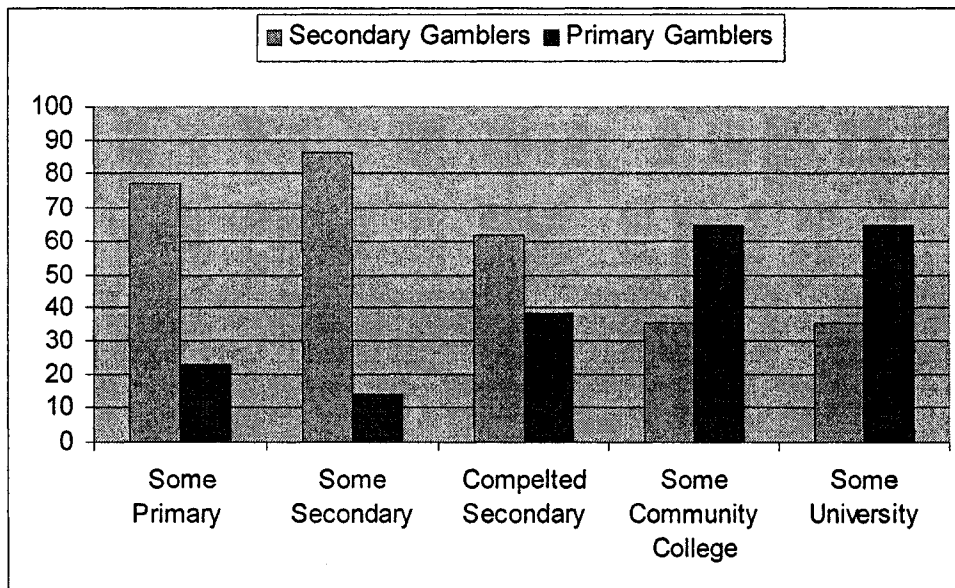|	Total by Education	% w/ Gambling as Secondary Problem	% w/ Gambling as Primary Problem
Some Primary School	40	77.5	22.5
Some Secondary	185	86.5	13.5
Completed Secondary	55	61.8	38.2
Some Community College	107	35.5	64.5
Some University	17	35.3	64.7

Figure 3. Education and Gambling

Young Offenders

A significant relationship existed between which type of gambler (primary versus secondary) a client was and their young offender status, $\chi^2(3, N = 418) = 28.62, p < .001$. Most identified as not being a young offender (80.9%). Of the young offenders in our sample, 39 of them (97.5%) presented with gambling as a secondary problem.

Legal Status

A significant relationship existed between the type of gambler (primary versus secondary) and their legal status, $\chi^2(7, N = 418) = 39.0, p < .001$. Clients not having any legal problems were more likely to present with gambling as the primary problem (41.1%), compared to those awaiting trial or sentencing (30.0%), incarcerated (9.7%), and those on probation (6.5%). Figure 4 is an illustration of these results.
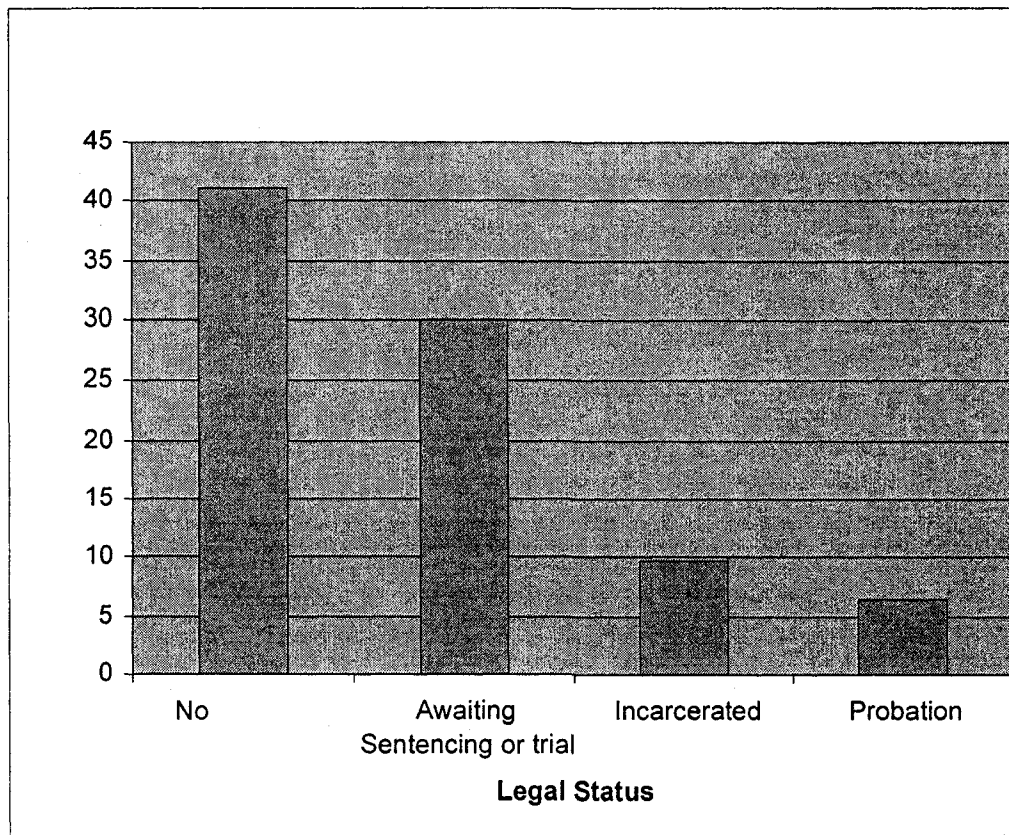
Figure 4. Percentage of Primary Problem Gamblers by Legal Status

Discussion

The present study examined the rates of comorbidity in gambling clients who attended treatment centres in Thunder Bay between 2003 and mid 2006. The findings showed a relatively high rate of substance addiction with 73.9% of gambling clients having a co-morbid addiction. This rate is somewhat higher than the prevalence rate of 50% reported in recent literature (Westphal & Johnson, 2003).

In the case of mental health co-morbidity, the rates were much lower, with the highest rates at 12.7% for major depressive disorder. This is much lower than findings from a meta-analysis study by Crockford and el-Guebaly (1998) who found that in most of the studies included in their meta-analysis, at least 75% of Problem Gamblers met the criteria for major depressive disorder. The present study also failed to identify elevated

rates in any other mental health disorders such as Obsessive Compulsive Disorder, Bipolar Disorder and Anxiety Disorder which have all been reported to be elevated in Problem Gamblers (Dell'Osso, Allen & Hollander, 2005). This is not to say however, that the gamblers in our study did not have mental health problems as 23.2% had been diagnosed with a mental health disorder at some point in their lifetime. The reasons for this discrepancy are unclear and likely reflect differences in the assessment procedures. For clients in the present data set, mental health assessment may have been less of a priority, and less rigorous assessment methods used.

Clients with Gambling as a Primary versus Secondary Problem

One striking finding that emerged from the data is that there was a large difference between clients who present primarily for treatment of gambling and those who present for treatment of another addiction, and for whom gambling was a secondary problem. In the case of substance comorbidity, most (79.4%) of those with gambling as a primary problem did not have a substance addiction, in contrast to only 4.3% of the secondary gambling group. Thus, substance co-morbidity in the primary group is much lower than would be estimated for the overall sample of problem gamblers. This very large difference between the two groups is an important distinction to make as the two groups are at opposite ends of the spectrum for rates of substance addiction. No previous studies that I know of on gambling comorbidity have taken this difference into consideration.

No difference in the rates of mental health comorbidity for either the last 12 months or lifetime was found between primary gamblers versus secondary gamblers. However, these two groups differed significantly in their type of mental illness. Of those

gamblers with ADD/ADHD/Disruptive Behaviour Disorder, none of them had gambling as their primary problem, while for those with Anxiety Disorder or Major Depressive Disorder, 81.8% and 64.2% respectively had gambling as their primary problem. This finding indicates that the distinction between gambling clients with gambling as their primary problem and those who have a substance addiction as their primary problem may also be important when reporting mental illness comorbidity in problem gamblers.

There were also many other significant differences between the two groups. Clients with gambling as the primary problem were more likely to be female, widows or widowers, employed or on retirement income, older, better educated and without any legal problems. In contrast, clients with gambling as the secondary problem were more likely to be male, single (never married) or separated/divorced, on income from either the Ontario Disability Support Program, Ontario Works, from family support or with no income at all. These clients also tended to be younger, less educated, and on probation.

The analyses included a comparison of gambling clients to the other clients who had substance addictions, but not a gambling problem. The differences between these two populations are largely similar to the differences between primary and secondary gamblers. Those with secondary gambling problems show more similarity to the substance addiction clients who do not have a gambling problem than they do to primary gambling clients. This finding supports the importance of identifying those who seek help primarily for a gambling problem, as they reflect a quite different population than the other addiction clients, including those who have a secondary gambling problem.

Limitations

This study is limited by the secondary nature of the data as much of the data relied upon a client's self-perception and level of honesty. The author also had no control over the selection of measures to be included in the database, the collection of data, or the data entry. One of the difficulties when working with an existing data set is that many variables will have missing data, and one has no control over the clients who are included in the data set. In particular, it was surprising that about 4% of the clients reported neither a substance nor a gambling addiction. One explanation for the absence of reported substance addictions in the non-gambling clients is that some clients are in denial and do not provide this information during their initial session and do not return for further sessions (N. Black, personal communication, July 2007). As well, information about other addictions was missing for 8.2% of the clients, so the decision was made in the present study to include the entire data set.

Another limitation is that the findings are from one geographical centre, Thunder Bay, which serves clients from most of Northwestern Ontario, and for one time period 2003 till mid 2006. Thunder Bay has one of the highest rates of gambling addiction in the province (3.6%, Rush, Veldhuizen & Adlaf, 2007), so the present findings may not generalize to centres with lower rates of problem gambling.

Directions for Future Research

The present study also used only one of the 13 excel files supplied from the Catalyst system. The remaining data sets included more detailed information on types of gambling (slots, poker, card games, etc.), specific health conditions (diabetes, blood pressure problems, cancer, etc.), program information (type of program, length of program, completed, etc.), referral sources, as well as more in depth information of some

variables examined in the present study such as frequency and type of of substance use. There is likely a considerable amount of useful knowledge to be gained from further studies examining these variables.

Summary

The existence of the Catalyst database provided an opportunity to gain a better understanding of the clients who present for treatment of gambling problems in this region. The findings show the importance of distinguishing between those who have gambling as their presenting problem and those who presented for treatment of a substance addiction, but who also had a gambling problem. Those who have a primary gambling problem are likely to be older, better educated, and have better sources of income. In contrast, those with gambling as a secondary problem are more likely to have trouble with the law, and to be single (never married).

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