Journal of Gambling Issues
Issue 33, September 2016
http://igi.camh.net/doi/pdf/10.4309/jgi.2016.33.10
DOI: http://dx.doi.org/10.4309/jgi.2016.33.10

Special Section: *JGI* Scholar's Award, Category A

Cognitive Behavioural Group Therapy for Problem Gamblers who Gamble over the Internet: A Controlled Study

Nicholas Harris[1,2] & Dwight Mazmanian[1]

[1] Department of Psychology, Lakehead University, Thunder Bay, Ontario, Canada
[2] Mental Health and Addictions Services, Eastern Health, St. John's, Newfoundland, Canada

Abstract

Several studies have found higher rates of problem gambling among Internet gamblers than non-Internet gamblers. Because of easy access and convenience, along with other gaming characteristics, many researchers in the field have advanced the argument that Internet gambling is potentially more addictive and problematic than land-based gambling activities. However, research examining the efficacy of treatments for problem gamblers who gamble over the Internet has not yet been conducted. The purpose of the present study was to examine the efficacy of group cognitive behavioural therapy for self-identified problem Internet gamblers. Thirty-two participants were randomly assigned to either the treatment group (n = 16) or wait list (delayed treatment) comparison group (n = 16). Results indicated that the treatment was efficacious in improving three of the four dependent variables from pre- to post-test/treatment: number of *DSM-IV* criteria for pathological gambling endorsed, perception of control over gambling, and number of sessions gambled. No significant pre- to post-test/treatment difference was found between groups on desire to gamble. Groups were combined to examine treatment outcome over time, with results showing significant pre- to post-treatment and pre- to three-month post-treatment improvement for all four dependent variables.

Keywords: problem gambling, Internet gambling, cognitive behavioural therapy, control trial

Résumé

De nombreuses études ont observé un taux plus élevé de problèmes de jeu chez les joueurs qui jouent en ligne que chez les autres joueurs. Étant donné l'accès facile et commode du jeu en ligne, qui s'ajoute aux autres caractéristiques des jeux de hasard, de nombreux chercheurs du domaine soutiennent que le jeu en ligne est plus susceptible d'entraîner une dépendance et de devenir problématique que les jeux de

hasard dans le monde réel. Aucune recherche ne s'est cependant penchée sur l'efficacité des différentes thérapies sur les personnes ayant un problème de jeu en ligne. Aussi l'objectif de la présente étude était-il d'examiner l'efficacité d'une thérapie de groupe cognitivo-comportementale menées auprès de personnes ayant un problème de jeu en ligne. Les 32 participants ont été distribués au hasard entre un groupe de thérapie (n = 16) et un groupe témoin (n = 16) dont les membres ont été inscrits sur une liste d'attente (thérapie retardée). Les résultats indiquent que la thérapie a permis d'améliorer trois des quatre variables évaluées dans le cadre d'un test précédant et suivant le traitement : le nombre des critères du DSM-IV liés au jeu pathologique présents, la perception d'exercer un contrôle sur le jeu et le nombre de séances de jeu. Le test précédant et suivant le traitement n'a révélé aucune différence entre les groupes quant au désir de jouer. Les groupes ont été mélangés pour évaluer les résultats de la thérapie dans le temps et d'importantes améliorations des quatre variables dépendantes ont été observées entre le test précédant la thérapie et ceux effectués après celle-ci et trois mois plus tard.

Introduction

Access to legalized gambling activities has grown substantially in recent years. A major reason for this growth has been the development of the Internet gambling industry (Gainsbury, Wood, Russell, Hing, & Blaszczynski, 2012). Internet gambling is "all forms of gambling on chance events for money (including wagering and betting on skilled games) via the Internet. This includes gambling using computers, mobile phones, or wireless devices connected to the Internet" (Gainsbury, Russell, Hing, Wood, & Blaszczynski, 2013, p. 2). Internet gambling has changed the gambling landscape worldwide, providing consumers with convenient, anonymous, and unlimited access to a wide-range of gambling activities.

Despite various consumer benefits, several concerns about online gambling have been identified. For instance, (1) credit card access allows Internet gamblers to gamble themselves into excessive debt; (2) unlike land-based casinos, Internet casinos cannot monitor the alcohol or drug consumption of their patrons and, as a result, are unable to stop intoxicated patrons from gambling further; (3) Internet gambling characteristics such as the pace of play and the opportunity to play multiple games at once, allow consumers to wager money at faster rates; and (4) the ability to gamble anonymously and privately allows Internet gamblers to gamble excessively without the knowledge of family members or friends (Gainsbury, Parke, & Suhonen, 2013; Griffiths, 2001). Given such concerns, it would appear that characteristics of Internet gambling provides patrons a platform to gamble more often and for longer periods of time than do more traditional means of land-based gambling. From this perspective, it seems that gambling via the Internet may contribute to an increase risk in problem gambling behaviours.

Problem gambling can be defined as "gambling behaviour that creates negative consequences for the gambler, others in his or her social network, or for the community" (Ferris & Wynne, 2001, p. 7). The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-V*) (American Psychiatric Association, 2013) classifies a gambling disorder, more severely, as Substance-Related and Addictive disorder. Research to date suggests a strong relationship between Internet gambling participation and problem gambling behaviours (e.g., Gainsbury et al., 2013; Griffiths & Barns, 2008; Griffiths, Wardle, Orford, Sproston, & Erens, 2009; Shen, Kairouz, Nadeau, & Robillard, 2015; Wood & Williams, 2011). For instance, in a survey of 12,521 international gamblers, Wood and Williams (2011) found that the prevalence of problem gambling was three to four times higher among Internet gamblers (16.4%) than non-Internet (exclusively land-based) gamblers (5.7%). Furthermore, Internet game play has been found to be associated with increased treatment participation among problem gamblers (Braun, Ludwig, Sleczka, Bühringer, & Kraus, 2014). Such findings have led many researchers in the field to argue that Internet gambling is more addictive and problematic than land-based gambling activities (Gainsbury et al., 2013; Griffiths & Barns, 2008). However, despite the growing number of studies demonstrating a relationship between Internet gambling and problem gambling, because of methodological limitations within these studies (e.g., cross-sectional designs), the direction of causality of this relationship is unknown (Wood, Williams, & Park, 2012). In other words, it may be the case that problem gamblers are more likely to seek out more gambling opportunities including those via the Internet. Research has also found that problem gamblers are more inclined to regularly participate in multiple gambling activities (McCormack, Shorter, & Griffiths, 2013). In fact, the vast majority of problem Internet gamblers also report utilizing land-based gambling venues (Gainsbury et al., 2012; Wardle, Moody, Griffiths, Orford, & Volberg, 2011). It may also be the case that the characteristics of Internet gambling may contribute to the engagement in problem gambling behaviours. In a qualitative study examining the features of Internet gambling that contribute to a loss of control in gambling behaviours, easy accessibility, ease of gambling on credit, and excessive online promotions, were reported by problem gambling participants as contributors to loss of control (Hing et al., 2014). Regardless of the directionality of this relationship, it is cause for concern, as the Internet has become a means for many to engage in maladaptive gambling behaviours.

Despite the growing concern of Internet problem gambling, to the best of our knowledge, there are no published studies to date that have examined the efficacy or effectiveness of existing treatment modalities on problem gamblers who utilize the Internet as a means of access to gambling. Given the Internet gambling-problem gambling relationship, and that many researchers have argued that gambling over the Internet may be more addictive and problematic than land-based gambling (Gainsbury et al., 2013; Griffiths & Barns, 2008), the argument could be made that problem Internet gambling behaviours may be less responsive to current evidence-based problem gambling treatments. Compared to land-based venues, Internet gambling allows for easier accessibility, an ability to gamble on credit, and

a faster pace of play; characteristics that may make problem gambling behaviours more resistant to change despite treatment. Within the literature, cognitive-behavioural therapy (CBT) has been the most extensively studied and supported treatment for problem gambling (Gooding & Tarrier, 2009). Cognitive behavioural therapy programs for problem gambling often include motivational enhancement, behavioural and cognitive interventions, and relapse prevention knowledge and strategies. Treatment objectives include helping the client understand the origins of his or her gambling problem, and why that problem is maintained over time, while concurrently providing cognitive and behavioural strategies to help break maladaptive patterns of gambling behaviours (Ladouceur & Lachance, 2007). To date, outcome studies examining CBT have utilized samples of problem gamblers who may or may not have gambled over the Internet.

The purpose of the current study was to examine the efficacy of group CBT for problem gamblers who gamble over the Internet. It was hypothesized that the treatment group would show significant improvements, in four gambling-related outcomes, when compared to the wait list comparison group: (1) *DSM-IV* criteria for pathological gambling, (2) urge to gamble, (3) perception of control over gambling, and (4) number of gambling sessions. These outcomes were assessed at pre-treatment, and again at immediate post-treatment, and once more at three-month post-treatment follow-up.

Method

Participants

Participants were 32 self-identified Internet gamblers seeking treatment for problem gambling. Participants included 17 males and 15 females and ranged from 22 to 52 years of age (M age = 34.3 years, SD = 7.3). Seventy-two percent of participants reported being Caucasian/White, 19% Aboriginal (First Nation or Inuit), 6% Hispanic/Latino, and 3% African-Canadian/Black. The most frequently reported land-based gambling games played by participants were slot machines (68.8%), casino table games (e.g., blackjack, roulette) (46.9%), bingo (18.8%), and sports betting (12.5%). Internet gambling games most frequently endorsed included poker (56.3%), slot machines (43.8%), sports betting (40.6%), and casino table games (34.4%). Participants entered the study from January 2012 to June 2014.

Measures

Demographic questionnaire. Individual characteristics including age, sex, ethnicity, marital status, employment status, and student status were assessed.

Gambling Behaviour and Treatment Participation Questionnaire. This brief 6-item gambling behaviour and treatment participation questionnaire was developed by the current researchers to assess the types of Internet gambling and non-Internet gambling activities participated in over the past 12 months. Two items assessed whether problem

gambling treatment had been engaged in before and the final item examined participant treatment outcome goals (e.g., stop gambling completely, cut back on gambling).

***DSM-IV-TR* Criteria for Pathological Gambling** (American Psychiatric Association, 1994). The 10 criteria for pathological gambling were administered in a questionnaire format. Participants were asked to rate each criterion "yes" or "no" based on their respective gambling-related behaviours over the previous month.

Gambling-Related Questions (Ladouceur & Lachance, 2007). This questionnaire is recommended by Ladouceur and Lachance (2007) as a pre- and post-treatment assessment measure for clients of a CBT program for problem gambling. This brief questionnaire measured perception of control over gambling ranging from 0% (not at all) to 100% (totally), desire to gamble ranging from 0 (not at all) to 10 (totally), and gambling frequency as measured by the number of participated gambling sessions. Each of these outcomes was measured over the previous month. This questionnaire has been used as a pre- and post-treatment measure in other studies examining the efficacy of CBT for pathological gambling (Ladouceur et al., 2001; Ladouceur et al., 2003; Sylvain, Ladouceur, & Boisvert, 1997).

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993). The AUDIT is a 10-item self-report questionnaire that measures past-year alcohol consumption, drinking behaviour, and alcohol-related problems. Total scores range from 0 to 40, with a score of eight or more indicating hazardous or harmful alcohol use. The AUDIT has been shown to have good internal consistency and strong validity (Allen, Litten, Fertig, & Barbor, 1997), and was administered in the current study to help ensure no group differences on alcohol consumption and related problems.

The Symptom Checklist -90- Revised (SCL-90-R; Derogatis & Unger, 2010). The SCL-90-R is a screening measure for general psychiatric symptomatology and includes dimensions measuring somatization, obsessive-compulsive, depression, anxiety, phobic anxiety, hostility, interpersonal sensitivity, paranoid ideation, and psychoticism. This self-report questionnaire includes 90 items that are measured on a 5-point scale ranging from 0 (not at all) to 4 (extremely). Summing the scores from all 90 items and dividing by 90 computes the Global Severity Index (GSI). The current study utilized GSI score to help ensure no group differences on general psychiatric symptomatology. SCL-90-R subscale scores were not utilized in the current study.

Desirability Scale of the Personality Research Form (Jackson, 1967). This Desirability scale has 16 items and a high score indicates that the respondent, either consciously or unconsciously, is responding to the items in such a way that is making himself or herself appear desirable. The Desirability scale has been shown to have good test-retest reliability over a two-week interval (r = .86) and good internal consistency (α = .82). The PRF Desirability Scale has been used in numerous studies

in personality as a detector of mild to extreme participant distortion or faking (e.g., MacNeil & Holden, 2006).

Infrequency Scale of the Personality Research Form (Jackson, 1967). This Infrequency scale has 16 items, and a high score indicates that the respondent may be randomly or carelessly responding to the questionnaire items. Test-retest reliability with a two-week interval (r = .46) and internal consistency (α = .51) are adequate given the nature of this scale.

Experimental Design and Procedure

Ethics approval for this study was obtained from the appropriate University Research Ethics Board. Participants were recruited from the general community through land-based advertisements, online advertisements, and local media announcements (e.g., newspaper, radio). To be included in the study participants had to have met the following criteria: (1) possess a self-defined problem with gambling and be interested in participating in treatment for problem gambling, (2) have gambled over the Internet in the past 12 months, (3) not already be receiving treatment for problem gambling, and (4) be 19 years of age or older. Participants having met inclusion criteria were assigned to either the treatment group or a wait list comparison group. Participants were sequentially assigned by the order in which they entered the study (i.e., first participant was assigned to the treatment group, second to the wait list comparison group, third to the treatment group, and so on).

Treatment Group. Participants assigned to the treatment group first completed the pre-test measures. These participants were administered 12 weekly sessions, each lasting 90 minutes in length, and groups were comprised of 3 to 5 participants (M = 4, SD = 1). Immediately following the treatment period (i.e., 12 weeks), the treatment group was administered post-test measures. Participants were also administered follow-up measures at three-months post-treatment. At the three-month follow-up time, participants were sent an e-mail reminding them to complete the follow-up questionnaires. The e-mail included a link to the online questionnaire. Participants were compensated with a $20 gift certificate for completing the post-treatment and three-month follow-up questionnaires.

Wait List Comparison Group. Participants assigned to the wait list comparison group first completed the pre-test measures and were then notified that they would be receiving treatment in 12 weeks' time. Participants were not notified specifically that they had been assigned to a wait list comparison group. Following the 12-week waiting period, participants completed the post-test measures and were offered the problem gambling treatment. Certain wait list participants engaged in therapy groups that had also included participants who had been assigned to the treatment group and who had not had to engage in the waiting-list period. Wait list participants also completed post-treatment measures following their respective treatment and three-month post-treatment follow-up measures.

Treatment. The treatment program followed Ladouceur and Lachance's (2007) treatment manual for pathological gambling. This CBT program includes four main components: (1) motivational interviewing, (2) behavioural interventions, (3) cognitive interventions, and (4) relapse prevention. Treatment consisted of an initial individual session and 11 weekly group sessions, each 90 minutes in length. The treatment program was tailored for group therapy, as clients were given opportunities during each session to discuss within the group their respective thoughts and feelings regarding their previous experiences with trying to refrain from gambling over the course of the previous week.

Therapist. The therapist was a PhD student in clinical psychology practicing under the supervision of a registered clinical psychologist. This student had previously taken several advanced courses in psychotherapy including courses in CBT and group therapy. In addition, the student had previously engaged in supervised clinical placements consisting of cognitive behavioural group therapy with individuals suffering from maladaptive substance use.

Attrition. Thirty-two participants were randomly assigned to either the treatment (n = 16) or wait list comparison group (n = 16). Following randomization, three participants dropped out of the study: one participant from the treatment group and two participants from the wait list comparison group. Furthermore, 5 participants assigned to the wait list comparison group declined to participate in treatment following the waiting list period. Several participants completed post-treatment and 3-month follow-up measures despite not attending all treatment sessions or discontinuing treatment while in the treatment phase of the study. See Figure 1 for participant attrition at each stage of the study. Of the 24 participants who began treatment the number of sessions attended by participants ranged from 2 to 12 sessions (M = 7, SD = 2.81).

Results

Data Screening

Prior to data analyses, data were downloaded from SurveyMonkey into a series of SPSS data files, which were then amalgamated into a single SPSS data file. Descriptive statistics and frequencies of the variables were computed and examined to detect univariate outliers and missing data. No univariate outliers were detected. If a participant failed to answer two or fewer items from the PRF Desirability scale, PRF Infrequency scale, AUDIT, *DSM-IV-TR* criteria for pathological gambling, or any of the SCL-90-R dimensions, those items were replaced with the participant's average score from that particular scale. If the participant failed to answer more than two items from any one of these scales, that total scale score was not calculated for the participant. Infrequency item scores were totalled to examine whether any participants had endorsed over three items on the Infrequency scale. No participants were identified as endorsing three or more Infrequency items.

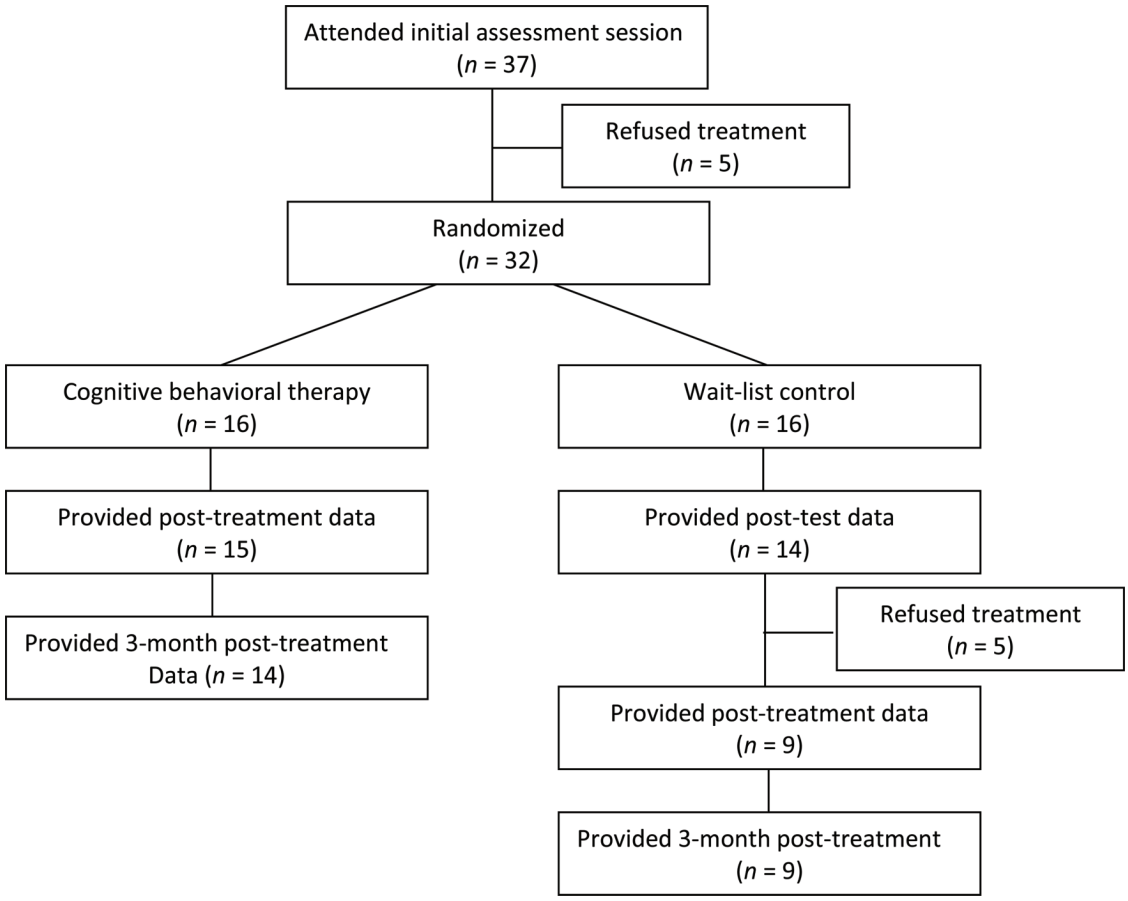

Figure 1. Participant Attrition through the Stages of the Study

Analyses

Pre-Treatment Group Differences. A series of independent sample *t*-tests and chi-square tests were conducted to examine pre-treatment differences between the treatment group and wait list comparison group (Table 1). No significant group differences were found on any demographic variables, pre-treatment measure scores, or on the four outcome measures. In terms of gambling-related and treatment-seeking behaviours, no pre-treatment differences were found on previous problem-gambling treatment engagement or current gambling-related treatment goals.

Comparison of Groups on Post-Treatment Outcome Measures. A one-way MANOVA was utilized to examine group differences on post-treatment outcome measures (*DSM-IV-TR* criteria, urge to gamble, number of gambling sessions, and perception of control). Results showed that group had a significant main effect, F (4, 21) = 2.7, p = .007, Wilks' λ = 0.53, partial η^2 = .47. A series of post hoc univariate analyses were performed to examine the main effect of group on each of the four post-treatment outcome measures. Results showed a significant difference between group means on DSM-*IV-TR* criteria for pathological gambling, F (1, 24) = 10.384, p = .004, partial η^2 = .302; perception of control

Table 1
Pre-treatment characteristics of the treatment and wait list comparison groups (n =32)

Variable	Group		*t*	*df*	χ^2	*p*
	Treatment (*n* = 16)	Wait list (*n* = 16)				
Age (years)	*M* = 36.69 (*SD* = 8.01)	*M* = 31.81 (*SD* = 5.79)	1.974			.058
Gender % Male	9 (56.25%)	8 (50.00%)		1	.125	.723
Marital status						
% Unmarried/not Common-law	7 (43.75%)	5 (31.25%)		1	.533	.465
% Married/Common-law	6 (37.5%)	10 (62.5%)		1	2.00	.157
% Separated/Divorced	3 (18.75%)	1 (6.25%)		1	1.14	.285
Ethnicity						
% Caucasian/White	12 (75%)	11 (68.75%)		1	.155	.694
% African-Canadian/black	0	1 (6.25%)		1	1.03	.310
% Hispanic/Latino	0	2 (12.5%)		1	2.13	.144
% Aboriginal (First Nation or Inuit)	4 (25%)	2 (12.5%)		1	.821	.365
Employment						
% Employed	12 (75%)	12 (75%)		1	1.00	1.00
% Unemployed	4 (25%)	4 (25%)		1	1.00	1.00
% Student	2 (12.5%)	6 (37.5%)		1	2.67	.102
Psychopathology measures						
AUDIT	*M* = 7.13 (*SD* = 6.02)	*M* = 9.56 (*SD* = 4.56)	1.291	30		.207
SCL-90-R GSI	*M* = 0.50 (*SD* = 0.34)	*M* = 0.46 (*SD* = 0.27)	.389	28		.701
Personality Research Form						
Desirability	*M* = 8.04 (*SD* = 1.73)	*M* = 9.00 (*SD* = 2.13)	1.397	30		.173
Infrequency	*M* = 0.69 (*SD* = 1.01)	*M* = 0.31 (*SD* = 0.48)	1.337	30		.191
Outcome measures						
DSM-IV criteria	*M* = 6.50 (*SD* = 1.32)	*M* = 7.13 (*SD* = 1.41)	1.297	30		.205
Perception of control	*M* = 0.94 (*SD* = 1.29)	*M* = 0.46 (*SD* = 0.63)	1.394	30		.174
Desire to gamble	*M* = 8.56 (*SD* = 1.31)	*M* = 8.50 (*SD* = 1.03)	.150	30		.882
# of gambling sessions	*M* = 11.53 (*SD* = 4.00)	*M* = 11.75 (*SD* = 5.09)	.135	30		.893
Previous PG tx % Yes	5 (28.75%)	5 (28.75%)		1	1.00	1.00
Current PG tx goal % abstinence	8 (50.00%)	8 (50.00%)		1	1.00	1.00

Note: tx = treatment, PG = problem gambling

over gambling, $F(1, 24) = 12.585$, $p = .002$, partial $\eta^2 = .344$; and number of sessions gambled, $F(1, 24) = 5.9$, $p = .023$, partial $\eta^2 = .197$. Despite being in the expected direction, there was no significant difference between groups on desire to gamble, $F(1, 24) = 2.417$, $p = .133$. These findings indicate that, at post-treatment, the treatment group endorsed significantly fewer *DSM-IV-TR* criteria, had higher levels of perceived control over its gambling, and participated in fewer gambling sessions than the wait list comparison group following the waiting list period. In contrast, neither group significantly differed on its level of desire to gamble. See Table 2 for outcome measure means and standard deviations.

Clinically Significant Change. To examine clinically significant change between groups, post-treatment/post-waiting list end state functioning was examined for the four outcome measures: *DSM-IV-TR* criteria for pathological gambling, perception of control over gambling, desire to gamble, and gambling frequency as measured by the number of gambling sessions participated in over the previous month. Given that the endorsement of five or more *DSM-IV-TR* criteria are needed for a diagnosis of pathological gambling, the criterion score utilized for this variable was less than five. In accordance with Ladouceur et al. (2003), the criterion scores utilized for perception of control over gambling and desire to gamble were set at seven or more and three or less respectively, while the criterion score for gambling frequency was set at gambling abstinence over the previous month. No significant pre-treatment/pre-waiting list differences were found between groups on these variables. At post-treatment/post-waiting list significantly more treatment group participants (93.3%) than wait list comparison group participants (28.6%) met the *DSM-IV-TR* criterion score, Fisher's exact z, $p < .001$. In other words, significantly more wait list comparison group participants met *DSM-IV-TR* criteria for pathological gambling

Table 2
Means and standard deviations of the outcome measures across groups

	Pre-treatment	Post-treatment	3 months post-treatment
Treatment group	(n = 16)	(n = 15)	(n = 14)
DSM-IV-TR criteria	6.5 (1.32)	2.13 (1.96)	1.94 (2.13)
Perception of control	0.94 (1.29)	5.07 (2.19)	5.46 (2.85)
Desire to gamble	8.56 (1.31)	4.47 (2.85)	4.08 (2.36)
# of gambling sessions	11.53 (4.00)	4.43 (4.80)	3.92 (5.13)
Wait list group	(n = 16)	(n = 14)	
DSM-IV-TR criteria	7.13 (1.41)	5.14 (2.35)	
Perception of control	0.46 (0.63)	1.85 (2.58)	
Desire to gamble	8.50 (1.03)	6.47 (2.82)	
# of gambling sessions	11.75 (5.09)	10.71 (6.58)	
Both groups combined	(n = 32)	(n = 24)	(n = 23)
DSM-IV-TR criteria	6.81 (1.38)	2.37 (1.98)	1.79 (2.02)
Perception of control	0.69 (1.03)	4.44 (2.47)	4.96 (2.79)
Desire to gamble	8.53 (1.16)	4.76 (2.73)	4.25 (2.45)
# of gambling sessions	11.64 (4.50)	4.87 (4.56)	4.15 (4.34)

at post-waiting list than did treatment group participants at post-treatment. Despite all being in the expected direction, no significant group differences were found for criterion scores on perception of control over gambling (33.3% of treatment group and 7.7% of wait list comparison group met the criterion score), desire to gamble (46.7% of treatment group and 15.4% of wait list comparison group met the criterion score) or gambling frequency (38.5% of treatment group and 7.1% of wait list comparison group met the criterion score).

Treatment Effects at Post-Treatment and Three-Month Follow-Up Periods. Both groups were combined (n = 24) to examine the four outcome measures over time (pre-treatment, post-treatment, three-month post-treatment). A series of one-way repeated measure ANOVAs were utilized for these analyses. To help correct for a violation of sphericity, a Greenhouse-Geisser correction was applied for the *DSM-IV-TR* criteria for pathological gambling analysis. Results showed that time had a significant main effect on *DSM-IV-TR* criteria, $F(1.42,31.16) = 69.28$, $p < .001$, $\eta p^2 = .759$; perception of control $F(2, 40) = 46.88$, $p < .001$, $\eta p^2 = .701$; desire to gamble, $F(2, 40) = 27.9$, $p < .001$, $\eta p^2 = .583$; and number of sessions gambled, $F(2, 38) = 42.37$, $p < .001$, $\eta p^2 = .625$. A priori tests using a Bonferroni correction, adjusting alpha levels to 0.0125 (0.05/4), revealed significant differences in all four outcome measures between pre-treatment and post-treatment time periods and between pre-treatment and three-month follow-up time periods. No significant differences were found between post-treatment and three-month follow-up time periods (Table 3). These findings indicate that the number of *DSM-IV-TR* criteria

Table 3
Bonferroni comparisons for change in dependent variables between pre-treatment, post-treatment, and three-month follow-up time periods (n = 24)

Comparisons	Mean Difference in Outcome Measure	Std. Error	95% CI	
			Lower Bound	Upper Bound
Pre-tx vs post-tx				
DSM-IV-TR criteria	4.26**	.441	3.11	5.4
Perception of control	-4.05**	.44	-5.19	-2.9
Desire to gamble	3.67**	.645	1.98	5.35
# of gambling sessions	7.83**	1.294	5.13	10.52
Pre-tx vs 3-month post-tx				
DSM-IV-TR criteria	4.52**	.533	3.14	5.9
Perception of control	-4.71**	.59	-6.26	-3.17
Desire to gamble	4.24**	.547	2.81	5.67
# of gambling sessions	8.42**	1.29	5.72	11.13
Post-tx vs 3-month post-tx				
DSM-IV-TR criteria	.62	.28	-.99	.47
Perception of control	-.67	.54	-.75	2.08
Desire to gamble	.57	.649	-2.27	1.13
# of gambling sessions	.60	.928	-2.54	1.34

Note: ** $p < .001$. tx = treatment

endorsed, the degree in which participants desired to gamble, and the number of sessions gambled significantly decreased from pre-treatment to post-treatment and that these gains were maintained at three-month follow-up. Furthermore, participants' perception of control over gambling significantly increased from pre-treatment to post-treatment, and this was also maintained at three-month follow-up.

Discussion

Efficacy of Group CBT for Problem Internet Gamblers

Overall, the results of the current study, including the large ($\eta^2 > .19$) effect sizes observed, are consistent with previous research demonstrating the efficacy of group CBT for problem gambling (Carlbring, Jonsson, Josephson, & Forsberg, 2010; Dowling, Smith, Thomas, 2007; Ladouceur et al., 2003; Myrseth, Litlerè, Støylen, & Pallesen, 2009). However, unlike previous studies, the aim of the current study was to examine the efficacy of group CBT for problem gamblers who gamble over the Internet. Previous treatment outcome studies have most certainly included problem gambling participants who gamble over the Internet, many of whom likely utilize the Internet for gambling to varying degrees (Wardle et al., 2011). Some may solely gamble on the Internet, others may frequently or rarely gamble on the Internet and also gamble at land-based venues, and others may only gamble at land-based venues. The current study utilized a sample of participants who self-identified as Internet gamblers. Given the characteristics of Internet gambling, such as unlimited access and convenience, the ability to gamble on credit, faster pace of play, a wider range of gambling activities, and an easier means of hiding excessive gambling from others, certain observers have argued that the Internet may make for a more addictive and potentially problematic experience than land-based venues (Gainsbury et al., 2013; Griffiths & Barns, 2008; McCormack et al., 2013). From this perspective, one could argue that problem Internet gambling behaviours may be less responsive to current evidence-based problem gambling treatments. The current study suggests that group CBT is helpful for problem Internet gamblers and this has important clinical implications. For instance, perhaps treatment programs targeting problem gambling should not necessarily distinguish between Internet and land-based gamblers, but include both in the same treatment groups. After all, as previously discussed, most Internet problem gamblers also report gambling at land-based venues in any case. Furthermore, because the theoretical understandings of why certain persons continue to engage in problem gambling behaviours, such as erroneous cognitions pertaining to the concepts of chance and randomness, do not appear to differ between Internet and land-based gamblers; the motivational, cognitive, and behavioural strategies learned in treatment are applied similarly by both land-based and Internet gamblers. Thus, although it is possible that Internet gambling characteristics may make it more problematic, from a clinical perspective, it may be useful to just view the Internet as another means to engage in gambling as opposed to another type that requires a different intervention.

Attrition. Research has shown high attrition rates in problem gambling treatment usually ranging from 30% to 50% (Ladouceur et al., 2001; Melville,

Casey, & Kavanagh, 2007). Treatment studies examining the efficacy of group CBT for problem gambling have shown similar rates at post-treatment and follow-up periods (Carlbring et al., 2010; Dowling et al., 2007; Jimenéz-Murcia et al., 2007; Ladouceur et al., 2003; Oei, Raylu, & Casey, 2010). High attrition at post-treatment and follow-up limit the conclusions from the findings of these studies. However, the issue whether to include those participants who do not provide outcome follow-up data is a controversial one. While study participants who drop out may be less likely to realize treatment success, it is also likely too stringent to assume them to be treatment failures (Dowling et al., 2007; Stinchfield & Winters, 2001). That said, intent-to-treat analyses are sometimes utilized in problem gambling treatment research (e.g., Myrseth et al., 2009; Oei et al., 2010). The current study's attrition rates are less than those previously reported as 23 of 24 (95.8%) and 22 of 24 (91.7%) participants who participated in treatment completed post-treatment and three-month post-treatment follow-up measures respectively. High retention rates observed in the current study are likely, at least partially, because of a result of the data collection methods utilized. An e-mail asking participants to complete post-treatment and three-month follow-up measures was sent to participants, along with a link to the measures available on SurveyMonkey. If participants did not complete the online measures within three days they were sent a reminder e-mail. These measures typically took participants between five to ten minutes, with a $20 gift certificate as incentive for completion. As a result of utilizing e-mail, some participants completed post-treatment and three-month follow-up measures despite not attending the final treatment session or having previously discontinued treatment. E-mail and online questionnaires may have been particularly effective for this group given its apparent comfort level with technology and the Internet. From this perspective, Internet-based interventions may be particularly appealing among problem Internet gamblers. Similar to Internet access providing boundless opportunity for gambling activities, the Internet also provides huge potential as a medium for treatment (Castrén et al., 2013). Previous research has shown Internet-based CBT programs to be effective for problem gambling (Carlbring & Smit, 2008). Furthermore, Internet-based treatments may also help improve treatment retention rates among this population (Gainsbury & Blaszczynski, 2011). Future problem gambling outcome studies may want to utilize similar data collection methods to those utilized in the current study to help improve study retention rates at post-treatment and follow-up time periods. Moreover, research should continue to examine Internet-based treatments for problem gambling, in particular for those persons who gamble over the Internet.

Limitations

In light of the implications of the current study, several limitations emerge that should be acknowledged. First, the small sample size in the current study necessitates replication. Small sample size can contribute to low statistical power, which can, in turn, decrease the likelihood that statistically-significant findings reflect a true effect and may, in fact, contribute to overestimates of effect size (Button et al., 2013). Of the three significant post-treatment outcome group differences found in the

current study (i.e., *DSM-IV-TR* criteria, perception of control, and number of sessions gambled) the observed power for these analyses ranged from .645 to .925. Furthermore, failure to obtain a significant post-treatment group difference on the outcome desire to gamble was likely because of the inadequate power observed (.320) for this analysis. Small sample size also limited the use of multilevel methods within the current study. Second, although all participants in the current study self-identified as Internet gamblers, Internet gambling frequency was not adequately measured. As problem Internet gamblers gamble over the Internet to varying degrees, as well as gamble at land-based gambling venues, also to varying degrees, it is therefore important for future research to measure better the frequency of Internet gambling involvement. Third, gambling-related outcome measures utilized in the current study were limited to problem gambling symptomology, gambling-related cognitions (e.g., perception of control) and gambling frequency (e.g., number of sessions gambled). As Walker et al. (2006) point out, it is also important for problem gambling outcome studies to assess gambling expenditures (e.g., net financial losses) to obtain a more comprehensive picture of change in problem gambling behaviours. Furthermore, these authors outline the importance of measuring both non-specific (e.g., therapeutic alliance) and specific process variables (e.g., gambling-related erroneous beliefs targeted in cognitive therapy) to examine therapeutic mechanisms of change. Future research should utilize such measures to help better understand factors associated with positive therapeutic change within this population. Fourth, post-treatment follow-up periods in the current study were limited to three-months. Previous treatment outcome studies examining the efficacy of problem gambling treatments have employed follow-up periods ranging from no follow-up to 24 months post-treatment. Given the episodic nature of problem gambling behaviours, longer follow-up periods are particularly useful in this population (López Viets & Miller, 1997). However, historically, problem gambling treatment studies have typically suffered from high attrition rates at follow-up time periods, particularly those of a longer duration. A particular strength of the current study is the low attrition rates observed at post-treatment and three-month follow-up time periods. Future studies should look to replicate these findings utilizing longer-term follow-up. Fifth, the utilization of a wait list comparison group without multiple treatment groups brings with it several disadvantages. Because participants assigned to the wait list knew they were not actively receiving treatment during the waiting period no placebo effect for this group is possible. In contrast, certain participants assigned to the treatment group may, in fact, have simply benefited from an expectation that treatment would help them reduce their respective problem gambling behaviours. Furthermore, because of the ethical concerns with assigning problem gambling participants to a wait list for an extended period of time, there was no wait list comparison group at three-month follow-up in the current study. As a result, improvements in outcome measures at three-months post-treatment could not be definitively attributed to the treatment provided. A next step in problem Internet gambling treatment outcome research is to assign participants to multiple treatment groups to help control for placebo effects. This step should take place so that between group comparisons on outcome measures can be made at post-treatment follow-up periods. Sixth, participants were assigned sequentially to either the

treatment or wait list group based on the order in which they entered the study. As a result, upon entry into the study, the researchers knew to which group participants would be assigned. This fact was a potential threat to the internal validity of the study. Lastly, only one therapist was utilized in this study. As a result, it cannot be determined to what degree therapist characteristics such as age, gender, clinical competency and clinical experience may have contributed to treatment outcomes. It is important that future research examine such factors on treatment outcome among this population.

Overall, the current study was the first to have examined treatment for problem gambling utilizing a sample made up entirely of participants who gamble over the Internet. Findings provide preliminary support for the efficacy of group CBT for problem gamblers who gamble over the Internet.

References

Allen, J. P., Litten, R. Z., Fertig, J. B., & Barbor, T. (1997). A review of research on the Alcohol Use Disorders Identification Test (AUDIT). *Alcoholism: Clinical and Experimental Research*, 21, 613–619. doi:10.1111/j.1530-0277.1997.tb03811.x

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC. Author.

Braun, B., Ludwig, M., Sleczka, P., Bühringer, G., & Kraus, L. (2014). Gamblers seeking treatment: Who does and who doesn't? *Journal of Behavioral Addictions*, 3, 189–198. doi:10.1556/JBA.3.2014.3.7

Button, K. S., Ioannidis, J. P., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, 14, 365–376. doi:10.1038/nrn3475

Carlbring, P., Jonsson, J., Josephson, H. & Forsberg, L. (2010). Motivational interviewing versus cognitive behavioural group therapy in the treatment of problem and pathological gambling: A randomized controlled trial. *Cognitive Behaviour Therapy*, 39, 92–103. doi:10.1080/16506070903190245

Carlbring, P., & Smit, F. (2008). Randomized trial of internet-delivered self-help with telephone support for pathological gamblers. *Journal of Consulting and Clinical Psychology*, 76, 1090–1094. doi:10.1037/a0013603

Castrén, S., Pankakoski, M., Tamminen, M., Lipsanen, J., Ladouceur, R., & Lahti, T. (2013). Internet-based CBT intervention for gamblers in Finland: Experiences

from the field. *Scandinavian Journal of Psychology*, 54, 230–235. doi:10.111/sjop.12034

Derogatis, L. R., & Unger, R. (2010). Symptom Checklist-90-Revised. In I. B. Weiner & W. E. Craighead (Eds.), *The Corsini Encyclopaedia of Psychology* (Vol. 4, pp. 1743–1744). Hoboken, NJ: John Wiley and Sons.

Dowling, N. Smith, D., & Thomas, T. (2007). A comparison of individual and group cognitive-behavioural treatment for female pathological gambling. *Behaviour Research and Therapy*, 45, 2192–2202. doi:10.1016/j.brat.2006.11.003

Ferris, J., & Wynne, W. (2001). *The Canadian Problem Gambling Index: Final report*. Ottawa, ON: Canadian Centre on Substance Abuse.

Gainsbury, S., & Blaszczynski, A. (2011). A systematic review of Internet-based therapy for the treatment of addictions. *Clinical Psychology Review*, 31, 490–498. doi:10.1016/j.cpr.2010.11.007

Gainsbury, S., Parke, J., & Suhonen, N. (2013). Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Computers in Human Behavior*, 29, 235–245. doi:10.1016/j.chb.2012.08.010

Gainsbury, S. M., Russell, A., Hing, N., Wood, R., & Blaszczynski, A. (2013). The impact of Internet gambling on gambling problems: A comparison of moderate-risk and problem Internet and non-Internet gamblers. *Psychology of Addictive Behaviors*, 27, 1092–1101. doi:10.1037/a0031475

Gainsbury, S., Wood, R., Russell, A., Hing, N., & Blaszczynski, A. (2012). A digital revolution: Comparison of demographic profiles, attitudes and gambling behavior of Internet and non-Internet gamblers. *Computers in Human Behavior*, 28, 1388–1398. doi:10.1016/j.chb.2012.02.024

Gooding, P., & Tarrier, N. (2009). A systematic review and meta-analysis of cognitive-behavioural interventions to reduce problem gambling: Hedging our bets?. *Behaviour Research and Therapy*, 47, 592–607. doi:10.1016/j.brat.2009.04.002

Griffiths, M., & Barnes, A. (2008). Internet gambling: An online empirical study among student gamblers. *International Journal of Mental Health Addiction*, 6, 194–204. doi:10.1007/s11469-077-9083-7

Griffiths, M., Wardle, H., Orford, J., Sproston, K., & Erens, B. (2009). Sociodemographic correlates of internet gambling: Findings from the 2007 British Gambling Prevalence Survey. *CyberPsychology and Behavior*, 12, 199–202. doi:10.1089/cpb.2008.0196

Griffiths, M. (2001). Internet gambling: Preliminary results of the first U.K. prevalence study. *Journal of Gambling Issues*, 5. Retrieved from: http://jgi.camh.net/doi/full/10.4309/jgi.2001.5.8

Hing, N., Cherney, L., Gainsbury, S. M., Lubman, D. I., Wood, R. T., & Blaszczynski, A. (2014). Maintaining and losing control during internet gambling: A qualitative study of gamblers' experiences. *New Media and Society*. doi:1461444814521140

Jackson, D. N. (1967). *Personality Research Form manual* (3rd ed.). Goshen, NY: Research Psychologists Press.

Jimenéz-Murcia, S., Álvarez-Moya, E. A., Granero, R., Aymami, M. N., Gómez-Peña, M., Jaurrieta, N., … & Vallejo, J. (2007). Cognitive-behavioral group treatment for pathological gambling: Analysis of effectiveness and predictors of therapy outcome. *Psychotherapy Research*, 17, 544–552. doi:10.1080/105003300601158822

Ladouceur, R., & Lachance, S. (2007). *Overcoming pathological gambling: Therapist guide*. New York: Oxford.

Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., Leblond, J., & Jacques, C. (2001). Cognitive treatment of pathological gambling. *Nervous and Mental Disease*, 189, 774–780. doi:0022-3018/01/18911-774

Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., & Leblond, J. (2003). Group therapy for pathological gamblers: A cognitive approach. *Behaviour Research and Therapy*, 41, 587–596. doi:10.1016/S0005-7967(02)00036-0

López Viets, V. C., & Miller, W. R. (1997). Treatment approaches for pathological gamblers. *Clinical Psychology Review*, 17, 689–702. doi:10.1016/S0272-7358(97)00031-7

MacNeil, B. M., & Holden, R. R. (2006). Psychopathy and the detection of faking on self-report inventories of personality. *Personality and Individual Differences*, 41, 641–651. doi:10.1016/j.paid.2006.03.004

McCormack, A., Shorter, G. W., & Griffiths, M. D. (2013). An examination of participation in online gambling activities and the relationship with problem gambling. *Journal of Behavioral Addictions*, 2, 31–41. doi:10.1556/JBA.2.2013.1.5

Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2007). Psychological treatment dropout among pathological gamblers. *Clinical Psychology Review*, 27, 944–958. doi:10.1016/j.cpr.2007.02.004

Myrseth, H., Litlerè, I, Støylen, I. J., & Pallesen, S. (2009). A controlled study of the effect of cognitive-behavioural group therapy for pathological gamblers. *Norwegian Journal of Psychiatry*, 63, 22–31. doi:10.1080/08039480802055139

Oei, T. P. S., Raylu, N., & Casey, L. M. (2010). Effectiveness of group and individual formats of a combined motivational interviewing and cognitive behavioural treatment program for problem gambling: A randomized controlled trial. *Behavioural and Cognitive Psychotherapy*, 38, 233–238. doi:10.1017/S1352465809990701

Saunders, J. B., Aasland, O. G., Babor, T. F., De la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: Part II. *Addiction*, 88, 791–804. doi:10.1111/j.1360-0443.1993.tb02093.x

Shen, Y., Kairouz, S., Nadeau, L., & Robillard, C. (2015). Comparing problem gamblers with moderate-risk gamblers in a sample of university students. *Journal of Behavioral Addictions*, 4, 53–9. doi:10.1556/2006.4.2015.002

Stinchfield, R., & Winters, K. C. (2001). Outcome of Minnesota's gambling treatment programs. *Journal of Gambling Studies,* 17, 217–245. doi:10.1023/A:1012268322509

Sylvain, C., Ladouceur, R., & Boisvert, J. M. (1997). Cognitive and behavioral treatment of pathological gambling: A controlled study. *Consulting and Clinical Psychology*, 65, 727–732. doi:0022-006X/97/3.00

Walker, M., Toneatto, T., Potenza, M. N., Petry, N., Ladouceur, R., Hodgins, D. C., & Blaszczynski, A. (2006). A framework for reporting outcomes in problem gambling treatment research: The Banff, Alberta Consensus. *Addiction*, 101, 504–511.

Wardle, H., Moody, A., Griffiths, M., Orford, J., & Volberg, R. (2011). Defining the online gambler and patterns of behaviour integration: Evidence from the British Gambling Prevalence Survey 2010. *International Gambling Studies*, 11, 339–356. doi:10.1080/14459795.2011.628684

Wood, R., Williams, R., & Parke, J. (2012). The relationship between Internet gambling and problem gambling. In R. J. Williams, R. T. Wood, & J. Parke (Eds.). *The Routledge International Handbook of Internet Gambling* (pp. 200–211). London: Routledge.

Wood, R. T., & Williams, R. J. (2011). A comparative profile of the Internet gambler: Demographic characteristics, game-play patterns, and problem gambling status. *New Media and Society*, 13, 1123–1141. doi:10.1177/1461444810397650

****

Submitted September 30, 2015; accepted November 18, 2015. This article was peer reviewed. All URLs were available at the time of submission.

For correspondence: Nicholas Harris, Eastern Health, Building 532, Pleasantville Charter Ave, St. John's, Newfoundland, Canada, A1B 4A4.
E-mail: nicholas.harris@easternhealth.ca

Competing interests: None declared.

Ethics approval: The Lakehead University Research Ethics Board approved the research project "An Examination of Cognitive Behavioural Group Therapy for Problem Gamblers who Gamble Primarily over the Internet: A Controlled Study" on March 08, 2012 (Project number 099 11-12; File number 1462436).

Acknowledgements: NH received a graduate student scholarship from the Ontario Problem Gambling Research Centre (OPGRC).