



TITLE: Cognitive Behavioural Therapy for Patients with Addictions: A Review of the Clinical and Cost-Effectiveness

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CONTEXT AND POLICY ISSUES:

Addictions are a common mental health concern.¹ One in 10 Canadians 15 years of age and over report symptoms consistent with alcohol or illicit drug dependence, and close to 4% of adults are classified as having moderate or severe gambling problems.¹ Substance use (substance dependence and substance abuse) accounts for the greatest burden of disease and mortality of all mental disorders.² The use of psychoactive substances, including alcohol, tobacco, and illicit drugs contributed to 12.4% of deaths worldwide in the year 2000.² Substance use problems often occur in association with depression, anxiety, and virtually all other forms of mental illness.² The use and misuse of alcohol, tobacco, and illicit drugs accounted for 20.0% of deaths, 22.2% of years of potential life lost, and 9.4% of hospital admissions in Canada in 1995.³ The rate of drug use by youth 15-24 years of age remains higher than that reported by adults 25 years and older: four times higher for cannabis use (32.7% versus 7.3%), and nine times higher for past-year use of any other illicit drug (15.4% versus 1.7%).⁴

Problem (or pathological) gambling is a common mental health concern in several parts of Canada.⁵ The 12-month prevalence of gambling problems in Canada has been estimated at 2.0%, with interprovincial variability.⁵ Although there are effective psychosocial treatments, it is estimated that only about 10% of problem gamblers seek treatment.⁶ Apart from a shortage of skilled therapists, long waiting lists, and the cost factor, fear of stigma may prevent many problem gamblers from seeking therapy.⁶ Consequently, a major challenge is to increase the accessibility and affordability of evidence-based psychological treatments for problem gambling.

Cognitive behavioral therapy (CBT) is a structured goal-directed form of psychotherapy in which patients learn how their thought processes contribute to their behavior.² Increased cognitive awareness is combined with techniques to help patients develop new and adaptive ways of behaving, and alter their social environment, which in turn leads to change in thoughts and emotions. CBT is usually time-limited consisting of approximately 10 to 20 one-hour sessions.² Although CBT is traditionally administered in an individual or group format, CBT administered

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remotely through technology-based interventions has recently received increased attention in the literature as a means of promoting greater accessibility to psychological interventions.⁷ Self-directed CBT (for example through a web-based or stand alone computer program) or telephone administered CBT (tele-therapy) has been introduced to help improve access to CBT for patients in remote areas.⁷ However, there is uncertainty on whether these alternate delivery strategies are as clinically effective or cost-effective as traditional CBT for the treatment of adults with alcohol, drug, or gambling addictions. Moreover, it is not clear if these strategies are appropriate for the entire population with addiction problems or whether they are better suited to particular patient subgroups.

This report will review the evidence of clinical and cost-effectiveness of CBT delivered in a self-directed manner or via tele-health applications relative to traditional CBT, and guidelines for patient selection. This information could help in decision-making pertaining to which patient groups could benefit from CBT for addictions when delivered in these alternative formats.

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of self-directed cognitive behavioural therapy (CBT) or tele-therapy compared with traditional CBT for the treatment of adults with alcohol, drug, or gambling addictions?
2. What is the cost-effectiveness of self-directed CBT or tele-therapy compared with traditional CBT for the treatment of adults with alcohol, drug, or gambling addictions?
3. What are the guidelines for patient selection criteria for self-directed CBT or tele-therapy for the treatment of adults with alcohol, drug, or gambling addictions?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, PsycINFO, The Cochrane Library (Issue 4, 2009), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between 2005 and Dec 2009. No filters were applied to limit the retrieval by study type.

SUMMARY OF FINDINGS:

No health technology assessments, systematic reviews, or economic evaluations were identified that compared self-directed interventions or tele-therapy with traditional CBT for the treatment of adults with alcohol, drug, or gambling addictions. No guidelines were identified that addressed patient selection criteria for self-directed CBT or tele-therapy for the management of addiction.

Four randomized controlled trials (RCT), published in six reports, were identified that assessed computer-based (three trials)⁸⁻¹¹ or telephone-based (one trial)^{12,13} CBT as therapy for alcohol and/or drug dependence. Of the three trials on computer-based therapy, two studies included a direct comparison of self-directed CBT with traditional therapy,⁸⁻¹⁰ and one study evaluated the efficacy of two computer-based interventions.¹¹ In addition, one published protocol was

identified of a three-arm RCT designed to assess the clinical and economic impact of online CBT-based therapy for problem drinkers.^{14,15} One RCT was identified for this report on self-directed CBT on gambling addictions.⁶ None of these studies were Canadian-based trials. The characteristics of these studies are summarized in Appendix 1.

Randomized controlled trials

Alcohol and/or Drug Dependence

Self-Directed CBT

Carroll et al. (2008; 2009)^{8,9} evaluated the efficacy and durability of a computer-assisted version of CBT as therapy for substance-dependence. Seventy-three adults seeking outpatient treatment for multiple substance use (cocaine, 59%; alcohol, 18%; opioids, 16%; marijuana, 7%) residing in a community setting in the USA were randomized to either standard treatment-as-usual (TAU; weekly individual and group sessions) or TAU with 8 weeks of biweekly access to computer-based training for CBT (CBT4CBT).⁸ Random regression analyses of use across time indicated significant differences between groups, such that those assigned to TAU increased their drug use across time while those assigned to CBT4CBT tended to improve slightly. Overall, CBT4CBT appeared to have both short-term and enduring effects on drug use during the 6-month follow-up period.⁹ The efficacy of self-directed CBT was further analyzed by Kay-Lambkin et al. (2009)¹⁰ for 97 adults with comorbid depression and alcohol/cannabis use recruited from a community-based setting in Australia. The investigators reported equivalent 12-month outcomes (targeting both substance use and depression simultaneously) when therapy was delivered over a 3-month period via a computer-based program with brief weekly input from a psychologist relative to face-to-face therapy.¹⁰

The study by Riper et al. (2008)¹¹ evaluated the efficacy of two computer-based interventions for problem drinkers over a 6-month follow-up period. Two hundred and sixty-one adults recruited from the general population in the Netherlands were randomized to either the experimental drinking less (DL) intervention or to the control condition. Different cut-off points for problem drinking were applied for men and for women (Appendix 1). The DL intervention was a web-based, multi-component, interactive self-help intervention (based on cognitive-behavioral and self-control principles) for problem drinkers without therapist guidance. The recommended treatment period was 6 weeks. The control group received access to an online psycho-educational brochure on alcohol use. At 6-months of follow-up, the DL intervention was successful in curbing alcohol intake. Although both the intervention and control groups achieved a decrease in alcohol consumption, this effect was significantly stronger in the DL intervention in terms of the study outcome measures.¹¹

Blankers et al. (2009)^{14,15} are presently undertaking a three-arm RCT to assess the clinical and economic impact of online therapy (based on CBT and motivational enhancement training) compared to a waiting list control group. The target sample size is 300 adult participants with problem drinking from the general population in the Netherlands.¹⁵ Two-online treatment programs for problem drinkers completed within 3-months following randomization will be compared in this trial: one is an anonymous, online, non-therapist involved, fully automated self-guided treatment program; and the other is a real-time, online, non-anonymous therapist-guided program. The primary outcome measure is the change in alcohol consumption from baseline to

the 3-month and 6-month follow-up period. Secondary outcome measures include changes in Alcohol Use Disorders Identification Test (AUDIT) scores, quality of life, and quality of functioning at work. Incremental cost-effectiveness ratios for both online treatment programs will be calculated.¹⁴ The trial is at the recruitment phase and there is at present no specific publication date for the research findings.¹⁵

Telephone-based CBT

McKay et al. (2005)^{12,13} compared telephone-based continuing care (tele-therapy) with two more intensive face-to-face interventions in 359 alcohol and/or cocaine-dependent adult participants who had completed an initial phase of intensive outpatient treatment. The participants were recruited from two outpatient substance abuse treatment programs in the USA: one community-based and the other at a Veterans Affairs medical centre facility. The study findings indicated that tele-therapy and brief counseling yielded higher abstinence rates over 24-months than intensive face-to-face interventions for most patients with alcohol and cocaine dependence (Appendix 1 includes treatment duration and reported rates).¹² Further analysis examining the mediators of this treatment effect suggested that the greater therapeutic effects of tele-therapy were partially accounted for by participation in self-help meetings and related activities during the continuing care phase of treatment, and by subsequent increases in commitment to abstinence and the maintenance of self-efficacy.¹³ These results further revealed that increases in self-help behaviors are associated with increases in self-efficacy, which accounted for the treatment differences from 7-24 months.^{12,13}

Problem Gambling

In the one trial identified on gambling addictions, Carlbring and Smit (2008)⁶ compared an 8-week Internet-based CBT program that included minimal therapist contact via email with a wait-list control group. To maximize compliance, the investigators supplemented the self-directed CBT program with short weekly telephone calls. Sixty-six participants with mild-to-moderate levels of depression were recruited from a community setting in Sweden who met the criteria for problem gambling according to the Diagnostic and Statistical Manual of Mental Disorders (4th edition; DSM-IV-TR, American Psychiatric Association, 2000).⁶ Participants randomized to the self-directed group achieved significant improvement on measures of problem gambling, general anxiety, depression and quality-of-life; these effects of self-directed therapy were maintained up to 36 months of follow-up.⁶ No significant differences on the outcome measures were observed in the wait-list control group during the treatment period. No between-group comparisons were undertaken at follow-up as individuals on the waiting list received therapy before follow-up data were collected. The investigators acknowledged that a substantial proportion of individuals with a history of problem gambling undergo recovery without therapy and this may have led to an overestimate of the true effect of self-directed CBT within the study.⁶

Limitations

Only a few technology-based interventions have been investigated in randomized controlled trials for the treatment of adults with alcohol, drug, or gambling addictions. Accuracy of the study findings on self-directed CBT or teletherapy cannot be assured given the lack of direct comparisons with traditional face-to-face therapy. Duration of aftercare interventions in the

current trials were limited to within two months and further analyses is required to investigate dose-response associations between the frequency of interventions and outcomes. Another limitation involves the generalizability of the results to a more heterogeneous population: for example, the participants recruited within the studies were mostly middle-age males presenting with multiple substance use problems. Differences in outcomes with participants seeking treatment and those referred to treatment may also be a factor limiting generalizability. Furthermore, it is difficult to assess the overall clinical significance of the treatment effects given the use of varied definitions for addiction, wide range of outcome measures, and high attrition rates among the study participants resulting in incomplete data at follow-up.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

For alcohol, drug, and gambling addictions, the literature suggests that computer or telephone-based interventions may be a viable alternative or a useful adjunct to conventional face-to-face therapy. Further research on this topic directed at discerning the active components of treatments which are deemed effective such as duration and intensity of therapy, especially among adolescents, is required because of the potential for computer or telephone-based interventions to reach individuals who are underserved by traditional therapy. There were no studies identified of cost-effectiveness comparing alternative delivery models and face-to-face delivery and therefore conclusions about cost-effectiveness cannot be made. In addition, no guidelines as to which patients with addictions would be best suited to self-directed CBT or tele-therapy were identified. Economic analyses should be routinely incorporated into future studies, so that the real costs and benefits of technology-based interventions can be compared with those of intensive inpatient programs.

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APPENDIX 1: Study Characteristics of the Randomized Controlled Trials of CBT for Addictions

First Author, Year (Country)	Aim of the Study	Patient Population [% Males; Mean Age], Setting	Intervention and Comparator	Outcomes (Measures)	Findings	Authors' Conclusions/ Implications
Alcohol/Drug Dependence						
McKay, 2005 (USA) ¹²	To compare telephone-based continuing care with two more intensive face-to-face interventions	Alcohol- and/or cocaine-dependent patients (N = 359) who had completed 4-week intensive outpatient programs [82; 42 yrs] Two outpatient substance abuse treatment programs, one community-based and the other at a Veterans Affairs medical center facility	Three 12-week continuing care treatments: TEL: weekly telephone-based monitoring and brief counseling contacts combined with weekly supportive group sessions in the first 4 weeks; n=102 RP: twice-weekly cognitive-behavioural relapse prevention; n=135; STND: Twice-weekly standard group counseling; n=122	Total abstinence rates; % days abstinent from alcohol and cocaine; negative consequences of substance use (Cocaine urine toxicological results; Gamma-glutamyl-transferase (gamma); Addiction Severity Index; Composite Risk Indicator Measure; Interviews & Self-reports)	At 24-months of follow-up: TEL group had higher rates of total abstinence than those in STND (60% vs. 45%; p < 0.05); In alcohol-dependent participants, gamma levels lower in TEL than in RP (p = 0.005); Rate of cocaine-positive urine samples increased more rapidly in RP than TEL (30% vs. 23%; p = 0.03); No difference between groups on % days abstinent or negative consequences of substance use	Telephone-based continuing care appears to be an effective form of step-down treatment for most patients with substance abuse; High-risk patients, however, may have better outcomes if they first receive group counseling after completing intensive outpatient programs. The study participants were mostly middle-aged, unmarried, African American men with long histories of substance abuse.
Carroll, 2008; 2009 (USA) ^{8,9}	Evaluate the efficacy and durability of effects of a computer-	73 individuals seeking treatment for substance dependence [57; 41 yrs]; Cocaine	Biweekly access to computer-based training in CBT skills with standard treatment-as-usual	Number of drug-positive samples; % reported treatment days	Random regression analyses of use across 6-months of follow-up indicated significant	CBT4CBT appears to have both short-term and enduring effects on substance use. The study did not

First Author, Year (Country)	Aim of the Study	Patient Population [% Males; Mean Age], Setting	Intervention and Comparator	Outcomes (Measures)	Findings	Authors' Conclusions/ Implications
	assisted version of CBT as treatment for substance dependence	use was primary problem (56%), followed by alcohol (18%), opioids (16%) and marijuana (7%); 79.5% were users of more than one drug or users of both alcohol and drugs. community setting	(CBT4CBT); n=35 Standard treatment-as-usual (TAU); n=38	using alcohol or any illicit drugs (Urine toxicology screens; Self-reports)	differences between groups ($p < 0.05$) in terms of substance use	control for level of exposure to treatment overall as CBT4CBT was used as an adjunct to standard treatment.
Riper, 2008 (Netherlands)¹¹	Test the effectiveness of self-help interventions delivered over the internet for problem drinkers	261 adult problem drinkers from the general population with a weekly alcohol consumption above 210 g of ethanol for men or 140 g for women, or consuming at least 60 g (men) or 40 g (women) at least 1 day a week over the past 3 months [51; 46 yrs] community setting	Drinking less condition, a web-based, multi-component, interactive self-help intervention for problem drinkers without therapist guidance. The recommended treatment period is 6 weeks. The intervention is based on cognitive-behavioural and self-control principles (DL; n=130). PBA: received access to an online psycho-educational brochure on alcohol use; n=131	% participants who reduced their drinking levels to within the normative limits of the Dutch guideline for low-risk drinking; reduction in mean weekly alcohol consumption (Dutch version of weekly recall instrument; Quantity-Frequency Variability Index)	At follow-up, 17.2% of the DL group had reduced their drinking successfully to within the guideline norms; in the control group this was 5.4% [OR 3.66; 95% CI 1.3-10.8; $p = 0.006$; NNT = 8.5]; Subjects in the DL group decreased their mean weekly alcohol consumption significantly more than control subjects, with a	The intervention showed itself to be effective in reducing problem drinking in the community. There was a substantial loss to follow-up (42%) and no diagnostic assessments were undertaken at baseline to assess severity of alcohol abuse or dependence.

First Author, Year (Country)	Aim of the Study	Patient Population [% Males; Mean Age], Setting	Intervention and Comparator	Outcomes (Measures)	Findings	Authors' Conclusions/ Implications
					difference of 12.0 standardized units (95% CI 5.9-18.1; $p < 0.001$; standardized mean difference 0.40)	
Kay-Lambkin, 2009 (Australia)¹⁰	Evaluate computer-versus therapist-delivered psychological treatment for individuals with comorbid depression and alcohol/cannabis use problems	97 individuals with comorbid major depression and alcohol/cannabis misuse [46; 35 yrs] community setting	All participants received a brief intervention (BI) for depressive symptoms and substance misuse, followed by random assignment to: Nine sessions of motivational interviewing and CBT (intensive MI/CBT); participants allocated to the intensive MI/CBT condition were selected at random to receive their treatment 'live' (i.e. delivered by a psychologist; n=35) or via a computer-based program (with brief weekly input from a psychologist; n=32). (BI alone; no further treatment, n=30)	Depression; alcohol/cannabis use; hazardous substance use index scores measured at baseline, and 3, 6 and 12 months post-baseline assessment (Beck Depression Inventory II (BD-II); Opiate Treatment Index; Interviews)	Reductions reported in BD-II scores over time across treatment groups ($p < 0.001$); Computer-delivered participants reported a three-fold reduction in substance use compared to the BI group which reported no significant change	Computer-based treatment, targeting both depression and substance use simultaneously, results in at least equivalent 12-month outcomes relative to a 'live' intervention. The sample size of 97 participants reduced the power to detect differences between treatment groups.

First Author, Year (Country)	Aim of the Study	Patient Population [% Males; Mean Age], Setting	Intervention and Comparator	Outcomes (Measures)	Findings	Authors' Conclusions/ Implications
Problem Gambling						
Carlbring, 2008 (Sweden)⁶	Test an online alternative to CBT	66 pathological gamblers (according to DSM-IV-TR) not presenting with severe comorbid depression [94; 32 yrs] University-based centre	8-week Internet-based CBT program with minimal therapist contact via e-mail and weekly telephone calls of less than 15 min. Average time spent on each participant, including phone conversations, e-mail, and administration, was 4 hr (n=34). A wait-list control; (n=32)	Changes in pathological gambling; Anxiety and Depression; Quality of life (Screening Tool for Gambling Problems; Hospital Anxiety and Depression Scale; Quality-of Life Inventory; Interviews)	The Internet-based intervention resulted in favorable changes in pathological gambling, anxiety, depression, and quality of life. Composite between-group effect size (Cohen's d) at post-treatment was 0.83; Follow-up carried out in the intervention group at 6, 18, and 36 months indicated that treatment effects were sustained (ds = 2.58, 1.96, and 1.98)	The evidence is in support of Internet-delivered treatment for pathological gamblers. However, it is not clear how effective the treatment is for more severely depressed individuals.

BD-II - Beck Depression Inventory II; BI - brief intervention; CBT4CBT - computer-assisted cognitive behavioural therapy; CI - confidence interval; DSM-IV-TR - Diagnostic and Statistical Manual of Mental Disorders 4th edition; DL - drinking less web-based self-help intervention; MI/CBT - motivational interviewing and cognitive behavioural therapy; NNT - numbers needed to treat; OR - odds ratio; PBA - web-based psycho-educational brochure on alcohol use; RP -relapse prevention; STND - standard group; TAU - treatment-as-usual; TEL - telephone-based continuing care