

Behavioral couples therapy versus cognitive behavioral therapy for problem gambling: a randomized controlled trial

Anders Nilsson¹ , Kristoffer Magnusson¹, Per Carlbring², Gerhard Andersson^{1,3} & Clara Hellner¹

Department of Clinical Neuroscience, Stockholm Center for Psychiatry Research and Education, Karolinska Institutet, Stockholm, Sweden,¹ Department of Psychology, Stockholm University, Stockholm, Sweden² and Department of Behavioral Sciences and Learning, Linköping University, Linköping, Sweden³

ABSTRACT

Background and aims There is evidence that cognitive behavioral therapy (CBT) is effective for treating problem gambling (PG). Some research points to the possible benefits of involving concerned significant others (CSOs) in treatment. This study compared the efficacy of behavioral couples therapy (BCT) and CBT for both the gambler and the CSO. **Design** Two parallel-group randomized controlled study comparing two different internet-based treatments for PG. Follow-up measures were conducted at treatment finish, and at 3-, 6- and 12-month post-treatment. **Setting** Stockholm, Sweden. **Participants** A total of 136 problem gamblers and 136 CSOs were included in the study: 68 gamblers and 68 CSOs for each treatment condition. The gamblers were on average 35.6 years old and 18.4% were female. CSOs were on average 45.3 years old and 75.7% were women. **Interventions** A treatment based on BCT was compared with a CBT intervention. Both treatments were internet-based, with 10 therapist-guided self-help modules accompanied by weekly telephone and e-mail support from a therapist. CSOs were given treatment in the BCT condition, but not in the CBT condition. **Measurements** The primary outcome measures were time-line follow-back for gambling (TLFB-G) and the NORC Diagnostic Screen for Gambling Problems (NODS) for problem gamblers, corresponding to DSM-IV criteria for pathological gambling. Secondary outcomes measures were the Patient Health Questionnaire-9 (PHQ-9), the Generalized Anxiety Disorder seven-item scale (GAD-7), the Relation Assessment Scale Generic (RAS-G), the Alcohol Use Disorders Identification Test (AUDIT), the Inventory of Consequences of Gambling for the Gambler and CSO (ICS) and adherence to treatment for both the problem gambler and the CSO. **Findings** The outcomes of both gambler groups improved, and differences between the groups were not statistically significant: TLFB-G: multiplicative effect = 1.13, 95% confidence interval (CI) = 0.30;4.31; NODS: multiplicative effect = 0.80, 95% CI = 0.24;2.36. BCT gamblers began treatment to a higher proportion than CBT gamblers: $P = 0.002$. **Conclusions** Differences in the efficacy of internet-based behavioral couples therapy and cognitive behavioral therapy for treatment of problem gambling were not significant, but more gamblers commenced treatment in the behavioral couples therapy group.

Keywords Behavioral couples therapy, cognitive behavioral therapy, concerned significant others, gambling disorder, internet-based treatment, problem gambling.

Correspondence to: Anders Nilsson, Centrum för Psykiatrforskning, Norra Stationsgatan 69, plan 7 113 64 Stockholm, Sweden. E-mail: anders.nilsson.2@ki.se
Submitted 8 April 2019; initial review completed 8 October 2019; final version accepted 14 October 2019

INTRODUCTION

An estimated 2.3% of the world population are problem gamblers.[1] Approximately, there are six concerned significant others (CSOs) for every problem gambler.[2] Problem gambling (PG) causes significant harm to problem gamblers as well as to CSOs,[3–9] not least negative financial impact. CSOs often have to support the gambler's livelihood, handle gambling-related debts or become the victim

of fraud or theft committed by the gambler.[5] Relationships between a problem gambler and CSOs may be strained due to lack of trust, anxiety and anger towards the gambler.[8] PG is also associated with health problems such as depression and substance use disorders, bowel problems and headaches, intimate partner violence and suicidality[10–14] in both the gambler and CSOs.

Several systematic reviews have investigated psychological treatments for PG.[15–19] All recommend

cognitive behavioral therapy (CBT), but call for better-designed trials. The CBT protocols included in these meta-analyses differ in terms of content and delivery method. While most are individual therapies, some are group-based and some are internet-delivered (ICBT).[20]

While efficacious, PG interventions are associated with poor adherence and reluctance to seek treatment; only 5–12% of problem gamblers seek treatment.[3,21] Barriers to treatment participation include lack of treatment access, shame and stigma, desire to treat the problem by oneself or denial of problems.[22–25] Of those who do seek treatment, many drop out prematurely.[26] Involving CSOs in treatment could increase gamblers' treatment-seeking behavior, their adherence to treatment[8,27] and enhance the effects of treatment.[8,28] Furthermore, there is a risk that CSOs unintentionally aggravate the PG when trying to assist, e.g. by paying off debts or concealing the problem from others.[29]

Several studies have investigated involving CSOs in treatment of PG, or interventions aimed at CSOs. Community Reinforcement and Family Training (CRAFT),[30–32] which aims to increase treatment-seeking behavior by working with PG CSOs, has been effective in trials involving other addictions, but has so far not proved as efficient for PG. In a non-randomized study of 675 male gamblers, a CBT treatment involving CSOs produced better outcomes than traditional CBT regarding relapse, adherence and attrition.[33] PG couple therapy may be promising.[34–36] but each of these trials included fewer than 30 couples, making it difficult to draw conclusions. A preliminary trial ($n = 23$) on coping skills training for CSOs[37] achieved positive results regarding anxiety and depression.

For other addictions, behavioral couples therapy (BCT)[38] has yielded positive results. BCT combines interventions for addiction and interventions for relationship functioning, and is based on similar behavioral principles as CBT. A meta-analysis including 12 studies showed superior outcomes for BCT compared to individual treatments, with a Cohen's effect size of $d = 0.44$.[39]

This paper describes a randomized controlled study of BCT for problem gamblers and their CSOs, in which the intervention was provided to participants via the internet. To our knowledge, aside from this study's pilot version,[40] this is the first ICBT study for PG involving more than one person in treatment. Other studies have investigated couple therapies on-line, e.g. the Our Relationship program,[41–43] on-line help for couples with sexual dysfunction,[44] expectant couples[45] and for children with mental health problems and their care-givers.[46] Several studies have investigated internet-based interventions involving only the gambler.[47–52]

The accessibility and privacy of internet-delivered interventions could help gamblers to overcome some of the barriers to treatment, and involving a CSO in treatment could

help to buffer some of the attrition associated with PG interventions.

The aims of this study were to compare (1) treatment response in terms of gambling, mental health, relationship satisfaction and adherence to treatment of problem gamblers in two ICBT conditions: BCT involving both the gambler and a CSO and CBT involving only the gambler; and (2) compare the treatment effects on the participating CSOs in terms of mental health and relationship satisfaction.

METHODS

Design

This study is a two parallel-group randomized controlled study comparing two different internet-based treatments for PG; CBT involving only the gambler and BCT involving both the gambler and the CSO. Follow-up measures were conducted at treatment finish and at 3, 6 and 12 months post-treatment. Sixty-eight gamblers and 68 CSOs participated in each treatment condition.

Recruitment

The study included 136 pairs (136 gamblers and 136 CSOs), mainly recruited via the Swedish National Gambling Helpline and on-line advertisements. The gamblers had to meet the criteria for PG according to the Problem Gambling Severity Index (PGSI),[53] while CSOs could display no such symptoms. The participating CSO had to be a partner, family member or friend of the gambler, and they had to have known each other for at least 3 months. Neither party could display symptoms of severe psychiatric disorders judged to require further treatment. Participants were required to live in Sweden, understand and write Swedish and be aged at least 18 years.

Participants enrolled via the study website (www.spelfri.se), and filled out an on-line screening questionnaire. Gamblers and CSOs signed up separately, and when both had completed the questionnaire, they were contacted by a therapist via telephone asking complementary questions. This allowed therapists to assess and decide on the eligibility of prospective participants. Participants were also required to complete an informed consent form. Admission was open from September 2015 to December 2016. The last follow-up measures were collected in June 2018.

This study was given ethical approval by the regional ethics board of Stockholm, Sweden. The registration number was 2014/175–31/5.

Randomization

After admittance, participants were evenly randomized into one of two treatment groups—CBT or BCT—as units comprised of gambler and CSO. The random allocation

sequence was generated by a research assistant not otherwise connected to the study, through the website www.random.org, and concealed to therapists, study investigators and participants. For the randomization, the research assistant received the participants non-identifiable study codes. After randomization, the research assistant assigned participants to the therapists, according to when participants were enrolled into the study.

Treatment arms

The treatment consisted of two arms—CBT and BCT—both containing 10 therapist-guided self-help modules administered during 12 weeks. The modules contained texts, images, short films and exercises accompanied by weekly telephone and e-mail support from a therapist, who spent approximately 15 minutes with each participant each week. Each module centered on a topic, such as functional analysis or economic recovery. In the CBT arm, only gamblers were given modules, whereas in the BCT arm, gamblers and CSOs were each given 10 modules. The modules given to CSOs and gamblers in the BCT condition were separate, but certain topics required participants to work together. The gambler and the CSOs had separate log-ins, and could not access each other's responses to exercises or questionnaires. The two arms were designed to be as similar as possible for the gambler to isolate the effect of involving a CSO in treatment. The CBT intervention was based on Swedish CBT manuals for PG. [54,55] The BCT intervention was based on BCT manuals for alcohol problems,[38] a Swedish manual for CSOs of problem gamblers,[56] the above-mentioned CBT manuals for PG and components inspired by an IBCT manual.[57] For more details on the modules, see the study protocol.[58]

Therapists

Eight therapists were involved in the screening process and provided treatment support to the participants. One was a licensed psychologist, three were psychologists in their final years of training and four were counselors working for the Swedish National Helpline for Gamblers and CSOs. All therapists participated part-time and received supervision once every 2 weeks, lasting approximately 1 hour.

Baseline measures

The screening questionnaire contained 187 items regarding demographic information, contact information and outcome measures. The PGSI[53] was used to screen for PG in the past year (see Table 1).

Outcome measures

The outcome measures involved gambling, comorbid conditions and relationship satisfaction. All measures were administered on-line, at baseline, at treatment end and 3, 6 and 12 months post-treatment (see Table 1). Time-line follow-back for gambling (TLFB-G)[61] and Relationship Assessment Scale generic (RAS-G)[66] were also administered weekly during the treatment period. Gamblers and CSOs filled out the measures separately.

Primary

The 30-day version of National Opinion Research Center Screen for Gambling Problem (NODS)[60] and TLFB-G were used as the primary outcome measures. NODS is widely used as an outcome measure in PG trials.[47,67] The Banff consensus statement[68] on how to report changes in problem gambling states that net losses and number of days gambled should be included in problem gambling trials,[68] which is why TLFB-G was chosen as a primary outcome measure.

Secondary

The Patient Health Questionnaire-9 (PHQ-9) measured depression, the Generalized Anxiety Disorder seven-item scale (GAD-7)[69] measured anxiety and the Alcohol Use Disorders Identification Test (AUDIT)[70] identified alcohol use disorders.

The RAS-G[66] measured relationship satisfaction and the inventory of consequences of gambling for the gambler and CSO (ICS) measured how gambling has affected the lives of the gambler and CSOs.[64]

Adherence was measured as number of modules started and completed (10 in total) and number of follow-up measures completed (four in total). Participants were also asked to rate their satisfaction with the program on a scale from 1 to 5, where 1 indicates a complete lack of satisfaction and 5 indicates a very high level of satisfaction.

Statistical analyses

The outcomes were analyzed using generalized linear mixed effects models (GLMMs). For outcomes measured weekly during the treatment period (i.e. TLFB-G, RAS-G), time was modeled using a restricted cubic spline with three knots. The follow-up measures were included as contrasts estimating the change from the post-test. In all models, the baseline scores were included only as covariates in the models and were allowed to be non-linearly related to the outcome using a restricted cubic spline. We modeled intercepts and slopes using random effects, and we investigated the impact of the treatment on the likelihood of returning the outcome measures using a generalized estimating equation (GEE) logistic regression model.

Table 1 Measures.

Outcome Inclusion	Name	Scoring	Psychometrics	Filled out by	
				gambler	CSO
Gambling	PGSI	9 items, 0–27 points; ≥ 8 indicates problem gambling. 1-year time-frame	Internal consistency ($\alpha = 0.82$ – 0.86), test–re-test reliability ($r = 0.75$)[59]	X	X
Demographics		Questions on age, gender, occupation, previous gambling experiences, etc.	–	X	X
Primary Gambling	NODS	17-item, 0–10 points. 0 indicates no PG, 1–2 mild subclinical risk of PG; 3–4 moderate subclinical risk of PG and 5–10 a probable diagnosis of pathological gambling. 30-day time-frame	Internal consistency ($\alpha = 0.88$) and test–re-test reliability ($r = 0.99$)[60]	X	–
	TLFB-G	Self-reported net losses and days gambled, last 30 days	Test–re-test reliability ($r = 0.73$ – 0.93) and convergent validity ($r = 0.73$ – 0.87)[61]	X	–
Secondary Alcohol use disorders	AUDIT	10 items, 0–40 points; ≥ 6 for women, ≥ 8 for men indicates harmful alcohol use	Internal consistency ($\alpha = 0.82$) and test–re-test reliability ($r = 0.93$ – 0.98)[62]	X	X
Depression	PHQ-9	9 items, 0–27 points. 0–4 indicates no depression, 5–9 minimal symptoms, 10–14 minor depression, moderately severe major depression, and 20–27 severe major depression	Internal consistency ($\alpha = 0.86$ – 0.89) and test–re-test reliability ($r = 0.84$)[63]	X	X
Anxiety	GAD-7	7 items, 0–27 points. 0–4 indicates no depression, 5–9 minimal symptoms, 10–14 minor depression, 15–19 moderately severe major depression, and 20–27 severe major depression	Internal consistency ($\alpha = 0.92$) and test–re-test reliability ($r = 0.83$)[63]	X	X
Gambling consequences	ICS	43 items, 0–123 points	Internal reliability ($\alpha = 0.86$ – 0.89) and test–re-test reliability (ICC = 0.93)[64]	X	X
Relationship satisfaction	RAS-G	7 items, each scored 1–5, the total score is the average of the 7 items	Internal consistency ($\alpha = 0.86$ – 0.90) and test–re-test reliability ($r = 0.74$ – 0.89) [65]	X	X
Adherence		Number of modules completed	–	X	X
Program satisfaction		Program satisfaction rated 1–5	–	X	X

PGSI = Problem Gambling Severity Index; NODS = NORC Diagnostic Screen for Gambling Problems; TLFB = time-line follow-back; AUDIT = Alcohol Use Disorders Identification Test; PHQ = Patient Health Questionnaire; ICS = Inventory of Consequences of Gambling for the Gambler and CSO; RAS-G = Relationship Assessment Scale–generic; GAD-7 = Generalized Anxiety Disorder seven-item scale; CSO = concerned significant other

The TLFB-G, NODS, PHQ-9, ICS and GAD-7 measures were modeled using a marginal two-part GLMM.[71] Data in addiction studies often exhibit a pattern where many participants abstain from gambling and thus report zero losses or a NODS score of 0. This causes the intensity and

severity of PG to be highly skewed for those who continue gambling. Marginal two-part models allow the occurrence of zeros to be modeled using one model and the overall intensity (i.e. the overall losses for gamblers) using another model. We correlated the two parts by including correlated

random effects. For TLFB-G and ICS, we used a gamma response distribution for non-zero values, and for NODS, PHQ-9 and GAD-7 we used a Poisson response distribution. We evaluated these models using posterior predictive checks,[72,73] which simulated the models' predictions from the posterior distribution and compared them to the observed data.

All data were analyzed as intent-to-treat (ITT), and under the missing at random (MAR) assumption. As the MAR assumption is unverifiable, sensitivity analyses were performed for NODS and TLFB-G where missing follow-up measurements were replaced with the participants' baseline measures. All analyses were performed using R version 3.5.1, and the GLMMs were fitted using Stan version 2.18.2[74] via the brms package, version 2.7.0.[75]

Sample size

The sample size was calculated with a Monte Carlo simulation with 1000 iterations, and α set at 5% to achieve 90% power, using TLFB-G as outcome measure. This corresponds to a marginal odds ratio (OR) of 1.5, indicating that if 60% of CBT participants are abstinent at treatment end, 69% in the BCT group will be abstinent. This would thus require 60 gambler participants in each group. Due to a higher number of dropouts than expected, a total of 68 gambler participants were admitted to each group. The sample size calculation assumed an intraclass correlation of approximately 0.65, indicating a large variation due to participants. We also investigated the impact of missing data. In a second simulation, we introduced a MAR missing data mechanism that let missingness depend on the participants' baseline probability of abstinence, where participants with a lower probability of abstinence tended to drop out more often. We chose to have 25% of the participants out approximately mid-point of the treatment period. For a more thorough description of the sample size calculation, see the study protocol.[76]

Results

Both gambler groups exhibited reductions in gambling and improved on all outcome measures compared to baseline (Tables 2,3). A large proportion of gamblers in both groups abstained from gambling while in treatment (Fig. 2). Both groups also evaluated the interventions as highly satisfactory (Table 5). However, the outcomes for the gamblers did not clearly favor either intervention (Table 3). In terms of gambling and psychological wellbeing, the differences between the groups were small. BCT gamblers had greater (but statistically non-significant) adherence to treatment, and more BCT gamblers commenced treatment (Table 4). A larger portion of CBT participants returned their follow-up measures compared to BCT participants (53

versus 41% at 12-month follow-up for gamblers and 71 versus 59% for CSOs (Fig. 1)), but the differences were 0.05 at post-test and at all follow-up measures. Sensitivity analyses revealed no statistically significant differences that would contradict the MAR assumption.

For CSOs, BCT led to favorable outcomes on ICS, and inconclusive differences on others (Table 4). The CSOs in the BCT group gave the intervention a higher ranking compared to those in the CBT group (Table 5).

Table 2 displays descriptive statistics of all participants.

Outcomes

Table 2 shows the results of all outcome measures for the gamblers at post-treatment and at all follow-up measurements, and Table 3 shows results for the CSOs. The baseline results are included as covariates in the analysis. The tables show the observed values, effect size coefficient for results on the log scale, Cohen's *d* and multiplicative effect (ES), lower and upper limits of the multiplicative effect on the response scale and *P*-values at a 0.05 significance level. *P*-values are based on normal approximations obtained using a Wald test. Figure 2 displays the outcomes of TLFB-G for gambling divided into probability of days with no losses to gambling, overall losses (in SEK) and the effect of treatment on both measures.

Adherence and evaluation

Table 4 shows adherence measured as the number of completed modules, as well as percentage of participants completing one module or fewer or more than eight modules. It also displays participants' evaluations of the treatments.

DISCUSSION

The present study aimed to investigate the impact of involving a CSO in an internet-based intervention for PG. Specifically, we were interested in the gambling and treatment adherence of the problem gambler and the measures of other psychiatric symptoms and relationship satisfaction of both the gambler and CSO. In general, the trial did not find substantial evidence of differences in efficacy between the two treatments. The outcomes were similar, even though the BCT gamblers had a slightly better adherence to treatment in terms of number of modules completed, and in the likelihood of commencing treatment. As mentioned, low adherence to treatment is a serious challenge faced by PG trials[26] and some ICBT trials.[77] This study partially supports the notion that involving a CSO in treatment might help improve adherence.

However, CBT gamblers returned more follow-up measures, and a significant number of prospective participants did not complete the screening questionnaire ($n = 77$) or

Table 2 Descriptive statistics of the participants included at the baseline.

<i>Gambler</i>	<i>BCT (n = 68)</i>	<i>CBT (n = 68)</i>	<i>Total (n = 136)</i>
Age, mean (SD)	35.8 (12.2)	35.4 (11.5)	35.6 (11.8)
Female, <i>n</i> (%)	13 (19.1%)	12 (17.6%)	25 (18.4%)
Highest education level (%)			
Doctoral studies	0 (0%)	2 (2.9%)	2 (1.5%)
University	22 (32.4%)	15 (22.1%)	37 (27.2%)
Secondary school	41 (60.3%)	42 (61.8%)	83 (61%)
Elementary school	5 (7.4%)	9 (13.2%)	14 (10.3%)
Years of problem gambling, mean (SD)	7.1 (6.8)	6.7 (5.2)	6.9 (6)
Most problematic game (%)			
Online casino	32 (47.1%)	31 (45.6%)	63 (46.3%)
Online betting	22 (32.4%)	24 (35.3%)	46 (33.9%)
Online poker	3 (4.4%)	4 (5.9%)	7 (5.1%)
Bookmaker betting	4 (5.9%)	1 (1.5%)	5 (3.6%)
Slot machines	2 (2.9%)	2 (2.9%)	4 (2.9%)
Horse track racing	0 (0%)	1 (1.5%)	1 (0.7%)
Trading	1 (1.5%)	0 (0%)	1 (0.7%)
Several different	4 (5.9%)	5 (7.4%)	9 (6.6%)
Previous attempts to quit, <i>n</i> (%)	61 (89.7%)	54 (79.4%)	115 (84.6%)
Previous participation in treatment/support, <i>n</i> (%)	23 (33.8%)	24 (35.3%)	47 (34.3%)
Mean gambling-related debt	254 104 SEK	589 910 SEK	419 507 SEK
Median gambling-related debt	190 000 SEK	285 000 SEK	200 000 SEK
NODS score, mean (SD)	6.6 (2.2)	6.4 (2.3)	6.5 (2.3)
TLFB-G SEK lost/day (SD)	1592.0 (7122.0)	1247.3 (5000.2)	1420.0 (6155.0)
PHQ-9 score, mean (SD)	13.7 (6.1)	13.8 (7.0)	13.8 (6.5)
GAD-7 score, mean (SD)	10.6 (5.7)	10.1 (6.2)	10.3 (5.9)
ICS score, mean (SD)	47.9 (17.9)	48.5 (19.5)	48.2 (18.7)
AUDIT score, mean (SD)	6.0 (4.5)	6.0 (4.8)	6.0 (4.7)
RAS-G score, mean (SD)	4.6 (0.7)	4.2 (0.6)	4.2 (0.6)
<i>CSO</i>	<i>BCT (n = 68)</i>	<i>CBT (n = 68)</i>	<i>Total (n = 136)</i>
Age, mean (SD)	44.3 (16.3)	46.3 (13.5)	45.3 (14.9)
Female, <i>n</i> (%)	49 (72%)	54 (79.4%)	103 (75.7%)
Relationship type, <i>n</i> (%)			
Partner	33 (48.5%)	36 (52.9%)	69 (50.7%)
Parent	25 (36.8%)	24 (35.3%)	49 (36.1%)
Other	10 (14.7%)	8 (11.8%)	18 (13.2%)
Estimated years of problem gambling, mean (SD)	6.8 (6.2)	6.3 (4.4)	6.6 (5.4)
Highest education level			
Doctoral studies	2 (2.9%)	2 (2.9%)	4 (5.9%)
University	32 (47.1%)	32 (47.1%)	64 (47.1%)
Secondary school	33 (48.5%)	29 (42.6%)	62 (45.6%)
Elementary school	1 (1.5%)	5 (7.4%)	6 (4.4%)
Previous participation in treatment/support, <i>n</i> (%)	11 (16.2%)	7 (10.3%)	18 (13.2%)
PHQ-9 score, mean (SD)	8.4 (5.9)	7.7 (6.3)	8.1 (6.1)
GAD-7 score, mean (SD)	8.4 (5.6)	7.2 (5.7)	7.8 (5.7)
ICS score, mean (SD)	56.4 (20.3)	56.4 (21.6)	56.4 (20.9)
AUDIT score, mean (SD)	3.2 (3.0)	2.7 (2.0)	3.0 (2.5)
RAS-G score, mean (SD)	3.7 (0.8)	3.8 (0.8)	3.8 (0.8)

BCT = Behavioral Couples Therapy; CBT = Cognitive Behavioral Therapy; NODS = NORC Diagnostic Screen for Gambling Problems; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder seven-item scale; ICS = Inventory of Consequences of Gambling for the Gambler and CSO; AUDIT = Alcohol Use Disorders Identification Test; RAS-G = Relationship Assessment Scale-generic; SEK = Swedish kronor (1 USD ≈ 9 SEK); SD = standard deviation; CSO = concerned significant other.

could not be reached for further assessment (*n* = 78), highlighting the challenges of involving and keeping participants in PG interventions.

For CSOs, the differences in outcomes were surprisingly small, considering that the CBT condition for CSOs was a control group. This differs from the results of the pilot

Table 3 Outcomes of BCT and CBT for gamblers.

	Estimated effects of BCT and CBT for gamblers						
	Mean BCT (SD) ^a	Mean CBT (SD) ^a	Diff ^b	Coefficient	ES ^c	95% CI for ES	P-value
NODS							
Post-treatment	1.0 (2.1)	1.3 (2.6)	-0.3	-0.07	0.94	(0.39; 2.23)	0.87
3-month FU	1.1 (2.3)	1.0 (2.2)	0.1	-0.47	0.62	(0.26; 1.45)	0.28
6-month FU	0.7 (1.5)	1.6 (3.0)	-0.9	-0.59	0.55	(0.22; 1.39)	0.21
12-month FU	1.0 (2.3)	1.0 (2.1)	0	-0.23	0.8	(0.24; 2.36)	0.68
TLFB-G (SEK) ^d							
Post-treatment	35.2 (35.2)	91.6 (88.8)	-56.4	0.19	1.21	(0.37; 3.98)	0.76
3-month FU	106.8 (171.2)	87.6 (180.0)	19.2	0.89	2.42	(0.63; 9.45)	0.19
6-month FU	24.0 (33.2)	116.8 (100.8)	-92.8	-0.09	0.91	(0.24; 3.59)	0.90
12-month FU	96.8 (228.0)	36.4 (204.0)	60.4	0.13	1.13	(0.30; 4.31)	0.85
PHQ-9							
Post-treatment	8.0 (8.1)	6.2 (7.3)	1.8	0.53	1.71	(1.01; 2.91)	0.05
3-month FU	5.9 (6.8)	3.8 (5.4)	2.1	0.47	1.59	(0.94; 2.64)	0.07
6-month FU	6.2 (6.9)	4.0 (5.3)	2.2	0.44	1.55	(0.87; 2.70)	0.13
12-month FU	5.5 (6.2)	3.9 (6.4)	1.6	0.48	1.62	(0.73; 3.62)	0.23
GAD-7							
Post-treatment	5.0 (6.0)	4.2 (5.5)	0.8	0.4	1.49	(0.87; 2.57)	0.15
3-month FU	5.2 (5.9)	3.4 (4.5)	1.8	0.47	1.61	(0.98; 2.65)	0.06
6-month FU	5.2 (5.7)	3.1 (4.4)	2.1	0.52	1.68	(1.00; 2.82)	0.05
12-month FU	4.8 (5.3)	2.7 (4.6)	2.1	0.53	1.7	(0.94; 3.13)	0.08
RAS-G							
Post-treatment	4.3 (0.7)	4.2 (0.9)	-0.1	0.02	0.03	(-0.34; 0.39)	0.87
3-month FU	4.2 (0.9)	4.2 (0.8)	0	-0.15	-0.23	(-0.60; 0.13)	0.21
6-month FU	4.0 (0.9)	4.3 (0.8)	0.3	-0.22	-0.34	(-0.75; 0.05)	0.09
12-month FU	4.2 (1.0)	4.2 (0.8)	0	-0.23	-0.35	(-0.93; 0.18)	0.21
ICS							
Post-treatment	23.7 (23.7)	19.1 (21.1)	4.6	0.41	1.5	(0.87; 2.55)	0.14
3-month FU	19.4 (23.9)	13.1 (18.9)	6.3	0.36	1.43	(0.87; 2.33)	0.15
6-month FU	20.4 (25.7)	14.8 (17.3)	5.6	0.31	1.37	(0.83; 2.25)	0.23
12-month FU	15.8 (22.3)	12.8 (17.4)	3	0.22	1.25	(0.64; 2.40)	0.52
AUDIT							
Post-treatment	4.5 (3.9)	4.2 (3.4)	0.3	0.24	0.05	(-0.19; 0.29)	0.67
3-month FU	3.4 (3.4)	3.9 (3.2)	-0.5	-0.39	-0.08	(-0.29; 0.13)	0.43
6-month FU	3.6 (2.6)	3.9 (3.1)	-0.3	-0.41	-0.09	(-0.32; 0.14)	0.45
12-month FU	4.7 (3.0)	3.8 (3.3)	0.9	0.79	0.17	(-0.10; 0.44)	0.21

BCT = Behavioral Couples Therapy; CBT = Cognitive Behavioral Therapy; NODS = NORC Diagnostic Screen for Gambling Problems; TLFB-G = Time-Line Follow-Back for Gambling; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder seven-item scale; ICS = Inventory of Consequences of Gambling for the Gambler and CSO; AUDIT = Alcohol Use Disorders Identification Test; RAS-G = Relationship Assessment Scale-generic; SEK = Swedish kronor (1 USD ≈ 9 SEK). ^aObserved values. ^bDifference in mean observed score/money spent for each outcome measure. A negative score favors BCT. ^cFor AUDIT and RAS-G, ES = Cohen's *d*. For all other measures, ES = multiplicative effect; FU = follow-up; CI = confidence interval; SD = standard deviation. ^dMean amount of money lost per day.

trial,[40] as well as other trials offering support to CSOs. [30,78]

Perhaps the screening process served as a short-term intervention itself. The screening prompts participants to analyze their behavior, commit to change, disclose their

gambling activity to a CSO and a therapist and to consult with the CSO regarding measures to be taken. Thus, the CSOs were, to some degree, involved in treatment in both conditions. The gamblers generally reported very low levels of gambling when the treatment started, possibly because

Table 4 Outcomes of BCT and CBT for CSOs.

	Estimated effects of BCT and CBT for CSOs						P-value
	Mean BCT (SD)	Mean CBT (SD)	Diff ^a	Coefficient	ES ^b	95% CI	
PHQ-9							
Post-treatment	4.6 (5.1)	5.3 (5.4)	-0.7	0.04	1.04	(0.68; 1.59)	0.86
3-month FU	3.5 (4.8)	3.5 (4.9)	0	-0.24	0.79	(0.52; 1.59)	0.25
6-month FU	3.3 (5.5)	4.9 (6.5)	-1.6	-0.39	0.68	(0.43; 1.06)	0.08
12-month FU	3.3 (2.7)	3.8 (5.4)	-0.5	-0.17	0.84	(0.51; 1.41)	0.51
GAD-7							
Post-treatment	4.3 (4.0)	4.5 (5.2)	-0.2	-0.01	0.99	(0.65; 1.52)	0.97
3-month FU	3.7 (4.6)	3.8 (4.3)	-0.1	-0.07	0.93	(0.63; 1.40)	0.74
6-month FU	3.4 (4.5)	3.9 (5.1)	-0.5	-0.14	0.87	(0.56; 1.34)	0.53
12-month FU	3.3 (4.8)	3.8 (5.3)	-0.5	-0.35	0.71	(0.42; 1.17)	0.18
RAS-G							
Post-treatment	3.9 (0.9)	3.9 (0.9)	0	-0.11	-0.14	(-0.41; 0.14)	0.33
3-month FU	4.0 (0.9)	4.0 (0.8)	0	0.03	0.04	(-0.25; 0.34)	0.76
6-month FU	3.9 (1.0)	3.9 (0.9)	0	0.02	0.03	(-0.28; 0.54)	0.85
12-month FU	4 (1.0)	4.0 (0.9)	0	0.12	0.15	(-0.23; 0.54)	0.45
ICS							
Post-treatment	28.1 (23.0)	23.1 (24.7)	-5.2	-0.02	0.98	(0.67; 1.44)	0.91
3-month FU	20.1 (22.1)	22.3 (23.1)	-2.2	-0.15	0.86	(0.61; 1.22)	0.40
6-month FU	20.6 (22.6)	20.3 (26.7)	0.3	-0.28	0.76	(0.53; 1.08)	0.12
12-month FU	16.6 (23.7)	22.9 (25.5)	-6.3	-0.54	0.58	(0.37; 0.92)	0.02 ^c
AUDIT							
Post-treatment	2.5 (2.2)	2.5 (1.8)	0	-0.14	-0.06	(-0.21; 0.11)	0.50
3-month FU	2.5 (2.2)	2.2 (1.5)	0.3	-0.21	-0.08	(-0.23; 0.06)	0.24
6-month FU	2.5 (2.3)	2.4 (1.8)	0.1	-0.2	-0.08	(-0.24; 0.09)	0.35
12-month FU	2.6 (2.7)	1.9 (1.6)	0.7	0.19	0.07	(-0.12; 0.27)	0.46

BCT = Behavioral Couples Therapy; CBT = Cognitive Behavioral Therapy; NODS = NORC Diagnostic Screen for Gambling Problems; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder seven-item scale; ICS = Inventory of Consequences of Gambling for the Gambler and CSO; AUDIT = Alcohol Use Disorders Identification Test; RAS-G = Relationship Assessment Scale—generic; CSOs = concerned significant others. ^aDifference in mean observed scores for each outcome measure. A negative score favors BCT. ^bFor AUDIT and RAS-G, ES = Cohen's *d*. For all other measures, ES = multiplicative effect; CI = confidence interval; SD = standard deviation. ^cIndicates a statistically significant value at the 0.05 threshold.

of changes made between screening and treatment start. This makes comparison between the two groups difficult, and could have had a negative impact on gamblers' motivation to participate in treatment.

Previous research suggests that CSOs' involvement in PG treatment is beneficial for gambling-related outcomes. [28] The results of this study thus stand out in comparison, and raise the question of whether CSO involvement could have negatively affected the outcome. This study is by far the largest in its field and one of the few employing a randomized controlled trial design, and the ambiguous results of involving a CSO in treatment could have implications for further research and clinical practice.

While potential adverse effects of psychotherapy were not investigated in the present study, it could explain some of the results. In a meta-analysis of 29 trials of ICBT ($n = 2866$) [79] for various psychological conditions, the

highest level of participant deterioration, 18%, was observed in a study of ICBT for relationship problems. One cited reason for deterioration in psychotherapy is that participants may be exposed to negative aspects of their lives, causing more negative emotions and thoughts which, in turn, could exacerbate their problems. [80] Involving CSOs in PG treatment could possibly intensify this process. PG is characterized by feelings of guilt and shame, and the CSOs could serve as a reminder of past events and their experiences of the gambler's PG. In a face-to-face setting, such themes could be immediately handled by the therapist, but internet-based treatments rarely provide that opportunity.

The ICBT format—two participants and an assigned therapist—may affect the results. Participants were required to synchronize the pace of their treatment in order to complete shared assignments. In the pilot version of

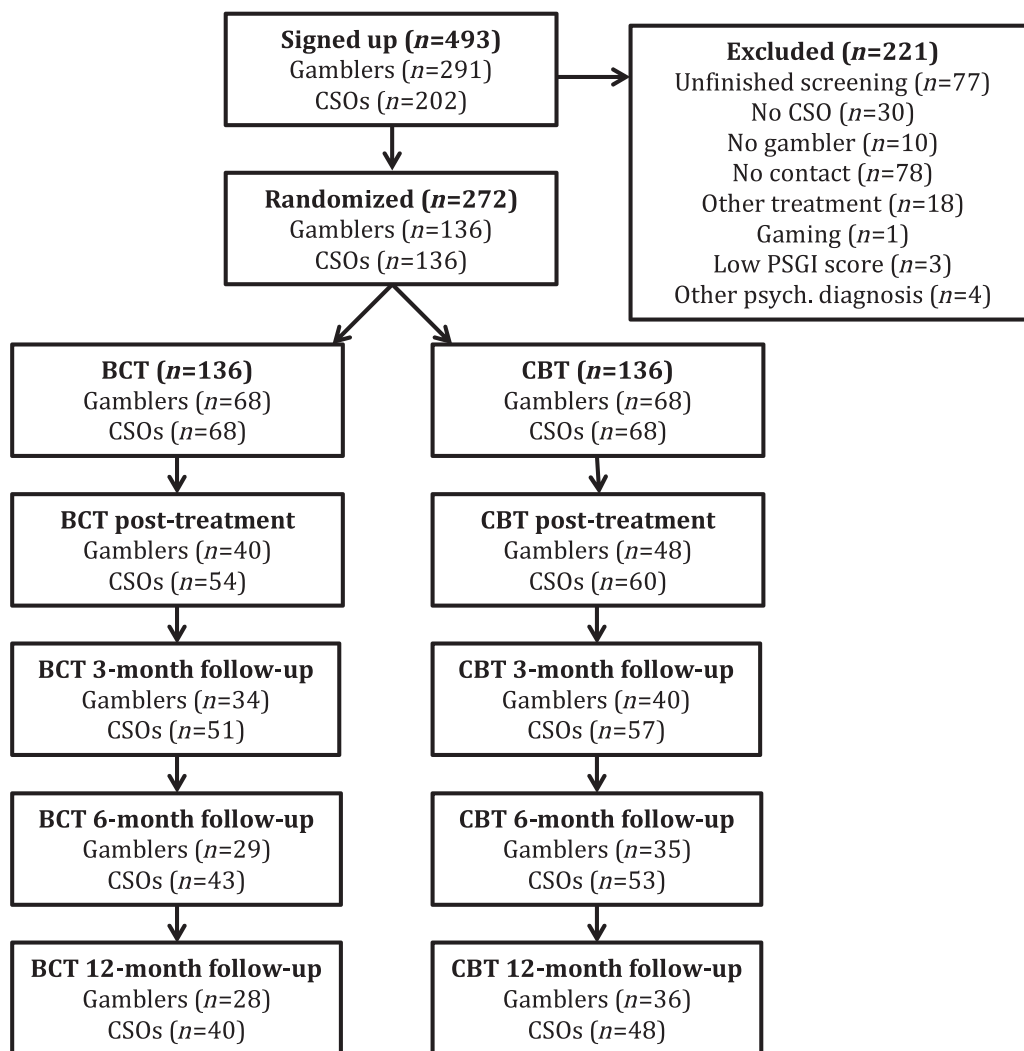


Figure 1 Participant flow. BCT = Behavioral Couples Therapy; CBT = Cognitive Behavioral Therapy; CSOs = Concerned Significant Others

Table 5 Adherence and evaluation.

	BCT gambler	CBT gambler	P-value	BCT CSO	CBT CSO	P-value
Mean no. of modules completed (SD)	6.8 (3.1)	6.0 (4.1)	0.41	7.2 (3.3)	–	–
Median no. of modules completed	8	8	–	8	–	–
≤ 1 modules completed	5.8%	14.7%	0.002*	5.9%	–	–
≥ 9 modules completed	41.2%	45.6%	0.046	48.5%	–	–
Mean evaluation score (SD)	4.5	4.5	0.49	4.4	3.5	< 0.001*
Median evaluation score	5	5	–	4	3.5	–

BCT = Behavioral Couples Therapy; CBT = Cognitive Behavioral Therapy; SD = standard deviation; CSO = concerned significant other. *Indicates a statistically significant value at the 0.05 threshold.

this trial, the therapists stated that this could affect the timing and structure of treatment.[40] Also, previous research suggested that internet-based treatments produce better results when delivered in a structured manner with a clear deadline,[81,82] which was sometimes unachievable, as two individuals were receiving

the treatment. Furthermore, ICBT is far less studied than regular CBT, and while research on other conditions, e.g. depression, panic disorder and tinnitus, have pointed to similar results between ICBT and face-to-face interventions,[83] such comparisons remain to be made in the PG field.

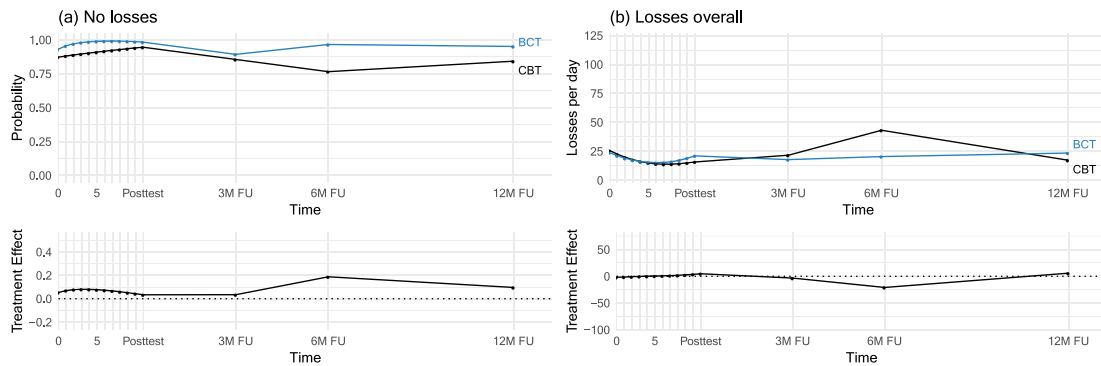


Figure 2 Timeline follow-back for gamblers. 1 USD \approx 9 SEK. (a) Probability of days without losses; (b) overall losses (in SEK). Ribbons represent 95% confidence intervals (CIs). Values represent outcomes for a 'typical' patient (i.e. with subject-specific effects at the center of the distribution) [Colour figure can be viewed at wileyonlinelibrary.com]

Limitations

This study has some limitations. First, the long screening process could have affected the results for the CSOs in the CBT group, who received what could be considered a brief intervention. Secondly, we cannot rule out that CSO in the CBT group also took part in the modules completed by 'their' gambler. Thirdly, the gamblers had often already abstained from gambling for weeks when signing up for the study. This could create a floor effect, making it more difficult to detect changes in the severity of problems and the relative efficacy of the two treatments.

CONCLUSIONS

The gamblers and CSOs in both groups improved on all outcomes, but the results indicate that the benefits of involving CSOs in treatment may not be as substantial as previously assumed. While adherence to treatment might increase with CSO involvement, other outcomes did not seem to be affected. Somewhat surprisingly, CSOs did not seem to benefit greatly from taking part in the treatment. Merely taking part in the screening and inclusion process for the study might have functioned as a short intervention. One possible direction for future research is to investigate the involvement of CSOs in regular face-to-face treatment as well, since it is unclear how the results from ICBT can be generalized to other therapeutic formats.

TRIAL REGISTRATION NUMBER

NCT02543372 at clinicaltrials.gov.

Declaration of interests

None.

Acknowledgements

This work was supported by Svenska Spel's Independent Research Council (grant number 2013-0015). It had no influence over the design, outcomes or analysis of this study. Svenska Spel is the state-organized gambling provider in Sweden, and it sets aside money to support research on PG. Its research committee is independent from the main organization, and the research is conducted according to regular university standards.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Data S1 Supporting Information.