Implementation and Preliminary Evaluation of a 12-Week Cognitive Behavioural and Motivational Enhancement Group Therapy for Cannabis Use Disorder

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ABSTRACT

BACKGROUND: The purpose of this paper is to provide a preliminary evaluation of treatment outcomes, retention and client satisfaction following a 12-week combined cognitive behavioural therapy (CBT) and motivational enhancement therapy (MET) group treatment for cannabis use disorder (CUD) delivered in an outpatient setting. Implementation of the program is also described.

METHODS: A retrospective observational cohort study was conducted using data collected from medical records and self-report assessments. Participants were treatment-seeking cannabis users at the Centre for Addiction and Mental Health, Toronto. Cannabis use, cannabis-related problems, craving, withdrawal symptoms, self-efficacy for remaining abstinent, depression and anxiety were assessed pre- and post-treatment. Treatment retention was calculated by inspecting clinic attendance records, and client satisfaction was evaluated using an anonymous feedback survey. Potential predictors of treatment outcomes and retention were investigated in exploratory analyses.

RESULTS: Cannabis use was lower and days of abstinence higher post-treatment (vs pre-treatment). Post-treatment improvements in cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood were also observed. Completion of group treatment (≥75% of sessions attended) was 57% and moderate levels of treatment satisfaction were reported.

CONCLUSIONS: This study provides preliminary evidence that a 12-week combined CBT and MET treatment for cannabis use disorder delivered in a novel group setting improves cannabis use outcomes. Potential predictors of reduced cannabis use and retention were identified. Future controlled studies are warranted, and strategies for increasing retention should be explored.

KEYWORDS: Cannabis use disorder, motivational enhancement therapy, cognitive behavioural therapy, psychotherapy, group treatment

Introduction

Cannabis use disorder (CUD) is characterized by loss of control over drug taking and symptoms may include hazardous use, the need to use larger amounts over time, physical, psychological and social problems associated with use, neglecting responsibilities, craving and withdrawal.[1] Globally, past 12 month prevalence of cannabis use is estimated at 3.8%, rising to 12.4% in North America.[2] It is estimated that ~10% of individuals who begin using cannabis will develop dependence,[3,4] and this figure is higher among adolescents and those who use cannabis daily.[5] Cannabis use is associated with poor health outcomes including increased risk of mental health problems such as psychosis, depression and anxiety.[5] Given the recent legalization of cannabis in several countries, there is increasing need for effective treatments for CUD.

There are currently no FDA approved pharmacological treatments available for CUD, and few studies of experimental compounds have been conducted to date, although some, such as tetrahydrocannabinol and cannabidiol (the primary psychoactive constituents of cannabis, which may be useful for facilitating withdrawal from cannabis – for example, nabilone, a synthetic THC analogue, has shown some promise as a substitution therapy and CBD has been proposed to reduce the subjective and reinforcing effects of THC[6]), gabapentin, *N*-acetylcysteine and varenicline, may be worth further investigation.[7-9] Initial studies of psychotherapy for CUD have investigated forms of motivational enhancement therapy (MET), cognitive behavioural therapy (CBT), contingency management and community or family interventions originally developed for use in other substance use disorders. These show that individually both brief MET and CBT can lead to modest improvements in cannabis-related outcomes among treatment seeking and non-treatment seeking adults,[10-15] although these studies have tended to have high rates of dropout[16] and it has been suggested that longer combination therapies may prove more effective.[14,17,18] Trials of combination treatments for CUD have shown positive effects. For example, the largest randomized study to date showed that 9 sessions of a combined MET, CBT and case management intervention reduced the percentage of cannabis use days and improved abstinence rates compared to a control condition at 4, 9 and 15 months follow-up (although effects at 15 months were small).[10] However, a review of current treatment approaches for CUD noted that despite these positive findings sustained abstinence remains problematic, and that both the optimal duration and intensity of treatment and mechanisms of therapeutic change are still unclear.[19] Additionally, identification of factors that predict treatment engagement and response, which would provide opportunities for optimization of treatment, have received little attention in the context of psychological treatment approaches (although secondary analysis of a recent RCT suggested that client factors including age and sex predicted engagement with nabiximols, a cannabis plant extract available as an oral spray that has been subject to investigation as a potential treatment for CUD although currently its only approved use is for the management of muscle spasticity and neuropathic pain associated with multiple sclerosis, for the treatment of CUD[20]).

Whilst previous studies suggest that CBT and MET are promising treatments for CUD, there is currently no 'gold standard' treatment for CUD and most studies have delivered these interventions to individuals, despite the fact group therapy is a common treatment modality for substance use disorders that may offer cost savings and other treatment benefits compared with individual therapy[21,22] (although several complexities associated with facilitating group treatments for substance use disorders have also been highlighted[23]). The current study adds to the existing literature by investigating a combination CBT and MET treatment for CUD delivered in a real-life group treatment setting. We also explore potential predictors of treatment outcomes which may have implications for the targeting, design and delivery of interventions in the future.

The Concurrent Outpatient Medical & Psychosocial Addiction Support Service (COMPASS) at the Centre for Addiction and Mental Health (CAMH) based in Toronto, Canada is a specialist outpatient service that provides evidence-based medical and psychosocial interventions for clients with addiction and/or concurrent disorders, including CUD. In February 2018, a novel combination CBT and MET group treatment was introduced at COMPASS for clients with CUD seeking to reduce or discontinue cannabis use. The treatment consists of a 12-week manualized CBT and MET group intervention, adapted from an individual counselling program developed by the US *Center for Substance Abuse Treatment (Substance Abuse and Mental Health Services Administration; SAMHSA).*[24] The treatment sessions focus first on enhancing motivation to change, and then increasingly on developing the behavioural, cognitive and emotional skills necessary for changing cannabis use.

Aims and hypotheses

The primary aim of this paper is to provide a preliminary evaluation of treatment retention, changes in cannabis use and client satisfaction following this group treatment for CUD at COMPASS, and to describe implementation of the program. To address this aim a retrospective observational cohort study was conducted using data collected during clinical care in a real-life treatment setting, from a convenience sample of clients who comprised the first 7 cohorts of the CBT and MET group treatment. Demographic and attendance-related information were collected from clinic records, and information about amount and frequency of cannabis use, cannabis-related problems, craving, withdrawal symptoms, self-efficacy, mood and satisfaction with treatment were collected using standardized self-report assessments. The main hypothesis is that following a 12-week CBT and MET group treatment weekly self-reported amount of cannabis used will be reduced, and weekly number of days abstinence will be increased, compared to pre-treatment levels of each. Additionally, it is hypothesized that clients will provide positive satisfaction ratings for the treatment group. The secondary aim is to investigate pre-to-post treatment changes in other measures relevant to cannabis use (ie, cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood), and it is hypothesized that these will be improved following the 12-week CBT and MET group compared to pre-treatment. Finally, in exploratory analyses associations of demographic and other variables with treatment retention and changes in cannabis use were investigated, which may inform future work aiming to identify potential predictors of positive treatment outcomes and that may have implications for treatment optimization in the future.

Methods

Design

A retrospective observational cohort study was conducted, using chart review of paper and electronic records collected for the purpose of clinical care at the beginning and end of a 12-week CBT and MET group treatment for CUD that was delivered in-person in an outpatient setting. Participants were treatment-seekers who were not originally recruited as a research sample. Data was collected retrospectively through chart review and self-report assessments completed as part of clinical care.

Setting

CAMH is a specialist psychiatric teaching hospital, fully affiliated with the University of Toronto, that provides inpatient and outpatient care. At CAMH, COMPASS provides evidence–based medical and psychosocial interventions for clients with addiction and/or concurrent disorders, including CUD. Client entry into COMPASS is through referral to an Addiction Information Session (a 1-time group session for new clients) followed by a comprehensive individual medical and psychosocial assessment. COMPASS has numerous group therapy streams available including the CBT and MET group treatment for CUD. Clients are referred to attend a single treatment program, although on completion (or drop-out) clients may subsequently be referred for other treatments as appropriate based on their care needs. The CBT and MET group treatment is a group for outpatients designed to support clients in the early stages of their recovery.

Participants

Participants were a convenience sample of treatment-seeking cannabis users enrolled into a 12-week CBT and MET group treatment for CUD at COMPASS between February 2018 to November 2019. Clients were referred to the group treatment by their treating physician at the COMPASS clinic based at CAMH in Toronto, Canada. Clients could join the group treatment if they had a goal of reducing or stopping cannabis use, or if they wanted to build skills in order to prevent relapse. All clients who began (ie, attended at least 1 session) any of the first 7 treatment cycles (ie, the first 7 cohorts of the treatment group) of the CBT and MET group treatment were included in this study. Membership of each cohort of the CBT and MET group is fixed at the start of the group, and the cohort progresses through the group treatment together according to session dates set at the start. Eligible participants were identified by inspecting clinic attendance records. If it was known that a client did not wish their clinical information to be used for research purposes, they were excluded from the study. This information is logged and clearly marked in a standardized format in the CAMH electronic medical records, and this field of

the records was checked by the researcher prior to proceeding with retrospective chart review. Access to the electronic medical records is logged to ensure that records are viewed only by authorized staff for approved purposes. All 7 treatment cycles were completed before data collection began.

Intervention and implementation

The CBT and MET group treatment is designed for clients with moderate to severe CUD and inclusive to those with concurrent disorders. Exclusion criteria for referral are cannabis abstinence >6 months and a need for higher level care than an outpatient group allows (eg, due to active mania or psychosis). Treatment consists of a 12-week manualized intervention, based on a manual developed for individual counselling ('Brief Counseling for Marijuana Dependence: A Manual for Treating Adults'[24]). Group sessions focus first on enhancing motivation to change, and then increasingly on developing the behavioural, cognitive and emotional skills necessary for changing cannabis use. Key components of the initial group sessions are to encourage reflection on the personal consequences of cannabis use and attitudes towards, and readiness for, change. These sessions also facilitate goal-setting and developing plans for change. The later sessions become more CBT-focused and address topics such as: problem solving, understanding and identifying patterns of cannabis use, coping with cravings, recognizing automatic thoughts associated with cannabis use, managing mood changes, cannabis refusal skills, assertiveness training, decision making and dealing with lapses. A brief overview of the weekly session content is provided in Table 1.

Group sessions run in closed cycles with a maximum of 10 clients per group. Clients are encouraged to attend all 12 weekly group sessions, and clients who attend ≥75% of the sessions are considered to have engaged with sufficient material to have 'completed' the group treatment. Each group session is delivered by 2 trained clinicians (typically a clinical psychologist and a residency-level PH.D. student in clinical psychology or a therapist with a master of social work) once per week (2 hours per session) for 12 weeks. All group facilitators meet the qualification, training and experience criteria outlined in the treatment manual[24] (although co-facilitators without the requisite 2-years post-qualification clinical experience, eg, residency level PH.D students, are always supervised by an appropriately experienced primary facilitator). The clinical psychologist provides training and mentorship to new facilitators by means of co-facilitation and providing a detailed overview of materials and assessment measures. Group facilitators meet weekly to review new referrals and discuss current group members' treatment plans. After session 1 facilitators prepare personal feedback reports for each client. Facilitators provide regular updates on group participation and progress to referring physicians. Team physicians and psychiatrists are consulted when needed for complex clients needing additional care. At the conclusion of treatment, discharge planning typically involves referral to

Table 1. Overview of CBT and MET group treatment sessions.

SESSION	FOCUS	CONTENT/AIMS
Week 1	MET	• Rapport building • Collect baseline cannabis use information to monitor therapeutic outcomes
Week 2	MET	Reviewing the Personal Feedback Report • Facilitate reflection on consequences of cannabis use • Explore attitudes about change (including benefits and costs) • Acknowledge expressions of readiness for change, help set goals and identify change strategies
Week 3	MET	Change Plan, Treatment Plan and Supporter Involvement • Specify how a supporter can help achieve and maintain change • Develop a change plan with coping strategies for high-risk situations
Week 4	CBT	Coping With Other Life Problems and Problem Solving • Identify and address non-substance-related problems that can pose obstacles to meeting cannabis goal • Introduce a strategy for solving problems • Apply the problem solving approach to cannabis use and related problems
Week 5	CBT	Understanding Cannabis Use Patterns • Provide psychoeducation on the development of addictive patterns • Introduce reasoning behind coping skills training • Examine high-risk situations and coping strategies
Week 6	CBT	Coping with Cravings and Urges • Enhance understanding about cravings and urges for cannabis use • Identify specific triggers or cues for cravings • Review and practice specific skills for addressing cravings
Week 7	CBT	Managing Thoughts About Cannabis Use • Identify and learn to cope with automatic thoughts associated with cannabis use
Week 8	CBT	Managing Negative Moods and Depression • Awareness of how moods affect cannabis use • Learn strategies to recognize, process and cope with emotions
Week 9	CBT	Cannabis Refusal Skills • Learn and practice assertive responses to offers of cannabis use
Week 10	CBT	Demonstrating Assertiveness • Improve ability to effectively express feelings and needs to others
Week 11	CBT	Recognizing Seemingly Irrelevant Decisions • Increase awareness of the decision-making process • Recognize how some choices increase likelihood of return to cannabis use
Week 12	CBT	Planning for Emergencies and Coping with a Lapse • Increase preparedness for unexpected triggers and situations likely to promote relapse • Learn techniques to manage aftermath of a lapse or relapse • Review treatment

other outpatient services and continuation of care with the primary COMPASS physician.

Time has continuously been allocated to program improvement, including streamlining all client materials into 1 workbook, creating a detailed session outline booklet for facilitators, and creating an electronic version of the personal feedback report. A portion of the personal feedback report is dedicated to comparing clients' use to that of other adults. This was updated to reflect recent Ontario norms since original material was outdated and came from an U.S. sample. Treatment was modified to consistently have 12 sessions; initially, the content was structured into 10 sessions (by merging 2 session content into 1) but it was subsequently decided the content should be presented over 12 sessions. Other minor changes were made to client materials to reflect harm reduction, rather than abstinence, language. Finally, during implementation questions arose around accepting referrals from different programs within the hospital. Given the volume of referrals it was ultimately decided to limit to internal referrals, ensuring that each client is under the care of a COMPASS physician.

Outcome measures

Demographics. Sample characteristics including age at start of treatment, sex, medical and psychiatric comorbidities and previous treatment for substance use disorder were collected from electronic hospital medical records.

Treatment retention. Clinic attendance records were inspected and the total number of sessions attended was recorded. Participants were deemed to have completed the group treatment if they attended ≥75% of the sessions.

Changes in cannabis use. The primary measure was self-reported cannabis use, assessed using Timeline Follow-Back (TLFB), a reliable retrospective calendar-based measure of the quantity and frequency of daily substance use.[25] Clients were encouraged to use a standardized TLFB protocol to estimate as accurately as possible the number of grams (or equivalent) consumed at each use over the past week. These estimates were converted where necessary and summed to calculate a weekly total number of grams used. TLFB was completed weekly (at each treatment session) and backfilled at the next earliest opportunity for any missed weeks. The following 'pre-treatment' and 'post-treatment' variables were calculated: (i) total grams of cannabis used, and (ii) number of days abstinence. Pre-treatment was defined as the week prior to the start date of the CBT and MET group treatment (week –1), and post-treatment was defined as the final week of the CBT and MET group treatment (week 12).

Also reported are 7-day point prevalence abstinence at the end of treatment (defined as the percentage of clients abstinent for 7 consecutive days during week 12) and continuous abstinence (defined as the percentage of clients who sustained abstinence for the whole treatment duration). 7-day point prevalence and continuous abstinence were calculated as a percentage of: (i) the number of clients for whom TLFB data was available at the start of treatment, and (ii) more conservatively, the number of clients who initiated treatment. Using both of these approaches, it was assumed that clients who dropped out of treatment or who failed to provide TLFB data had failed to maintain abstinence.

Client satisfaction. Client satisfaction was evaluated using an anonymous feedback survey completed at the end of treatment (week 12). Clients were asked to rate their agreement with the statement '*Overall, I feel satisfied with the group treatment I received*' using a 4-point scale (where 1 = Strongly disagree, 2 = Disagree, 3 = Agree and 4 = Strongly agree).

Other outcomes relevant to cannabis use (cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood). Clients completed the *Cannabis Use Disorder Identification Test – Revised* (CUDIT-R[26]) before treatment began to assess hazardous cannabis use and the *Reasons for Quitting Questionnaire* (RFQ[27]) to assess motivation to quit (n.b. the CUDIT-R and RFQ were *not* repeated at the end of treatment at week 12). Additionally the following self-report measures were collected at week –1 ('pre-treatment') and again at week 12 ('post-treatment'): (i) the *Marijuana Problem Scale* (MPS[13,28]) to identify life domains negatively affected by marijuana use, (ii) the *Marijuana Craving Questionnaire* (MCQ-SF[29]) to assess craving for marijuana along the dimensions of compulsivity, emotionality, expectancy and purposefulness, (iii) the *Marijuana Withdrawal Checklist* (MWC[30]) to assess incidence and severity of perceived withdrawal symptoms, (iv) the *Self-Efficacy Questionnaire* (SEQ[31,32]) to assess self-perceived confidence in the ability to resist marijuana use in a variety of situations, (v) the *Generalized Anxiety Disorder scale* (GAD-7[33]), to measure anxiety-related symptoms and (vi) the *Patient Health Questionnaire* (PHQ-9[34]) to measure depressive symptoms.

Statistical analyses

All analyses were conducted using the statistical software package IBM SPSS Statistics (Version 24). In all analyses, 2-tailed p-values of less than 0.05 were considered statistically significant. Standard assumptions of parametric tests were evaluated, and non-parametric alternatives used where any assumptions were violated (in all cases, non-parametric tests were used due to violation of the assumption of normality).

To test the main hypothesis that cannabis use will be reduced following a 12-week CBT and MET group treatment self-report assessments of cannabis use (grams/week and days abstinence, derived from TLFB) at pre-treatment (week –1) were compared with post-treatment (week 12) using paired-samples t-tests (or Wilcoxon signed-rank tests). Similarly, the impact of treatment on other variables relevant to cannabis use (cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood) was investigated using a series of paired-samples t-tests (or Wilcoxon signed-rank tests), to compare pre-treatment and post-treatment scores. Pre- versus post-treatment comparisons for these variables were based upon only participants who provided data at both times. To explore potential predictors of treatment completion, demographic characteristics and pre-treatment self-report assessments of interest were compared between treatment 'completers' versus 'non-completers' using independent samples *t*-tests (or Mann Whitney *U* tests), for continuous variables or Chi Square for categorical variables (n.b., this included an estimate of pre-treatment cannabis use, since baseline TLFB data was available for non-completers as well as completers). Finally, to explore factors associated with changes in cannabis use a series of Pearson's correlations (or Spearman's), between post-treatment cannabis use (grams/week) with pre-treatment cannabis use, cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood were conducted. Since the analyses presented here were exploratory, no corrections for multiple comparisons were applied.

Results

A total of 69 clients were identified for whom at least some data was available. Due to the retrospective nature of the study, and because self-report assessments were originally completed for the purpose of clinical care, there was a large amount of missing data. In order to maximize the available sample size cases were deleted on a pairwise basis (ie, participants with partially missing data were included in any analyses for which relevant information was available). The number of participants included in each analysis is reported in the relevant sections throughout.

Demographics

Participants were aged 33.7 years (range 20-62 years) and 65% were male. Current or past history of psychiatric comorbidity, predominantly mood and anxiety disorders, was documented for 68% of participants and 38% had received treatment for substance use disorders in the past 12 months. Participant characteristics including details of psychiatric and medical comorbidities, recent treatment for substance use disorders, hazardous cannabis use and motivation to quit are summarized in Table 2.

Treatment retention

No clients participated in more than 1 treatment cycle. Of 69 clients who attended the first group treatment session, 39 (57%) attended at least 75% of the sessions and were considered to have completed the group treatment. The overall mean number of sessions attended was 7.26 (SEM = 0.40). Completers attended a mean of 9.77 (SEM = 0.19) sessions (vs mean = 4.00, SEM = 0.37 for non-completers).

Change in cannabis use

Total grams of cannabis used in the pre-treatment week (mean = 4.68, median = 3.25, IQR = 7.00) was significantly greater than total grams used in the post-treatment week (mean = 1.55, median = 0.00, IQR = 1.75; *z = −3.27, P < .001, r = −.44, overall* n = 27). Additionally, the number of days abstinence in the pre-treatment week (mean = 2.70, median = 2.00, IQR = 7.00) was significantly lower than the number of days abstinence in the post-treatment week (mean = 4.93, median = 7.00, IQR = 5.00; *z = −3.03, P = .001, r = .41, overall* n = 27).

Seven-day point prevalence abstinence at end of treatment was 31% (14 out of 45 clients for whom TLFB was available at start of treatment), or more conservatively 20% (14 out of 69 clients who initiated treatment). Continuous abstinence was 11% (5 out of 45 clients for whom TLFB was available at start of treatment) or using a more conservative approach 7% (5 out of 69 clients who initiated treatment).

Client satisfaction

33 feedback surveys were completed. Of these, all clients strongly agreed or agreed that overall they were satisfied with the group treatment (ie, 48% of 69 clients who initiated treatment were satisfied). No clients who completed the CBT and MET group treatment indicated dissatisfaction with treatment.

Changes in other outcomes relevant to cannabis use

Compared to pre-treatment there were significant improvements post-treatment in cannabis-related problems (MPS), craving (MCQ-SF), withdrawal symptoms (MWC), self-efficacy (SEQ) and mood (GAD-7 and PHQ-9). All pre-treatment versus post-treatment comparisons are presented in Table 3.

Predictors of treatment completion and change in cannabis use

Completion. Non-completers used significantly more grams/week of cannabis in the pre-treatment week (mean = 10.19 g, median = 9.00, IQR = 10.75, n = 19) compared to completers (mean = 4.81 g, median = 3.25, IQR = 6.63, n = 26; *U = 157.00, z = −2.08, P = .038, overall* n = 45). In addition, pre-treatment perceived self-efficacy for achieving abstinence was significantly lower and anxiety symptoms significantly higher among non-completers compared to completers. Comparisons of completers versus non-completers are presented in Table 4.

Change in cannabis use. There was a significant positive correlation between pre-treatment grams/week of cannabis use and post-treatment grams/week of cannabis use (*r* = .50, *P* = .008, n = 27). There were no other significant correlations between variables relevant to cannabis use and post-treatment grams/week of cannabis use.

Discussion

This paper describes the implementation of a 12-week combined CBT and MET group intervention for CUD delivered in-person in an outpatient setting. It also provides a preliminary retrospective evaluation of the first 7 cohorts of this group intervention. Given the lack of a recognized 'gold standard' treatment for CUD, high levels of misuse and increasing availability of cannabis, research aiming to identify effective interventions is a priority. This study is novel since it provides an insight into the usefulness of a combined CBT and MET intervention for cannabis use disorder delivered specifically in a group setting under conditions of routine care in a real-life treatment setting. It also begins to explore predictors of intervention outcomes that may facilitate treatment personalization in the future. A significant reduction in cannabis use (grams/week) and a significant increase in days of abstinence following treatment were found (although point prevalence and continuous abstinence rates were low). In addition, there were significant post-treatment improvements in measures of cannabis-related problems, craving, withdrawal symptoms, self-efficacy and depression and anxiety symptoms. Treatment satisfaction was moderate, although retention of clients was low. In exploratory analyses cannabis use in the final week of treatment was associated with pre-treatment cannabis use but not with any other cannabis-related or mood variables. Further, it was found that heavier pre-treatment cannabis use, lower self-efficacy and higher pre-treatment anxiety symptoms were associated with intervention non-completion.

Table 2. Sample characteristics.

	OVERALL		MALES (N=46)		FEMALES (N=22)	
	MEAN (SEM)	FREQUENCY (%)	MEAN (SEM)	FREQUENCY (%)	MEAN (SEM)	FREQUENCY (%)
Age[a] (n=67)	33.69 (1.14)		35.28 (1.39)		30.19 (1.76)	
Psychiatric comorbidities (n=66)						
MDD		24 (34.78)		18 (39.13)		6 (27.27)
Bipolar disorder		6 (8.70)		2 (4.35)		4 (18.18)
Schizoaffective disorder		3 (4.35)		2 (4.35)		1 (4.55)
GAD		12 (17.39)		5 (10.86)		7 (31.82)
Social anxiety disorder		11 (15.94)		6 (13.04)		5 (22.73)
PTSD[a]		9 (13.04)		1 (2.17)		8 (36.36)
Panic disorder		5 (7.25)		2 (4.35)		3 (13.63)
Obsessive-compulsive disorder		2 (2.90)		2 (4.35)		0 (0.00)
Borderline personality disorder		9 (13.04)		3 (6.52)		6 (27.27)
ADHD		3 (4.35)		2 (4.35)		1 (4.55)
Eating disorder		2 (2.90)		0 (0.00)		2 (9.09)
Schizophrenia spectrum disorder		1 (1.45)		1 (2.17)		0 (0.00)
Medical comorbidities (n=66)						
Asthma		5 (7.25)		3 (6.52)		2 (9.09)
COPD		2 (2.90)		2 (4.35)		0 (0.00)
Chronic pain		1 (1.45)		0 (0.00)		1 (4.55)
Osteoarthritis		1 (1.45)		0 (0.00)		1 (4.55)
GERD		1 (1.45)		1 (2.17)		0 (0.00)
Hypercholesterolemia		1 (1.45)		0 (0.00)		1 (4.55)
Previous treatment for SUDs in past 12 months (n=66)[b]						
Pharmacotherapy		10 (14.49)		6 (13.04)		4 (18.18)
Psychological treatment		9 (13.04)		6 (13.04)		3 (13.64)
Pharmacotherapy and psychological treatment		7 (10.14)		4 (8.70)		3 (13.64)
CUDIT-R score (n=44)	22.98 (0.51)		22.88 (0.62)		23.27 (0.91)	
RFQ total score (n=48)	11.67 (0.67)		11.12 (0.74)		13.57 (1.32)	

Abbreviations: ADHD, attention deficit hyperactivity disorder; COPD, chronic obstructive pulmonary disease; CUDIT-R, Cannabis use disorder identification test – revised; GAD, generalized anxiety disorder; GERD, gastroesophageal reflux disease; MDD, major depressive disorder; PTSD, post-traumatic stress disorder; RFQ, Reasons for Quitting Questionnaire; SUDs, substance use disorders.
[a]Gender differences: males were significantly older than females ($P = .021$), and incidence of PTSD was lower among males compared to females ($P < .001$).
[b]Previous treatment for SUDs in the past 12 months did not impact post-treatment cannabis use or treatment completion, $P > .05$.

Table 3. Pre-treatment and post-treatment comparison of cannabis-related problems, craving, withdrawal symptoms, self-efficacy and mood.

	Nᵃ	PRE-TREATMENT			POST-TREATMENT			STATISTICAL COMPARISON	P	EFFECT SIZE
		MEAN (SEM)	MEDIAN (IQR)	RANGE	MEAN (SEM)	MEDIAN (IQR)	RANGE			
MPS	18	16.00 (1.72)		0.00-28.00	8.78 (1.76)		0.00-25.00	t(17)=3.05	.007	d=0.72
MCQ-SFᵇ	18	3.53 (0.30)	3.50 (2.04)	1.08-5.75	2.33 (.31)	1.75 (2.58)	1.00-4.67	z=-2.72	.006	r=-.64
MWCᵇ	18	18.94 (2.33)	17.50 (13.25)	5.00-41.00	1.44 (1.38)	11.00 (7.50)	2.00-24.00	z=-3.03	.001	r=-.71
SEQ	18	3.49 (0.30)		2.05-6.70	4.83 (.34)		2.50-6.90	t(17)=-4.96	<.001	d=-1.17
GAD-7ᵇ	18	8.78 (1.22)	8.50 (9.00)	1.00-17.00	4.67 (.84)	4.00 (5.50)	0.00-12.00	z=-2.67	.006	r=-.63
PHQ-9ᵇ	18	11.94 (1.55)	11.00 (11.25)	0.00-22.00	7.39 (1.74)	5.50 (7.25)	0.00-24.00	z=-2.49	.010	r=-.59

Abbreviations: GAD-7, Generalized Anxiety Disorder scale; MCQ-SF, Marijuana Craving Questionnaire; MPS, Marijuana Problem Scale; MWC, Marijuana withdrawal checklist; PHQ-9, Patient Health Questionnaire; SEQ, Self-Efficacy Questionnaire.
ᵃSummary statistics are presented only for participants who completed measures at both pre- and post-treatment.
ᵇMedian (and IQR) included where a non-parametric statistical test was used.

These findings are consistent with previous psychosocial treatment studies showing that individually CBT and MET lead to modest improvements in cannabis-related outcomes,[10-15] and that high intensity and longer duration (ie, >4 sessions delivered for >1 month) combined interventions may be most beneficial,[14] as implemented here (although previous trials of combined interventions for treatment of cannabis use disorder have delivered these individually rather than in a group setting, as we did in the current study). While rates of 7-day point prevalence and continuous abstinence were low in this study (20% and 7% respectively, using the most conservative estimates), these self-report estimates were limited by a large amount of missing data and remain to be confirmed using objective markers of cannabis use such as urine drug screens. Overall, the observations reported here suggest that larger clinical trials of this intervention employing appropriate control groups are warranted. Findings also indicate that there were significant improvements in cannabis-related problems, craving, withdrawal symptoms, self-efficacy and depression and anxiety symptoms at the end of treatment compared to pre-treatment. Such improvements are consistent with the purpose of specific sessions within the treatment program (eg, MET targets self-efficacy) and may facilitate the maintenance of, and confidence in, remaining abstinent or moderating use following the end of treatment. Larger prospective studies with appropriate post-treatment follow-up should now be conducted to confirm this.

In exploratory analyses (not corrected for multiple comparisons) it was found that pre-treatment levels of cannabis use (grams/week) were significantly positively associated with cannabis use (grams/week) in the last week of treatment. However, pre-treatment levels of other cannabis-related and mood variables were not associated with post-treatment cannabis use. This suggests that initial levels of use (rather than cannabis-related problems, craving, withdrawal, self-confidence in remaining abstinent or mood) may be the best predictor of treatment success, with heavier pre-treatment users continuing to use more at the end of treatment. It should be noted, however, that cannabis use during the last treatment week is a rather crude index of treatment success (chosen here due to the heterogeneity in abstinence during the pre-treatment week). If confirmed these findings may suggest that the heaviest cannabis users could benefit from additional pharmacotherapy or psychosocial cessation support. Future work should attempt to replicate these findings and identify additional predictors of intervention outcomes to facilitate treatment personalization.

A major problem with psychosocial interventions for the treatment of substance use disorders is poor retention. One meta-analytic review including 2340 patients found approximately one-third dropped out across all psychosocial treatments.[16] Similarly, retention with the present treatment was low, with approximately 43% of those attending the first treatment session failing to complete treatment. High rates of dropout may be due to the long duration of treatment (12-weeks)

Table 4. Comparison of completers and non-completers.

	COMPLETERS		NON-COMPLETERS		STATISTICAL COMPARISON	P
	N	MEAN (SEM)	N	MEAN (SEM)		
Age[a]	38	32.00 (12.00)	29	30.00 (13.00)	$U=431.50$, $z=-1.51$	.131
Sex[b]	39	♂29 (74.36%)	29	♂17 (58.62%)	$\chi^2(1)=1.88$	.198
CUDIT-R	25	22.24 (0.76)	19	23.95 (0.59)	$t(42)=1.69$	.099
RFQ	26	12.54 (0.92)	22	10.64 (0.97)	$t(46)=-1.42$	.162
MPS	26	15.38 (1.44)	22	17.55 (1.75)	$t(46)=0.96$	.342
MCQ-SF	25	3.63 (0.21)	19	3.29 (0.37)	$t(42)=-0.82$	.415
MWC	25	18.08 (1.63)	19	22.89 (2.27)	$t(42)=1.77$	.084
SEQ	26	3.81 (0.25)	22	2.99 (0.25)	$t(46)=-2.29$	.027
PHQ-9	25	11.64 (1.26)	19	15.05 (1.35)	$t(42)=1.83$	.075
GAD-7[a]	25	10.00 (9.00)	19	16.00 (9.00)	$U=150.00$, $z=-2.08$	.037

Abbreviations: CUDIT-R, Cannabis use disorder identification test; GAD-7, Generalized Anxiety Disorder scale; MCQ-SF, Marijuana Craving Questionnaire; MPS, Marijuana Problem Scale; MWC, Marijuana withdrawal checklist; PHQ-9, Patient Health Questionnaire; RFQ, Reasons for Quitting Questionnaire; SEQ, Self-Efficacy Questionnaire.
[a]Median (and IQR) are reported instead of mean (and SEM) where a non-parametric statistical test was used.
[b]Frequency (and percentage) of males (♂) is reported instead of mean (and SEM).

or treatment dissatisfaction (satisfaction ratings were largely unavailable from clients who dropped out of treatment so it is unclear if they perceived treatment favourably or unfavourably) and may have been compounded by severe CUD in the current sample (mean pre-treatment CUDIT-R was approximately 23), although there was no significant difference in CUDIT-R between completers and non-completers. In exploratory analyses investigating predictors of retention, it was found that non-completers (vs completers) had heavier pre-treatment cannabis use, lower self-efficacy and higher pre-treatment anxiety symptoms. Although they remain to be confirmed these are important findings because they begin to identify those that may require additional support to help them engage with and remain in treatment. For example, additional support to increase confidence and reduce anxiety before treatment starts may improve retention. Alternatively, a contingency management-based component could be added to the treatment as these demonstrate the greatest promise for retention in cannabis treatment.[35] However, more research is needed to identify reasons for drop-out from treatment and to develop strategies for improving retention, and future trials should document reasons for drop-out, which were not recorded in the present retrospective study.

The principal limitation of the retrospective design of this study is that as self-report assessments were originally completed for the purpose of clinical care there was a large amount of missing data, and post-treatment data was largely unavailable for participants who failed to complete treatment. A further limitation of the use of a retrospective study design is that information regarding some important potentially confounding variables was not available. For example, detailed

information about concurrent medications or access to other psychological treatments, which may have influenced cannabis use, was lacking. As such it is unclear whether the improvements in cannabis use and abstinence observed in this study were attributable solely to the CBT and MET group treatment (although there was no evidence that access to other treatments for substance use disorders in the past 12 months impacted on post-treatment cannabis use or treatment completion). In addition, better characterization of the sample with regard to factors such as psychiatric and medical comorbidities, socioeconomic status, race and education (along with information about what proportion of eligible clients invited to attend actually participated in the group) in future studies would improve the generalizability of findings. Lastly, metrics regarding therapist adherence to the manualized treatment were not available, and future studies should incorporate formal monitoring and evaluation of adherence in order to increase confidence in the study outcomes.

Finally, while these findings demonstrate statistically significant improvements in metrics related to cannabis use, it is difficult to quantify what magnitude of change represents a clinically meaningful effect at present (see Brezing and Levin[6]). Previous studies have shown that reduction of cannabis use is associated with improvements in functional outcomes such as depression, anxiety and sleep quality[36,37] and it is proposed that reduction of cannabis use (as opposed to a goal of total abstinence, which may increasingly be unrealistic) should be viewed as a desirable endpoint.[38] Despite this, there is currently a lack of consensus regarding what constitutes a clinically significant reduction in cannabis use[6,39] and this should be the subject of future research.

In conclusion, a preliminary retrospective study of a 12-week CBT and MET group treatment implemented and delivered in an outpatient setting was found to significantly reduce cannabis use and increase days of abstinence (although point prevalence and continuous abstinence rates were low). Treatment retention was comparable to previous studies but low, and moderate levels of treatment satisfaction were observed. Within the context of several countries having legalized cannabis use (or considering doing so), there is growing need for an effective treatment for CUD (although it should be noted that the relationship between legalization and drug use appears to be complex, and while some evidence suggests legalization may be associated with increased cannabis use findings are inconsistent and it is currently unclear whether legalization has accelerated rates of CUD or increased treatment demand[40-42]). This retrospective study provides preliminary evidence to support the use of this intervention in a novel group setting, although with the caveat that this study is limited by missing data and high attrition, and these findings remain to be confirmed. Adequately powered, prospective clinical trials are now warranted to fully evaluate treatment effectiveness and retention. Future studies could build upon these initial findings, for instance by identifying factors that could be used for tailoring the treatment to improve outcomes (eg, additional support could be provided to those most likely to drop-out), by incorporating biomarkers of cannabis use to verify self-reported abstinence, or by assessing the feasibility of remote intervention delivery given the potential value of telehealth-based interventions in a post-COVID-19 age.

Author Contributions

LT and BLF conceptualised and designed the study. LT, KB and ZB collected and coded data. LT and KB led data analysis and drafted the initial manuscript. All authors contributed to interpretation of findings, and contributed to the review and editing of the manuscript. BLF provided overall oversight of the project.

Ethical Approval

Ethical approval was obtained for this retrospective study from the Toronto Academic Health Sciences Network Research Ethics Board at CAMH prior to data collection (REB #111-2019). It was not possible to contact participants to obtain informed consent (a consent waiver was granted since they were no longer in treatment, would not be expecting to be contacted regarding research, and contact details may have been out-of-date), and participants did not receive compensation.

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