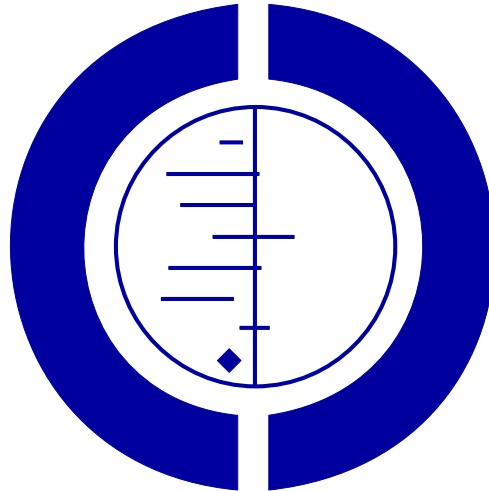


Psychotherapeutic interventions for cannabis abuse and/or dependence in outpatient settings (Review)

Denis C, Lavie E, Fatséas M, Auriacombe M



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TABLE OF CONTENTS

| | |
|--|----|
| ABSTRACT | 1 |
| PLAIN LANGUAGE SUMMARY | 2 |
| BACKGROUND | 2 |
| OBJECTIVES | 3 |
| CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW | 3 |
| SEARCH METHODS FOR IDENTIFICATION OF STUDIES | 3 |
| METHODS OF THE REVIEW | 5 |
| DESCRIPTION OF STUDIES | 6 |
| METHODOLOGICAL QUALITY | 7 |
| RESULTS | 8 |
| DISCUSSION | 10 |
| AUTHORS' CONCLUSIONS | 10 |
| POTENTIAL CONFLICT OF INTEREST | 11 |
| ACKNOWLEDGEMENTS | 11 |
| SOURCES OF SUPPORT | 11 |
| REFERENCES | 11 |
| TABLES | 14 |
| Characteristics of included studies | 14 |
| Characteristics of excluded studies | 16 |
| GRAPHS AND OTHER TABLES | 18 |
| COVER SHEET | 18 |

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Denis C, Lavie E, Fatséas M, Auriacombe M

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ABSTRACT

Background

Cannabis use disorder is the most common illicit substance use disorder in general population. Despite that, only a minority seek assistance from a health professional, but the demand for treatment is now increasing internationally. Trials of treatment have been published but to our knowledge, there is no published systematic review .

Objectives

To evaluate the efficacy of psychosocial interventions for cannabis abuse or dependence.

Search strategy

We searched the Cochrane Central Register of Trials (CENTRAL) *The Cochrane Library* Issue 3, 2004; MEDLINE (January 1966 to August 2004), PsycInfo (1985 to October 2004), CINAHL (1982 to October 2004), Toxibase (until September 2004) and reference lists of articles. We also contacted researchers in the field.

Selection criteria

All randomized controlled studies examining a psychotherapeutic intervention for cannabis dependence or abuse in comparison with a delayed-treatment control group or combinations of psychotherapeutic interventions.

Data collection and analysis

Two authors independently assessed trial quality and extracted data

Main results

Six trials involving 1297 people were included. Five studies took place in the United States, one in Australia. Studies were not pooled in meta-analysis because of heterogeneity. The six included studies suggested that counseling approaches might have beneficial effects for the treatment of cannabis dependence. Group and individual sessions of cognitive behavioral therapy (CBT) had both efficacy for the treatment of cannabis dependence and associated problems, CBT produced better outcomes than a brief intervention when CBT was delivered in individual sessions. Two studies suggested that adding voucher-based incentives may enhance treatment when used in combination with other effective psychotherapeutic interventions. Abstinence rates were relatively small overall but favored the individual CBT 9-session (or more) condition. All included trials reported a statistically significant reductions in frequency of cannabis use and dependence symptoms. But other measures of problems related to cannabis use were not consistently different.

Authors' conclusions

The included studies were too heterogenous and could not allow to draw up a clear conclusion. The studies comparing different therapeutic modalities raise important questions about the duration, intensity and type of treatment. The generalizability of findings is also unknown because the studies have been conducted in a limited number of localities with fairly homogenous samples of treatment seekers. However, the low abstinence rate indicated that cannabis dependence is not easily treated by psychotherapies in outpatient settings.

PLAIN LANGUAGE SUMMARY

Psychotherapeutic interventions for cannabis abuse and/or dependence in outpatient settings

Cannabis use disorder is the most commonly occurring illicit substance use disorder in the general population. Despite the large number of cannabis users who seek or may need treatment only a few randomized clinical trials exist that explore the most effective interventions. The six studies included in this review show that cannabis dependence is not easily treated by psychotherapies in outpatient settings. Cognitive-behavioral (CB) both in individual or group sessions, motivational enhancement in individual sessions have been demonstrated to be effective to reduce cannabis use. The most recent, best quality and largest controlled trial, found extended individual CBT to be more effective than brief individual motivational therapy. The two studies on contingency-management treatments concluded that this may enhance outcomes combined with CBT or motivational enhancement.

BACKGROUND

Population-based studies have consistently revealed that cannabis is the most widely used illicit substance in many Western countries including Europe (EMCDDA 2003) North America and Australia (Copeland 2001b; Donnelly 1994). In many countries, among those accessing treatment for drug use disorders, cannabis is more commonly the principal drug of concern than heroin (AIHW 2003; EMCDDA 2003).

The diagnostic criteria for cannabis use disorder including abuse and dependence are described in the *Diagnosical and Statistical Manual of Mental Disorders (DSM-IV)* (DSM-IV R 1994) and the *International Classification of Diseases (ICD-10)* (WHO 1992). Cannabis use disorder is the most commonly occurring illicit substance use disorder in the general population.

According to DSM-IV, cannabis abuse is characterized by a pattern of cannabis use that can cause clinically significant distress or impairment in the absence of dependence. The 12-month prevalence of cannabis abuse in general population has been estimated at 0.7% (Swift 1998).

Epidemiological studies estimated that around 6% of those who had used cannabis in the past year met DSM-IV criteria for cannabis dependence (Grant 1998). This is higher in countries such as Australia where among those having used cannabis more than five times in the previous year almost one third (31.7%) met criteria for a cannabis use disorder (21% dependence and 10.7% abuse) (Swift 1998).

Despite these high levels of problem use, only a minority seek assistance from a health professional (Copeland 1999a; Degenhardt 2003). The demand for treatment for cannabis use disorder, nonetheless, is increasing internationally. In 1999, the US Treatment Episode Data Set recorded more than 220,000 admissions for primary cannabis use to publicly funded substance abuse treatment (SAMHSA 2002). This represented 14% of admissions to these facilities, and a doubling of the rate since 1993. In 2000, that dataset reported that cannabis accounted for 61% of all adolescent admissions (SAMHSA 2003). Australia has also seen a doubling in the rates of cannabis treatment from 2000/1 to 2001/2, with a rate

of 21% overall and 45.5% of those aged less than 20 years (AIHW 2003). In Europe, the percentage of clients seeking treatment for cannabis as their main drug ranges from 2.5% in Portugal to 24% in Germany (EMCDDA 2003). There has been a concomitant increase in the number of emergency department cannabis-related episodes in the United States. Taking into account changes in population, there has been a 139% increase in such presentations reported from 1995 to 2002 (SAMHSA 2003).

Clients seeking treatment for cannabis use exhibit social impairment (family member complaining, lost friends, financial difficulty, impaired work or school performance, legal problem) and psychiatric distress (somatization, depression, anxiety, irritability, phobic anxiety, paranoid ideation, psychoticism), report multiple adverse consequences (inability to stop using, feeling bad about abusing, procrastinating, loss of self-confidence, memory loss and withdrawal symptoms) associated with cannabis use and repeated unsuccessful attempts to stop using (Budney 1999; Budney 2000; Stephens 1993a). Their use persisted despite negative consequence, and most perceived themselves as unable to quit (Budney 2000; Copeland 2001b).

Until recently, relatively little research has focused on the treatment of cannabis abuse or dependence. A major factor contributing to the lack of clinical research focused on this disorder is that many believed that cannabis use did not produce a dependence syndrome, thus treatment to assist with quitting was not desired or needed (McRae 2003a). However, since a survey was carried out in 1987 in the USA (Roffman 1987), reports confirm that individuals with cannabis-related problems readily respond to advertisements for treatment, but the majority do not use others substances (Budney 1999; Copeland 2001b; Stephens 1993a). Evidence of adverse effects on health and changes in societal tolerance of drug use suggest that there will be an increase in the number of cannabis users seeking to quit.

The cannabis-specific program in the USA may have legitimized the need for treatment related to cannabis abuse or dependence, reduced stigma associated with drug abuse treatment, and attracted clients who otherwise would be reluctant to approach counseling (Copeland 2001b; Stephens 1993a). However, despite the large

number of cannabis users who seek or may need treatment only a few randomized clinical trials exist to discuss the most effective interventions. Randomized controlled trials of outpatient treatments have compared interventions such as cognitive behavioral therapy, motivational enhancement therapy, relapse prevention, family therapy approaches, group therapy and support groups. These interventions have been delivered as group and individual interventions.

Treatment development and efficacy studies targeting cannabis abuse or dependence began to appear in the scientific literature during the 1990s. To our knowledge, there is no systematic review published in the existing literature on the treatment of cannabis abuse or dependence including psychotherapeutic advances.

The purpose of this systematic review was to evaluate the effectiveness of psychotherapeutic interventions for cannabis abuse or dependence.

OBJECTIVES

To evaluate the efficacy of psychosocial interventions for cannabis abuse or dependence.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

All relevant randomized controlled studies examining a psychotherapeutic intervention for cannabis dependence or abuse in comparison with a delayed-treatment control group or combinations of psychotherapeutic interventions were included.

Types of participants

All participants who met diagnostic criteria for cannabis abuse or dependence, assessed by *Diagnostic and Statistical Manual of Mental Disorders (DSM IV)* OR *International Classification of Diseases (ICD-10)* and sought treatment in outpatient settings were included. All adult participants (> 18) were included regardless of gender, and nationality. The history of previous treatments was considered, but it was not an eligibility criterion. Exclusion criteria were current dependence on alcohol or any other drug (except nicotine).

Types of intervention

Experimental intervention

One treatment or more than one treatment for the management of cannabis abuse or dependence delivered in a group or individual model in an outpatient setting.

Control intervention

No intervention (untreated control group or delayed control group) OR

Intervention other than that considered in the intervention group

The intervention considered included:

- (1) cognitive behavioral therapy;
- (2) motivational enhancement therapy;(3) family support network;
- (4) family therapy;
- (5) combination of the above.

Types of outcome measures

Primary outcomes:

- (1) Severity of dependence/abuse measured with a standardized questionnaire (e.g. *Addiction Severity Index (McLellan 1980)*; *Severity of Dependence Scale (Swift 1998)*)
- (2) Self-reported use of cannabis (number of day, time per day) with confirmation by biological analysis (urinalysis, or hair/saliva analyses)
- (3) Dropout from treatment, measured as the absolute number of participants at the end of the follow up

Secondary outcomes:

- (4) Frequency of self-reported other substance intake
- (5) Level of cannabis-related problems: medical problems, legal problems, social and family relations, employment and support, assessed by questionnaires such as the *Cannabis Problems Questionnaire (Copeland 2001b)*

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: *Drugs and Alcohol Group* methods used in reviews.

Electronic searches

We developed detailed search strategies for the identification of studies to include in the review. These were based on the search strategy developed for MEDLINE but revised appropriately for each database. The search strategy combined the subject search with phases 1 & 2 of the *Cochrane Sensitive Search Strategy for Randomized Controlled Trials (RCTs)* as published in Appendix 5b2 of the *Cochrane Reviewers' Handbook (Alderson 2004)*. There was no language restriction or time restrictions.

We searched:

- (1) *Cochrane Central Register of Controlled Trials (The Cochrane Library Issue 4, 2004)* which includes the *Cochrane Drugs and Alcohol Group' Register of Trials*
- (2) MEDLINE (January 1966 to August 2004):
- (3) EMBASE (January 1988 to August 2004)
- (4) PsycInfo (1985 to October 2004)
- (5) CINAHL (1982 to October 2004)
- (6) *Toxibase (www.toxibase.org)* until September 2004

Cochrane Central Register of Controlled Trials (CENTRAL, The Cochrane Library Issue 4,2004):

- 1.substance-related disorders:MESH

2.(cannabis near abuse*)
 3.(marijuana near abuse*)
 4.Marijuana smoking:MESH
 5.#1 or #2 or #3 or #4
 6.cannabis
 7.marijuana
 8.#6 or #7
 9.psychotherapy:MESH
 10.psychotherap*
 11.behav* near therap*
 12.motivational near enhancement
 13.cognitive* near therap*
 14.famil* near therap*
 15.Social support:MESH
 16.#9 or #10 or #11 or #12 or #13 or #14 or #15
 17.#5 and #8 and #16

MEDLINE (OVID - January 1966 to October 2004) and PASCAL (OVID - 1991 to October 2004):

1.exp marijuana abuse/
 2.(cannabis adj abuse\$).ab,ti.
 3.1 or 2
 4.exp Cannabis/
 5.cannabis.ab,ti
 6.marijuana.ab,ti.
 7.hashish.mp
 8.4 or 5 or 6 or 7
 9.exp psychotherapy/
 10.psychotherap\$.ti,ab
 11.(psychodynamic adj2 therap\$).ti,ab
 12.exp Behavior therapy/
 13.(behaviour adj2 therap\$).ti,ab
 14.(behav\$ adj2 management).ti,ab
 15.(cognitive\$ adj2 therap\$).ti,ab
 16.exp Counseling
 17.counsel\$.ti,ab
 18.exp mind and body relaxation technique/
 19.(relaxation adj2 therap\$).ti,ab
 20.(guided adj2 imagery).ti,ab
 21.biofeedback.tw.
 22.(family adj2 therap\$).ti,ab
 23.9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
 or 20 or 21 or 22
 24.3 and 8 and 23
 25.randomized-controlled-trial.pt
 26.controlled-clinical-trial.pt
 27.exp randomized-controlled-trials/
 28.exp random-allocation/
 29.exp double-blind-method/
 30.exp single-blind-method/
 31.25 or 26 or 27 or 28 or 29 or 30
 32.exp clinical trials/
 33.clinical trial.pt

34.(clin\$ adj2 trial\$).ti,ab
 35.(singl\$ or doubl\$ or trebl\$ or tripl\$) near (blind\$ or mask\$).ti,ab
 36.exp placebos/
 37.placebo\$.ti,ab
 38.random\$.ti,ab
 39.exp research-design
 40.32 or 33 or 34 or 35 or 36 or 37 or 38 or 39
 41.31 and 40
 42.limit 41 to human

EMBASE (OVID - January 1988 to October 2004):

1.exp drug abuse/
 2.exp cannabis addiction/
 3.(drug or substance\$) adj (misuse or abuse\$ or addict\$ or dependen\$).ti,ab
 4.1 or 2 or 3
 5.exp cannabis/
 6.cannabis\$.ti,ab
 7.marihuana.ti,ab
 8.5 or 6 or 7
 9.exp PSYCHOTHERAPY/
 10.psychotherap\$.ti,ab
 11.psychodynamic adj2 therap\$).ti,ab
 12.(behaviour adj2 therap\$).ti,ab
 13.(behav\$ adj2 management).ti,ab
 14.(cognitive\$ adj2 therap\$).ti,ab
 15.(cognitiv\$ adj2 behavio\$).ti,ab
 16.(motivation enhancement terap\$).ti,ab
 17.exp motivation/
 18.(famil\$ adj2 therap\$).ti,ab
 19.exp Social support/
 20.9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
 21.4 and 8 and 20
 22.random\$.ab,ti
 23.placebo.ab,ti
 24.(singl\$ or doubl\$ or trebl\$ or tripl\$) and (blind\$ or mask\$).mp
 25.(cross-over\$ or crossover\$).tw
 26.randomized controlled trial/
 27.controlled study/
 28.phase-2-clinical-trial/
 29.phase-3-clinical-trial/
 30.double blind procedure/
 31.single blind procedure/
 32.crossover procedure/
 33.Latin square design/
 34.exp PLACEBOS/
 35.(multicenter adj study).ti,ab
 36.22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or
 32 or 33 or 34 or 35
 37.21 and 36
 38.limit 37 to human

CINAHL (OVID -January 1967 to October 2004):

- 1.exp "Substance Use Disorders"/
- 2.(drug or substance\$) adj2 (misuse or abuse\$ or addict\$ or dependen\$).ti,ab
- 3.(cannab\$ adj2 abuse\$).ti,ab
- 4.1 or 2 or 3
- 5.exp cannabis/
- 6.cannabis.ti,ab
- 7.(marijuana or marihuana).ti,ab
- 8.5 or 6 or 7
- 9.exp Psychotherapy/
- 10.psychotherapy\$.ti,ab
- 11.(behav\$ adj2 therap\$).ti,ab
- 12.(cognitive adj2 therap\$).ti,ab
13. (family therap\$).ti,ab
14. exp social networks/
15. exp Support, Psychosocial/
16. 9 or 10 or 11 or 12 or 13 or 14 or 15
17. 4 and 8 and 16
18. exp Clinical Trials/
19. randomi\$.tw.
20. clini\$.tw.
21. trial\$.tw.
22. (clin\$ adj2 trial\$).tw.
23. (singl\$ or doubl\$ or tripl\$ or trebl\$) adj2 (mask\$ or blind\$).ti,ab
24. crossover.tw.
25. allocate\$.tw.
26. assign\$.tw.
- 27.(random\$ adj2 (allocate\$ or assign\$)).tw.
28. exp Random Assignment/
29. 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28
30. 17 and 29

PsycINFO (EBSCOhost)

((((DE "Cannabis" OR DE "Hashish" OR DE "Marijuana")) AND (DE "Drug Dependency" OR DE "Drug Addiction")) AND (DE "Psychotherapy" OR DE "Adlerian Psychotherapy" OR DE "Analytical Psychotherapy" OR DE "Autogenic Training" OR DE "Behavior Therapy" OR DE "Brief Psychotherapy" OR DE "Client Centered Therapy" OR DE "Cognitive Behavior Therapy" OR DE "Eclectic Psychotherapy" OR DE "Existential Therapy" OR DE "Experiential Psychotherapy" OR DE "Expressive Psychotherapy" DE "Gestalt Therapy" OR DE "Group Psychotherapy" OR DE "Guided Imagery" OR DE "Humanistic Psychotherapy" OR DE "Hypnotherapy" OR DE "Individual Psychotherapy" OR DE "Insight Therapy" OR DE "Integrative Psychotherapy" OR DE "Interpersonal Psychotherapy" OR DE "Logotherapy" OR DE "Persuasion Therapy" OR DE "Primal Therapy" OR DE "Psychoanalysis" OR DE "Psychodrama" OR DE "Psychodynamic Psychotherapy" OR DE "Psychotherapeutic Counseling" OR DE "Rational Emotive Behavior Therapy" OR DE "Reality Therapy" OR DE

"Relationship Therapy" OR DE "Solution Focused Therapy" OR DE "Supportive Psychotherapy" OR DE "Transactional Analysis")) or (MM "Individual Psychotherapy") (DE "Behavior Modification" OR DE "Behavior Therapy" OR DE "Biofeedback Training" OR DE "Contingency Management" OR DE "Fading (Conditioning)" OR DE "Omission Training" OR DE "Overcorrection" OR DE "Self Management" OR DE "Time Out") OR (DE "Cognitive Techniques" OR DE "Cognitive Restructuring" OR DE "Cognitive Therapy" OR DE "Self Instructional Training") or (MM "Outpatient Treatment") or (DE "Psychotherapeutic Techniques" OR DE "Psychodrama") OR DE "Progressive Relaxation Therapy") or (MM "Sociotherapy") OR (MM "Psychosocial Readjustment")

Toxibase (www.toxibase.org) until October 2004
CANNABIS and DRUG DEPENDENCE and PSYCHOTHERAPY and AMBULATORY CARE

Manual Searches

We checked the reference lists of all potentially eligible studies obtained as full reports to identify any further studies not retrieved by the electronic search. We also obtained full reports of review articles retrieved by the search and check these for other relevant citations. In addition, we contacted authors of included studies and experts in the field for leads on unpublished or difficult to find studies.

METHODS OF THE REVIEW

Selection of trials

Two authors independently screened the titles and abstracts of all publications, obtained by the search strategy. We obtained all potentially eligible studies as full articles and these were assessed independently for inclusion by the two authors. In doubtful or controversial cases, the authors discussed all identified discrepancies and reach consensus on all items. If consensus was not reached, they referred to the original author to solve the problem. Experts familiar with the language managed potential language problems in retrieved studies. When key information relevant to the systematic review was missing, we contacted investigators and asked them to provide additional data and clarifications. If the majority of trials use the same scale or specific outcome measures, we asked the primary investigators of the trials that do not report these specific measures to provide relevant data, if available.

We accepted all randomized trials of psychotherapeutic interventions in cannabis dependence or abuse regardless of type of psychotherapy, model or duration of therapy. If reports pertained to overlapping patients, we retained only the largest study, to avoid duplication of information.

Assessment of the methodological quality

In order to limit bias, gain insight into potential comparisons and guide interpretation of findings, two authors, using the criteria

described in the Cochrane Reviewers' Handbook, independently assessed the methodological quality of the eligible studies. In the context of a systematic review, the validity of a study was the extent to which its design and conduct were likely to prevent systematic errors, or bias (Moher 1995).

Allocation concealment.

We used the following criteria:

- (A) adequate allocation concealment, central randomization (e.g. allocation by a central office unaware of subject characteristics), on-site computer system combined with allocations kept in a locked unreadable; computer file that can be accessed only after the characteristics of an enrolled participant have been entered or other description that contained elements convincing of concealment.;
- (B) unclear allocation concealment: when the authors either did not report an allocation concealment approach at all or report an approach that did not fall in the category A or C;
- (C) inadequate allocation concealment: alternation or reference to case numbers, dates of birth, day of the week. Any procedure that is entirely transparent before allocation, such as an open list of random numbers or other description that contained elements convincing of not concealment.

Performance bias:

Blinding of those providing and receiving the intervention.

- (A) Double blind.
- (B) Single blind (blinding of participants).
- (C) Unclear.
- (D) No blinding.

Attrition Bias

- (A) Loss to follow up completely recorded
- (B) Loss to follow up incompletely recorded
- (C) Unclear or not done

Detection bias

Blinding of the outcome assessor

- A) Blind to treatment allocation at outcome assessment
- B) Not blind to treatment allocation at outcome assessment
- C) Unclear

Intention to treat analysis

- A) Intention to treat analysis performed
- B) Intention to treat analysis not performed
- C) Unclear

Data extraction

The authors independently extracted data.

Data analysis

We tabulated information in 'Characteristics of included trials' and 'Characteristics of excluded trials'.

The studies could not be pooled because of non comparability of interventions and outcomes. Therefore, no graph was included in this review.

Data synthesis

Due to the heterogeneity of the included studies, a meta-analysis could not be performed and the relevant studies were described separately.

DESCRIPTION OF STUDIES

The search strategies resulted in 1820 records which were screened by reading both titles and abstracts. Thirty-nine studies were considered eligible (Andersen 1986; Babor 2002; Babor 2004; Battjes 2004; Botvin 1984; Botvin 1990a; Botvin 1990b; Botvin 1995; Buchan 2002; Budney 2000; Carroll 1996; Copeland 2001b; Copeland 2001; Dennis 2002; Diamond 2002; Duncan 2000; Lang 2000; Levin 2004; Liddle 2001; McHugo 1999; McRae 2003a; Miller 1989; Roffman 1988; Roffman 1993; Rohrbach 1993; Santisteban 2003; Sinha 2003; Smith 1988; Spoth 2001; Steinberg 2002; Stephens 1993a; Stephens 1994; Stephens 1995; Stephens 2000; Stephens 2002; Strang 2004; Tims 2002; Vendetti 2002; Zacny 1991). Six of these met the inclusion criteria. In total, these six trials involved 1297 participants.

The reasons for exclusion were: study design not in the inclusion criteria of this review (Babor 2002; Battjes 2004; Buchan 2002; Carroll 1996; Lang 2000; McRae 2003a; Miller 1989; Rohrbach 1993; Smith 1988; Steinberg 2002; Stephens 1993a; Zacny 1991), study outcomes not in the inclusion criteria of this review (Copeland 2001b; Roffman 1988; Roffman 1993; Stephens 1995; Stephens 2002; Strang 2004; Vendetti 2002), interventions were not in the scope of this review (Levin 2004) or participants selection not in the inclusion criteria of this review (Andersen 1986; Botvin 1984; Botvin 1990a; Botvin 1990b; Botvin 1995; Dennis 2002; Diamond 2002; Duncan 2000; Liddle 2001; McHugo 1999; Santisteban 2003; Spoth 2001; Steinberg 2002; Tims 2002).

Included studies:

1. Treatment regimen and setting

All the included studies took place in the United States except one Copeland 2001 that took place in Australia.

All the included studies had an out-patient design.

Three different therapeutic modalities were compared: cognitive-behavioral therapy (CBT), motivational intervention (MET), social support.

Cognitive-behavioral intervention emphasized the role of cognitive, behavioral and environmental factors in cannabis dependence. CBT focused on identifying high-risk situations for relapse, acquiring behavioral and cognitive coping skills. The CBT was a multi-sessions intervention package incorporating a motivational interview and a standard relapse prevention intervention including cognitive-behavioral therapy. Five included studies compared CBT with another therapy (Stephens 1994; Stephens 2000; Budney 2000; Copeland 2001; Babor 2004). CBT were similar for all included studies but were delivered individually for three of

them (Budney 2000; Copeland 2001; Babor 2004) and in group sessions for the two others (Stephens 1994; Stephens 2000). Motivational enhancement therapy (MET) was delivered in individual session. It refers to an empathic therapeutic style designed to resolve ambivalence and elicit motivation to change. The therapeutic stance is one in which empathy is expressed, resistance and argumentation are avoided, and self-efficacy is supported. Therapists sought to increase the participant's willingness to participate in treatment and reduce their cannabis use by heightening their awareness of the personal consequences resulting for cannabis use. They provided advice that could be used to stop cannabis. MET were similar for the four included studies assessing such therapy (Stephens 2000; Budney 2000; Sinha 2003; Babor 2004). The social support treatment used a group process model of therapeutic change. Only one included study use the social support treatment as a comparison treatment (Stephens 1994).

Three studies used a delayed-treatment control (DTC) condition as a control group (Stephens 2000; Copeland 2001; Babor 2004). Two studies used contingency management (Budney 2000; Sinha 2003). In Sinha et al., participants received vouchers each time they attended MET sessions. Budney et al. used voucher-based incentives that were linked to weekly negative urinalysis results.

2. Duration of the trials

The duration of the studies was four weeks (Sinha 2003), six weeks (Copeland 2001), 12 weeks (Stephens 1994), 14 weeks (Budney 2000), 18 weeks (Babor 2004; Stephens 2000).

3. Participants

The participants of the multicentric study (Babor 2004) met the current DSM-IV diagnosis of cannabis dependence. The participants in the Sinha et al. study met current DSM-IV criteria for cannabis dependence (75%) or cannabis abuse (25%) (Sinha 2003). In the study of Stephens et al (Stephens 1994) a formal diagnosis of cannabis abuse or dependence was not conducted but participants exceeded the diagnostic cut point of Drug and Alcohol Screening Test (DAST). The participants in the others three studies (Budney 2000; Copeland 2001; Stephens 2000) were not required to meet DSM criteria for cannabis disorder but they met more than 6 / 9 DSM-III-R dependence criteria. In all studies, participants were excluded if they met current abuse or dependence DSM criteria for any other drug (except nicotine). Their ages were between 18-65 years old. The total number of participants included in this review is 1297.

4. Types of comparison

- One study compared CBT 1-session versus CBT 6-session versus DTC (Copeland 2001)
- One study compared MET (3-session) versus MET + voucher (3-session) (Sinha 2003)

- Four studies compared CBT with other therapies:

- CBT (10-session) versus social support group (10-session) (Stephens 1994);
- CBT versus MET:
- CBT (9-session) versus MET (2-session) versus DTC (Babor 2004);
- CBT (14-session) versus MET (2-session) versus DTC (Stephens 2000); - CBT (14 session) versus CBT (14-session)+voucher versus MET (4-session) (Budney 2000).

METHODOLOGICAL QUALITY

All the included studies were randomized controlled trials (RCTs).

Randomization:

All the included studies were described as randomized. Stephens 1994 described eligible participants were blocked on sex and randomly assigned to two treatment conditions. Stephens 2000 did not mention randomization procedure. The authors noted that the inclusion of a delayed treatment condition raised ethical concerns regarding the withholding of treatment. Budney 2000, Copeland 2001 and Sinha 2003 mentioned the randomization procedure without further description. Babor 2004 described participants were randomly assigned to conditions at each site using an urn randomization program to balance key variables across treatment groups.

Allocation concealment:

Stephens 1994 mentioned that therapists were unaware of the alternative treatment and hypotheses of the study. Stephens 2000 did not mention the allocation concealment but from the article it seems that the therapists were aware of the allocation but different therapists provided each treatment. Budney 2000 did not mention the allocation concealment but from the article it seems that the therapists were aware of the allocation but therapists were the same for all three treatment groups. Copeland 2001 did not mention the allocation concealment but the 24-week post-treatment completion follow up was conducted by an independent researcher blind to the participants' treatment allocation. Sinha 2003 did not mention the allocation concealment but to reduce potential therapist effects, all therapists delivered both conditions, that is, therapies were crossed rather than nested within conditions. Babor 2004 mentioned that research assistants were not blinded to the participants' experimental condition. But independent evaluators blind to treatment assignments reviewed 633 treatment sessions for therapist competency, adherence to protocol and other indicators of therapy process. Moreover, from the article, it seems there were no significant differences across sites in treatment adherence, competence, and other process measures.

Performance bias

All the participants did not know the other available group treatment.

Attrition bias

Information about drop-outs or participants that left early were reported in all six included studies.

Detection bias

Four studies were marked A (Budney 2000; Copeland 2001; Stephens 1994; Stephens 2000). The two others studies were marked B (Babor 2004; Sinha 2003).

Intention-to-treat

Four studies were marked A (Babor 2004; Budney 2000; Copeland 2001; Sinha 2003). The two others studies were marked B (Stephens 1994; Stephens 2000).

RESULTS

The studies were not directly comparable because of the heterogeneity of interventions. Therefore no meta-analysis was performed. The main outcomes defined at the protocol stage were described below.

1. Primary outcomes

• Retention in treatment

Babor 2004 reported that the mean number of sessions attended by MET participants was 1.6 with 71.9% receiving both sessions. Stephens 2000 reported that seventy-six of the 88 MET participants (86%) attended both sessions.

Sinha 2003 reported that 64% of participants in the MET + voucher condition and only 39% in the MET condition completed 28-days treatment ($P < 0.05$). Moreover, participants in the MET + voucher condition attended a higher number of treatment sessions in 28 days as compared to the MET alone condition (1.8 versus 2.3 sessions). This difference did not reach the statistical significance ($p < 0.07$). Fourteen of the 37 participants in the MET+ voucher group versus 8 of the 28 participants in the MET group continued in treatment after completing the trial. This difference was not statistically significant.

The number of attended CBT-sessions ranged from 55% to 78%. Babor 2004 reported that the mean number of sessions attended was 6.5. Over 47% of the sample attended all CBT-sessions, whereas 8.3% failed to attend any session. Stephens 1994 reported that the mean number of treatment sessions attended was 7.6. Sixty-nine per cent ($n = 146$) of participants attended 7 or more of the 10 sessions. There were no significant differences in attendance or completion rates between the CBT or Social support conditions. Stephens 2000 reported the average number of CBT treatment sessions attended was 8.4 out of a possible 14. Fifty per cent ($n = 58$) of CBT participants attended 10 or more sessions.

Budney 2000 defined the treatment acceptability as the number of participants who attended more than one therapy session. Acceptability did not differ significantly across treatment conditions (100% for CBT + voucher, 95% for CBT and 85% for MET group). Treatment retention was also comparable across the three groups. The authors also defined rates of treatment completion as attending at least one session and giving one urine specimen during the final two weeks of treatment. Completion rates were respectively 55%, 65% and 45% in the CBT + Voucher, CBT and MET groups ($p = 1.6$, not significant).

Copeland 2001 reported that there was no difference in the likelihood of participating in follow up between treatment group. Participants allocated to 6-CBT who completed follow up had attended significantly more sessions than those who did not (4.7 versus 3.3 sessions, $p = 0.02$). There was no significant difference in likelihood of completing follow up among those who did and did not attend the 1-CBT session.

• Relapse to cannabis use

Stephens 1994 reported nearly two thirds (63%, $n = 105$) of participants reported abstinence during the last two weeks of the treatment period; analyses showed no significant differences between treatment conditions ($p > 0.07$). Both CBT and social support group interventions were associated with a reduction in cannabis use throughout the post-treatment follow-up period (respectively 49%, 39%, 24%, 22% and 20% of the participants reporting abstinence at the 1-, 3-, 6-, 9-, and 12-month follow up). But there was no difference in outcome between treatment groups ($p > 0.05$). At 12 months, approximately 14% of participants reported abstinence from cannabis use and an additional 19% of participants reported a cannabis use at 50% or less of their pretreatment levels.

Copeland 2001 reported superior outcomes (fewer cannabis-use related problems and less concern over their control over marijuana use) than participants in the delayed treatment control group. However, there were no significant differences between groups in reported per cent days abstinent (DTC 29.7%; 1-CBT 44.8%; 6-CBT 35.9%), although there was a trend ($p = 0.09$) for the 1-CBT group to have a greater percentage of days abstinent than the delayed-treatment group. Few participants (11/158) across groups reported continuous abstinence throughout the follow-up period (delayed treatment group, 0%; 1-CBT, 4.9% $n = 3$; 6-CBT, 15.1% $n = 8$). In Budney 2000 study, no significant differences were found between the MET and the CBT groups, although there were trends toward better efficacy with the CBT treatment. Self-reported cannabis use for the prior 30 days post-treatment was significantly reduced for all groups compared to pretreatment reports (CBT + Voucher, pretreatment 24.1 days versus post-treatment 6.6 days; CBT, pretreatment 20.4 days versus post-treatment 7.4 days; MET, pretreatment 23.2 days versus post-treatment 13.0 days).

Stephens 2000 and Babor 2004 reported that both MET and CBT treatments produced greater reductions in cannabis use than

observed in the delayed treatment group. The number of joints smoked per day was significantly lower in both active treatment groups compared with the DTC group ($d_s = 0.29$ versus 43) (Babor 2004). Participants in the active treatment groups also reported fewer times used per day (1.15 with CBT versus 1.19 with MET versus 1.97 with DTC) (Stephens 2000). However, in the Stephens 2000 study, no differences in outcome were observed between MET and CBT treatments. At a four month post-intake assessment, participants in the CBT and MET groups reported reduced cannabis use compared to participants in the delayed treatment group (6.7 days of use per month with CBT versus 7.9 days with MET versus 17.1 days with DTC). Abstinence rates for the 90 days preceding the four month assessment were identical between the CBT and MET groups (37%) and significantly greater than the DTC (9%). At the 16-month assessment, cannabis use had increased in both the CBT and MET groups but was lower than pretreatment levels (12.3 days of use per month with CBT; 13.0 with MET). The abstinence rate at the 16-month follow up was 29% for the CBT intervention and 28% for the MET condition. Babor 2004 reported that at four months, 22.6% of participants in the CBT intervention had been abstinent for the previous 90 days, compared to 8.6% of participants in the MET treatment and 3.6% in the delayed treatment control group. The percentages of reductions in days smoked from baseline were 15.9%, 35.7%, and 58.8% for the DTC, MET, and CBT treatment conditions, respectively. The CBT treatment produced significantly greater reductions than the MET treatment. The CBT participants reported fewer periods of cannabis use than the MET participants. Sinha 2003 reported that a significant main effect of time was observed for self-reported days of cannabis use per month (10.2 to 8.3 days for MET group, 16.0 to 10.4 for MET + voucher group). But the effects of treatment condition were not significant. Budney 2000 reported the group receiving vouchers achieved significantly longer periods of cannabis abstinence throughout the study, and a greater percentage of these voucher participants were abstinent during the last week of treatment compared with the other two treatment groups (CBT + Voucher, 35%; CBT, 10%; MET, 5%).

- **Severity of cannabis dependence**

Stephens 2000 reported a lower number of dependence symptoms (1.96 with CBT versus 1.94 with MET versus 4.63 with DTC), and fewer problems related to marijuana use (3.50 with CBT versus 3.26 with MET versus 7.89 with DTC) than participants in the delayed treatment group. Sinha 2003 reported a significant main effect of time for the ASI cannabis composite score. Significant decrease of scores was observed from pre-treatment to follow up and from the post-treatment to follow-up assessment period ($p < 0.01$).

Copeland 2001 reported an apparent dose-response effect, with those receiving 6-CBT showing a significantly greater decrease in the SDS scores than participants in the 1-CBT group ($p = 0.04$). Budney 2000 reported no differences between CBT and MET group treatment were observed on the ASI composite scores. A

significant main effect for time was observed for the ASI psychiatric, family, employment and legal composite scores, indicating overall improvement in these areas of functioning across the three groups (CBT, CBT + voucher, MET). However, Babor 2004 reported fewer dependence symptoms in the MET ($sd = 0.33$) and CBT ($sd = 0.90$) conditions relative to the DTC condition. The CBT condition differing significantly from the MET condition ($p = 0.52$).

2. Secondary outcomes

- **Other substance use**

Stephens 1994 reported that increased alcohol problems tended to be related to less reduction in the use of cannabis. In fact, post-treatment cannabis use, expressed as a percentage of pre-treatment cannabis use, was correlated with increased alcohol problems at three month follow up ($p > 0.02$), at the six month follow up ($p < 0.02$) and at the 12-month follow up ($p < 0.02$).

Stephens 2000 reported that the frequency of alcohol use was correlated with the frequency of cannabis use at the four month ($r = 0.18$) and 13-month ($r = 0.25$). Other drug use during the past 90 days did not differ between CBT and MET treatment groups at pretreatment, but DTC participants were using other drugs more frequently (mean = 5.0 days) at the four month follow up than CBT (mean = 0.8) or MET (mean = 0.5) ($p < 0.05$). Similar analyses revealed significant increases in the number of alcohol problems at every follow up. There was a trend to increase days of alcohol use during the past 90 days (18.0 days at pre-treatment and 24.8 days at 16-month follow up).

Budney 2000 reported no significant pre-treatment to post-treatment changes in alcohol use were observed between or within treatment groups as measured by self-reported number of days of alcohol use and the ASI alcohol composite score. Random urine screens revealed marginal other drug use (4 of 240 urine specimens tested positive for drugs other than cannabis). Consistent with prior studies (Stephens 1994; Stephens 2000) there was no evidence that reductions in cannabis use led to an increase in alcohol use.

- **Level of cannabis-related problems**

Sinha 2003 reported the ASI legal composite score did not change significantly between the pre-MET and post-MET treatment assessments, but significant improvements from pre-treatment levels were observed at the follow up assessment ($p < 0.02$). Time by treatment condition effects were not significant. However, a significant main effect for time indicated overall improvement from intake to post-treatment on these two measures across the CBT, CBT + voucher and MET groups in the study of Budney et al. (Budney 2000).

Copeland 2001 reported a trend towards fewer cannabis-related problems in the six session CBT than the one session CBT.

In the study of Budney 2000, no differences between CBT and MET were observed on Marijuana Consequences Questionnaire

or Global Symptom Index. Babor 2004 reported the CBT treatment showed greater reductions than both the MET treatment and the DTC condition, which did not differ significantly from each other ($sd = 0.53$ and 0.41 respectively).

DISCUSSION

Only six studies, with a total of 1297 participants, met the inclusion criteria for this review.

Stephens 1994 suggested that these two group counseling approaches might have beneficial effects for the treatment of cannabis dependence. Stephens 2000 results supported the findings of Stephens 1994 study indicating that a group CBT treatment had efficacy for the treatment of cannabis dependence and associated problems. Stephens 2000 found no difference between MET and CBT treatments. Overall, Copeland 2001 study was consistent with prior studies in demonstrating that both brief and extended cognitive-behavioral type interventions delivered in individual sessions were effective in reducing marijuana use compared to no treatment controls.

However, the lack of between-group differences limits conclusions regarding the causal role of treatment. As noted by Stephens 1994, one cannot rule out the possibility that the decrease in cannabis use may have been the result of having a motivated, self-referred treatment sample. For example, a monetary deposit was required for participation, which may have excluded less motivated or financially stable participants. Further limitations of these studies included a lack of ethnic diversity in the sample, recruitment from only one geographic location, and collection of urine samples for drug screening at only two time points. Urine drug screens were not obtained; therefore all drug use data is based on self-report and collateral verification. Finally, participants were not required to meet criteria for marijuana dependence to participate in the study. Babor 2004 controlled some of these bias by conducting a multi-site study and addressed many of the limitations of the previous trials. A more ethnically diverse sample was obtained. A monetary deposit prior to enrollment was not required; nonetheless, participants were still mostly well-educated and financially stable. A standardized diagnosis of cannabis dependence was obtained by structured interviews and used as an inclusion criteria. Urine drug screens and collateral verification of participants' reports or cannabis use were obtained, although only for one third of participants. The outcome differences between the brief and extended interventions were maintained at 9 months and 15 months, indicating that unlike the prior study Stephens 2000, CBT produced better outcomes than a brief intervention (MET).

Moreover, in the Stephens 2000 trial, the individual therapy (MET) was provided by therapists with more experience than the therapists conducting the group (CBT) sessions, which might have contributed to the comparable outcomes between groups. In a same way, Copeland 2001 noted that the limitations of this study

included the use of therapists with relatively little experience. Also, there was a wide range for the time of the follow-up interview (median 237 days; range 102 to 533 days), which might have affected the reliability of the findings. One important difference between this multi-site study of Babor 2004 and the prior studies Stephens 1994; Stephens 2000 was that the CBT intervention was delivered via individual therapy rather than group sessions. Hence, the comparisons of contrasting results across studies regarding CBT versus brief intervention outcome are confounded by the mode of treatment delivery.

Budney 2000 study suggested that adding voucher-based incentives may enhance treatment outcomes when used in combination with other effective psychotherapeutic interventions. However, the study did not clearly show an advantage to adding cognitive-behavioral treatment to the motivational intervention. The small sample size ($n = 20$ for each treatment group) may have limited the power to detect a significant difference. A further limitation of this study is the lack of post-treatment follow-up data.

Abstinence rates were relatively small overall but favored the CBT 9-session (or more) condition. In all included trials were observed a statistically significant reductions in frequency of cannabis use and dependence symptoms. But other measures of problems related to cannabis use were not consistently different and may be a function of low initial problems severity in areas such psychiatric severity, medical problems or major socioeconomic problems.

AUTHORS' CONCLUSIONS

Implications for practice

These studies indicate that many cannabis-dependent adults respond well to several types of interventions, even though continuous abstinence is a less common outcome than reduced cannabis use. Regarding the low abstinence rate, results indicated that cannabis dependence is not easily treated by psychotherapies in outpatient settings. These findings support the notion that abstinence is not the only meaningful outcome of treatment. But, studies were to heterogenous that could not allow a clear conclusion. However, all psychotherapies tested (Cognitive-behavioral (CBT), motivational enhancement) have been demonstrated to be effective to reduce cannabis use delivered both in individual or group sessions. The improvement rates should be thought of as illustrations of the impact of reduced use. The most recent, best quality and largest controlled trial, found extended CBT (9-session or more) to be more effective than brief motivational therapy when CBT was delivered in individual sessions. But, this was the only one study that show such difference. More studies are needed to replicate such results. The two studies on contingency-management treatment concluded that this may enhance outcomes combined with CBT or motivational enhancement.

Implications for research

Response rates, particularly regarding abstinence from cannabis, leave much room for improvement.

The studies comparing different therapeutic modalities raise important questions about the optimal duration, intensity and type of treatment. The generalizability of findings is also unknown because the studies have been conducted in a limited number of localities with fairly homogenous samples of treatment seekers. Only one multisite randomized trial was designed to replicate and extend findings from previous studies. More multisite randomized trials should be conducted. Moreover, future studies should address longer term outcomes. Future analyses of therapy session process ratings in relation to outcomes may shed some light on important aspects of the interventions. Future studies should consider dismantling designs in which hypothesized active components of the interventions are offered individually or in specific combinations and are compared with appropriate attention-placebo interventions to control for number of sessions of contact.

As alcohol research has suggested that the therapeutic effects of pharmacotherapy and psychotherapy may be synergetic, similar combinations may prove optimal in the treatment of cannabis dependence.

POTENTIAL CONFLICT OF INTEREST

None.

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*Indicates the major publication for the study

TABLES

Characteristics of included studies

| Study | Babor 2004 |
|------------------------|---|
| Methods | Randomized controlled trial. Multi-site: three sites chosen through a competitive process. Therapist training and treatment fidelity. |
| Participants | 450 randomized. Cannabis user, met DSM-IV criteria for cannabis dependence. 5.6/7 DSM-IV criteria for cannabis dependence; Mean age = 36.1 yrs; Sex: 68% male (n = 308); Average cannabis use: 82 days of the past 90 days; Mean daily smoking episode: 3.7/day |
| Interventions | 9-session CBT vs 2-session MET vs delayed treatment controlled group (entered in treatment 4-months later) |
| Outcomes | Proportion of days of cannabis use during the preceding 90 days (follow-up 4, 9, 15 months after interventions); Mean number of quarterly periods during which cannabis was used per day of use, number of joints smoked per day, number of problems related to use (MPS score), SCID dependence or abuse symptoms, ASI composite scores, BDI scores |
| Notes | Follow-up: Delayed treatment (n = 148): 4-month 92.6 %; 2-sessions (n = 146): 4-month 87.7 %, 9-month 86.3 %, 15-month 82.4 %; 9-sessions (n = 156): 4-month 85.3 %, 9-month 87.8 %, 15-month 82.5 % |
| Allocation concealment | A – Adequate |

| Study | Budney 2000 |
|---------------|--|
| Methods | Randomized controlled trial. Therapists were the same for all three treatment groups. |
| Participants | 60 cannabis users seeking treatment for marijuana dependence. 6.4/9 DSM-III-R criteria for cannabis dependence; Mean age = 23 yrs; Sex: male = 50, female = 10; Mean duration of cannabis use = 15.2 yrs; 22.5 days/ month; Mean daily smoking episode = 3.7/day |
| Interventions | 4-session MET vs 14-session CBT therapy vs CBT + voucher incentives |
| Outcomes | Treatment acceptability: attrition; Cannabis abstinence: urinalysis; Other substance use: self-report; Psychosocial functioning: ASI composite scores, URICA, SCQ, BSI, BDI |
| Notes | Intent-to-treat analysis. Analysis of covariance (treatment group = covariate, weeks of cannabis abstinence = dependent variable) to test therapist effects. |

Characteristics of included studies (Continued)

Allocation concealment A – Adequate

| Study | Copeland 2001 |
|------------------------|---|
| Methods | Randomized controlled trial. Therapy fidelity control. Follow-up assessment by an independent researcher blind to participants' treatment allocation |
| Participants | 229 adults cannabis users. 96.4 % mt DSM-IV criteria for cannabis dependence. Mean age = 32.3 yrs; Mean duration of cannabis use : 13.9 yrs; |
| Interventions | 6-session brief cognitive-behavioral (6-CBT) vs 1-session CBT vs delayed-treatment control group |
| Outcomes | Assessment 24-weeks after treatment completion. Cannabis abstinence; level of cannabis use (daily consumption); Score on the Severity of Dependence Scale, score of Cannabis Problems questionnaire; Psychological distress: SCL-90-R |
| Notes | Adjusting for co-variate: therapist variable. Drop-out: 50 % did not complete the 6-sessions CBT. ITT analysis |
| Allocation concealment | A – Adequate |

| Study | Sinha 2003 |
|------------------------|---|
| Methods | Randomized controlled trial. All therapists delivered both conditions (cross-tailored). |
| Participants | 65 young probation-referred. Met DSM-IV criteria for cannabis dependence. Mean age = 20.6 yrs; Sex: 16 female; Mean cannabis days of use/month = 13.5; Mean duration of cannabis use = 6.7 yrs; Previous cannabis treatment = 0.6 |
| Interventions | 3-sessions MET vs 3-sessions MET + contingency management with vouchers for treatment attendance (MET/CM) |
| Outcomes | Assessment at the end of interventions (28 days) and 1-month follow-up. Treatment engagement: No of sessions attended, Days of cannabis use, ASI composite scores, SOCRATES precontemplation subscale |
| Notes | Analysis sample = 55 randomized ITT analysis |
| Allocation concealment | A – Adequate |

| Study | Stephens 1994 |
|--------------|---|
| Methods | Randomized controlled trial. Therapists supervision and therapy control. Therapists were unaware of the content of the alternative treatment and hypotheses of the study |
| Participants | 212 cannabis users seeking help to quit cannabis. Mean age = 31.9 yrs; Sex: 161 male, 51 female; Days of cannabis use past 90 days = 80.7; Mean duration of cannabis use = 15.4 yrs; No of previous attempts to quit = 7.0 |

Characteristics of included studies (Continued)

| | |
|------------------------|--|
| Interventions | 10-session CBT vs 10-session Social support |
| Outcomes | Follow-up: 1, 3, 6, 9, 12 months Abstinence rate Cannabis use (self-report + urinalysis) Other substance use (self-report + urinalysis) Drug-related problems (DAST) |
| Notes | |
| Allocation concealment | A – Adequate |

| | |
|---------------|--|
| Study | Stephens 2000 |
| Methods | Randomized controlled trial. Therapists supervision and therapy control. |
| Participants | 291 cannabis users seeking treatment. Mean No of dependence criteria = 6.7/9 (DSM-III-R); Mean age = 34.0 yrs; Sex: 77 % were male; Mean duration of cannabis use = 17.3 yrs; Days of use past 90 days = 74.6; |
| Interventions | 14-session CBT group treatment vs 2-session individual treatment using motivational interviewing (MET) vs 4-months delayed treatment control group |
| Outcomes | Follow-up 4, 7, 13, 16 months after treatment. Treatment participation and fidelity: average of sessions attended, Cannabis use: days of use per month, times used per day, No of dependence criteria, No of cannabis-related problems; Other substance use: self-report and urinalysis; |

| | |
|------------------------|--------------|
| Notes | |
| Allocation concealment | A – Adequate |

ASI: Addiction Severity Index
BDI: Beck Depression Inventory
BSI: Brief Symptom Inventory
CBT: Cognitive-behavioral therapy
CM: Contingency Management
DSM-III-R: Diagnostical and Statistical Manual of Mental Disorders (III edition Revised)
DSM-IV: Diagnostical and Statistical Manual of Mental Disorders (IV edition)
ITT: Intention to Treat
MET: Motivational Enhancement Therapy
SCID: Structured Clinical Interview for Diagnostical and Statistical Manual of Mental Disorders
SCL-90-R: Symptom Check List-90-Revised
SCQ: Social Communication Questionnaire
URICA: University of Rhode Island Change Assessment scale
vs: versus

Characteristics of excluded studies

| | |
|---------------|--|
| Andersen 1986 | RCT. Only women. Drug addicts, not only cannabis dependence. |
| Babor 2002 | Prospective study. No RCT. Adolescents under 18 years old. |
| Battjes 2004 | Prospective study. No RCT. Adolescents under 18 years old. |
| Borvin 1984 | RCT. 7th grade student. Participants under 18 years old. |
| Borvin 1990a | RCT. Students attending 56 schools. Participants under 18 years old. |
| Borvin 1990b | RCT. 8th grade students. Participants under 18 years old. |

Characteristics of excluded studies (Continued)

| | |
|------------------|---|
| Borvin 1995 | RCT. 12th-grade students. Prevention program. Participants were not cannabis-dependent users. |
| Buchan 2002 | Cross-sectional study. Participants were adolescents ranging in age from 12 to 18 years. |
| Carroll 1996 | Review of 24 RCTs evaluated the effectiveness of cognitive-behavioral relapse prevention among adults tobacco, cocaine, marijuana users. |
| Copeland 2001c | RCT. Only clinical profile of participants involved in the included RCT Copeland 2001. |
| Dennis 2002 | Cannabis Youth Treatment Project. RCT. Adolescents between the age of 12 and 18. Excluded because participants were under 18. |
| Diamond 2002 | RCT. Participants were under 18. |
| Duncan 2000 | RCT. 9th to 12th-grade students. Excluded because participants were under 18. |
| Lang 2000 | Cross-sectional study. Selection bias. |
| Levin 2004 | RCT. Intervention = divalproex sodium. Excluded because intervention is not in the scope of the study. |
| Liddle 2001 | RCT. Participants were adolescents between 13 and 18. Excluded because participants were under 18. |
| McHugo 1999 | RCT. Unclear randomization procedure. Randomization based on extensive longitudinal process data. |
| McRae 2003 | Review. Excluded for not being a clinical trial but a review of several trials. |
| Miller 1989 | Cross-sectional study. No control group. |
| Roffman 1988 | RCT. Preliminary results of one of two cohorts. Intervention : relapse prevention vs social support. Complete data published in Stephens 1994 (included). |
| Roffman 1993 | RCT. Outcome = characteristics of cannabis-dependent users in three subgroups. Excluded because outcome were not in the scope of the review. |
| Rohrbach 1993 | RCT. Random assignment unclear. 4 cohorts. Program offered different for each cohort. |
| Santisteban 2003 | RCT. Participants = Hispanic families with a behavior problem adolescent. Outcome = family functioning. Excluded because participants and outcome were not in the scope of the review. |
| Smith 1988 | Non RCT. Intervention = aversion therapy. Excluded because study design and intervention were not in the scope of the review. |
| Spoth 2001 | RCT. Pretest study. Participants were 6th graders and their families. Not only cannabis users. Selection bias. Excluded because participants were under 18. |
| Steinberg 2002 | No RCT. Discussion of Marijuana Treatment Project. |
| Stephens 1993 | Cross-sectional study. Follow-up 12 months. Outcome = variables to predict post-treatment indices of marijuana intake. Excluded because study design and outcome were not in the scope of the review. |
| Stephens 1995 | RCT. Same cohort than Stephens 1994 (included). Outcome: coping, temptation, perceived stress. Excluded because the outcome were not in the scope of the review. |
| Stephens 2002 | Marijuana Treatment Project. Characteristics of participants involved in the Marijuana Treatment Project trial (included in the review, Babor 2004) |
| Strang 2004 | RCT. Method unclear. Outcome = cessation cannabis smoking. Cluster analysis is mentioned but no results are given. Excluded because no data suitable for inclusion. |
| Tims 2002 | RCT. Blocked random assignment. Participants were adolescents between 12 and 18. Excluded because participants were under 18. |
| Vendetti 2002 | Data from Marijuana Treatment Project. Only drop-outs. Aim of the study = factors associated with drop-outs. Excluded because objective and outcome were not in the scope of the study. |
| Zacny 1991 | RCT. Unclear randomization procedure. Intervention = food deprivation and self-administration of marijuana. Excluded because methods use were unclear. |

Characteristics of excluded studies (*Continued*)

RCT: Randomised controlled trial

vs: versus

GRAPHS AND OTHER TABLES

This review has no analyses.

COVER SHEET

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|---|---|
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| Contact address | Cecile Denis Research worker Laboratoire de Psychiatrie Universite Victor Segalen Bordeaux - Centre Carreire du CHCP 121 rue de la Bechade Bordeaux Cedex 33076 EUROPEAN UNION E-mail: cecile.denis@labopsy.u-bordeaux2.fr Tel: +33 5 56 56 17 38 Fax: +33 5 56 56 35 15 |
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