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Motivational interviewing for substance abuse

Geir Smedslund, Rigmor C. Berg, Karianne T. Hammerstrøm, Asbjørn Steiro, Kari A. Leiknes, Helene M. Dahl, Kjetil Karlsen

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Motivational interviewing for substance abuse (Review)

Smedslund G, Berg RC, Hammerstrøm KT, Steiro A, Leiknes KA, Dahl HM, Karlsen K

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[Intervention Review]

Motivational interviewing for substance abuse

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ABSTRACT

Background

There are 76.3 million people with alcohol use disorders worldwide and 15.3 million with drug use disorders. Motivational interviewing (MI) is a client-centred, semi-directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence. The intervention is used widely, and therefore it is important to find out whether it helps, harms or is ineffective.

Objectives

To assess the effectiveness of motivational interviewing for substance abuse on drug use, retention in treatment, readiness to change, and number of repeat convictions.

Search strategy

We searched 18 electronic databases, 5 web sites, 4 mailing lists, and reference lists from included studies and reviews. Search dates were November 30, 2010 for Cochrane Library, Medline, Embase and PsychINFO.

Selection criteria

Randomized controlled trials with persons dependent or abusing substance. Interventions were MI or motivational enhancement therapy. The outcomes were extent of substance abuse, retention in treatment, motivation for change, repeat conviction.

Data collection and analysis

Three authors independently assessed studies for inclusion, and two authors extracted data. Results were categorized into (1) MI versus no-treatment control, (2) MI versus treatment as usual, (3) MI versus assessment and feedback, and (4) MI versus other active treatment. Within each category, we computed meta-analyses separately for post-intervention, short, medium and long follow-ups.

Main results

We included 59 studies with a total of 13,342 participants. Compared to no treatment control MI showed a significant effect on substance use which was strongest at post-intervention SMD 0.79, (95% CI 0.48 to 1.09) and weaker at short SMD 0.17 (95% CI 0.09 to 0.26], and medium follow-up SMD 0.15 (95% CI 0.04 to 0.25]). For long follow-up, the effect was not significant SMD 0.06 (95% CI-0.16 to 0.28). There were no significant differences between MI and treatment as usual for either follow-up post-intervention, short and medium follow up. MI did better than assessment and feedback for medium follow-up SMD 0.38 (95% CI 0.10 to 0.66). For short follow-up, there was no significant effect . For other active intervention there were no significant effects for either follow-up.

There was not enough data to conclude about effects of MI on the secondary outcomes.

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Authors' conclusions

MI can reduce the extent of substance abuse compared to no intervention. The evidence is mostly of low quality, so further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

PLAIN LANGUAGE SUMMARY

Motivational interviewing is a short psychological treatment that can help people cut down on drugs and alcohol

More than 76 million people worldwide have alcohol problems, and another 15 million have drug problems. Motivational interviewing (MI) is a psychological treatment that aims to help people cut down or stop using drugs and alcohol. The drug abuser and counsellor typically meet between one and four times for about one hour each time. The counsellor expresses that he or she understands how the clients feel about their problem and supports the clients in making their own decisions. He or she does not try to convince the client to change anything, but discusses with the client possible consequences of changing or staying the same. Finally, they discuss the clients' goals and where they are today relative to these goals. We searched for studies that had included people with alcohol or drug problems and that had divided them by chance into MI or a control group that either received nothing or some other treatment. We included only studies that had checked video or sound recordings of the therapies in order to be certain that what was given really was MI. The results in this review are based on 59 studies. The results show that people who have received MI have reduced their use of substances more than people who have not received any treatment. However, it seems that other active treatments, treatment as usual and being assessed and receiving feedback can be as effective as motivational interviewing. There was not enough data to conclude about the effects of MI on retention in treatment, readiness to change, or repeat convictions.The quality of the research forces us to be careful about our conclusions, and new research may change them.

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SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

motivational interviewing compared to no treatment control group for substance abuse

Patient or population: patients with substance abuse
Settings:
Intervention: motivational interviewing
Comparison: no treatment control group

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	no treatment control group	motivational interviewing				
amount of substance abuse post intervention		The mean amount of substance abuse post intervention in the intervention groups was **0.79 standard deviations higher** (0.48 to 1.09 higher)		202 (4 studies)	⊕⊕○○ **low**[1,2]	
amount of substance abuse short follow-up Follow-up: 1-6 months		The mean amount of substance abuse short follow-up in the intervention groups was **0.17 standard deviations higher** (0.09 to 0.26 higher)		2327 (15 studies)	⊕⊕⊕○ **moderate**[1]	
amount of substance abuse medium follow-up Follow-up: 7-12 months		The mean amount of substance abuse medium follow-up in the intervention groups was **0.15 standard deviations**		2326 (12 studies)	⊕⊕○○ **low**[1]	

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		higher (0.04 to 0.25 higher)		
amount of substance abuse long follow-up Follow-up: mean 12 months		The mean amount of substance abuse long follow-up in the intervention groups was **0.06 standard deviations higher** (0.16 lower to 0.28 higher)	363 (1 study)	⊕⊕○○ **low**[1,3]
Readiness for change		The mean Readiness for change in the intervention groups was **0.05 standard deviations higher** (0.11 lower to 0.22 higher)	1495 (5 studies)	⊕⊕○○ **low**[4,5]
Retention Follow-up: 0-3 months		The mean Retention in the intervention groups was **0.26 standard deviations higher** (0 to 0.52 higher)	427 (2 studies)	⊕○○○ **very low**[4,6,7]

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Unclear randomisation and blinding of assessor.
[2] Confidence interval from 0.48 to 1.09

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[3] Confidence interval includes both negative and positive values.
[4] Incomplete outcome data addressed. Unclear allocation concealment and blinding.
[5] I-squared = 48%.
[6] I-squared = 36%.
[7] Confidence interval from -0.00 to 0.50.

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BACKGROUND

Description of the condition

According to the World Health Organization (WHO 2009) there are 76.3 million people with alcohol use disorders worldwide. In addition, there are at least 15.3 million people who suffer from a drug use disorder, and injecting drug use is reported in 136 countries.

Substance abuse refers to the overindulgence in and dependence on a drug or other substance leading to effects that are detrimental to the individual's physical and mental health, or the welfare of others. The disorder is characterized by a pattern of continued pathological use of a drug or other substance, that results in repeated adverse social consequences related to drug use, such as failure to meet work, family, or school obligations, interpersonal conflicts, or legal problems. There are on-going debates as to the exact distinctions between substance abuse and substance dependence. We follow the definitions by the American Psychiatric Association (APA 2000) and distinguish between the two by defining substance dependence as a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems. There is a pattern of repeated self-administration that can result in tolerance, withdrawal, and compulsive drug-taking behavior (APA 2000). Substance abuse is a maladaptive pattern of substance use manifested by recurrent and significant adverse consequences related to the repeated use of substances. In order for an Abuse criterion to be met, the substance-related problem must have occurred repeatedly during the same 12-month period or been persistent.

Substance abuse may lead to addiction or substance dependence. Medically, physiologic dependence requires the development of tolerance leading to withdrawal symptoms. Both abuse and dependence are distinct from addiction which involves a compulsion to continue using the substance despite the negative consequences, and may or may not involve chemical dependency (APA 2000). Dependence almost always implies abuse, but abuse frequently occurs without dependence, particularly when an individual first begins to abuse a substance. There is also a distinction between "misuse" and "abuse" of substances. Substance misuse is the incorrect use of medication by patients, who may use a drug for a purpose other than that for which it was prescribed; or use of a substance for unintended purposes (APA 2000). The focus of this review is substance abuse, dependency or addiction, but not misuse.

Description of the intervention

Motivational interviewing (MI) was started by Miller (Miller 1983) and developed by Miller and Rollnick (Miller 1991). MI is a client-centred, semi-directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence. MI integrates the relationship-building principles of Carl Rogers (Rogers 1951) with more active cognitive-behavioural strategies. The intervention has four basic principles (described below). A brief variant of MI is called Motivational Enhancement Therapy (MET). MET is manual-based, and was developed as part of Project MATCH (Project MATCH 1997). Project MATCH was a large multi site trial comparing MI with cognitive behavioral therapy (CBT) and twelve-step facilitation therapy. MI counselling does not require professional training as nurse, psychologist, etc. Hence, MI may be incorporated in programmes run by health care staff as well as e.g. prison staff. There are explicit standards for practitioners regarding education and competence, and there is quality control to ensure that the method is in fact used as intended. One instrument for assessing treatment integrity is the Motivational Interviewing Treatment Integrity (MITI) scale (Moyers 2005). For a description of various measures of treatment fidelity in MI, we recommend the review by Madson and Campbell (Madson 2006). Promising results have been reported as to the effect of the method for alcohol dependence, smoking cessation, drug addiction, HIV-risk behaviours, treatment adherence, diet & exercise, and eating disorders (Carey 2007; Burke 2004 ; Hettema 2005; Rubak 2005). MI has recently been introduced into the criminal justice system, in Europe as well as in North-America. In the research literature, the most widely used approach related to MI has been one in which the client is given feedback based on individual results from standardized assessment measures or a modification of it. Burke et al. (Burke 2003) considered this feedback-based approach to constitute an adaptation of motivational interviewing (AMI) because it is defined by the presence of the feedback component and not solely by the use of motivational interviewing per se. More broadly, they also applied the term AMI to interventions that incorporate additional non-motivational interviewing techniques while retaining motivational interviewing principles as the core of treatment as well as to interventions that have been specifically adapted for use by non-specialists.

How the intervention might work

MI is intended to work through its four main principles: (1) express empathy, (2) support self-efficacy, (3) roll with resistance, and (4) develop discrepancy. As expressed on the official homepage of Motivational Interviewing (http://motivationalinterview.org/clinical/principles.html), expressing empathy involves seeing the world through the client's eyes. Supporting self-efficacy means that clients are held responsible for choosing and carrying out actions to change. The third principle, rolling with resistance, means that the counsellor does not fight client resistance, but "rolls with it." Statements demonstrating resistance are not challenged. Instead the counsellor uses the client's "momentum" to further explore the client's views. Lastly, motivation for change occurs when people

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perceive a discrepancy between where they are and where they want to be. MI counsellors work to develop this situation through helping clients examine the discrepancies between their current behavior and future goals. When clients perceive that their current behaviours are not leading toward some important future goal, they become more motivated to make important life changes. Apodaca and Longabaugh (Apodaca 2009) did a literature search to identify potential within-session mechanisms of change in MI. The most consistent evidence was found for three constructs: client change talk/intention (related to better outcomes); client experience of discrepancy (related to better outcomes); and therapist MI-inconsistent behavior (related to worse outcomes).

Why it is important to do this review

The intervention is used widely, and therefore it is important to find out whether it helps, harms or is ineffective. Several reviews and meta-analyses have been published (e.g. Andreasson 2003; Burke 2003; Burke 2004; Carey 2007; deWildt 2002; Dunn 2001; Emmelkamp 2006; Grenard 2006; Hettema 2005; Larimer 2007; Lundahl 2010; Nahom 2005; Rubak 2005; Vasilaki 2006) but they all differ somewhat from our review. Some of them have studied effects of MI (AMI) on other groups in addition to substance abusers or studied only alcohol abusers. Others included other designs in addition to randomised trials. The main strengths of the present review are that it employs a comprehensive and systematic search strategy aiming to be exhaustive, and that it includes only randomized controlled trials. We will also assess the risk of bias of the included studies and grade the evidence for the primary outcomes.

OBJECTIVES

To assess the effectiveness of motivational interviewing, as a primary or support intervention, for substance abuse, in terms of levels of drug use, retention in treatment, and readiness for change.

METHODS

Criteria for considering studies for this review

Types of studies

We included studies where units (persons, therapists, institutions) were allocated randomly or quasi-randomly to motivational interviewing or other conditions. Included studied had to be published in or after 1983, which was the year that MI was introduced. We had no limitation on length of study. We excluded studies that recruited participants in emergency rooms and provided one session of MI during the stay in the emergency room.

Types of participants

Persons defined as having either substance abuse, dependency or addiction, but not misuse. There were no limitations on age or other participant characteristics. The term substance refers to a drug of abuse, a medication, a toxin or alcohol, excluding nicotine. The reason for excluding nicotine, is that there is an existing Cochrane review on motivational interviewing for smoking cessation (Lai 2010). According to International classification of Diseases version 10 (ICD-10) (WHO 1993) we included the following codes, F10 to F19*, excluding F15 (caffeine) and F17 (tobacco). Equivalent disorders and codes in the Diagnostic and Statistical Manual of Mental Disorders, third revised edition (DSM-III-R) (APA 1987) and fourth edition, (DSM-IV) (APA 1994), chapter Substance-Related disorders, were also included. We also included studies in which substance abuse was not formally diagnosed. Participants could be dual diagnosis clients. We included both participants who only abuse substances and participants who also have mental problems, but we analysed the two groups separately.

*[Mental and behavioural disorders due to use of - alcohol (F10 - 303), - opioids (F11), - cannabinoids (F12), - sedatives or hypnotics (F13), - cocaine (F14), - other stimulants (amphetamine) (F15), - hallucinogens (F16), - volatile solvents (F18) and - multiple drug use and use of other psychoactive substances (F19).]

Types of interventions

Experimental intervention

Primarily, the interventions should be labelled motivational interviewing (M)) or motivational enhancement therapy (MET). The intervention could basically be offered in three ways: (1) as a standalone therapy, (2) MI integrated with another therapy, or (3) MI as a prelude to another therapy (e.g. cognitive behavioral therapy). Only individual, face-to-face interventions were included. We excluded group interventions, and interventions not given in person (e.g. computer-delivered or telephone interventions). Because most psychosocial interventions have many unspecific elements in common, and because terms like "motivational intervention" and "motivational interview" not necessarily refers to Miller's specific program of MI, we included only studies that reviewed audio or video recordings to ensure that the intervention given was indeed MI.

Studies had to include checks of audio- or videotaping of sessions in order to assess fidelity of treatment.

Control intervention

The comparator could be no intervention, waiting list control, placebo psychotherapy or other active therapy.

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Types of outcome measures

Data on substance abuse could be both dichotomous (number of participants ceasing substance abuse) and continuous (e.g. mean number of days used in last 30 days). Substance abuse could also be measured using various scales or inventories like the OTI (Opiate Treatment Index) (Darke 1991; Darke 1992), the Timeline Follow-Back (Sobell 1992), and the Rutgers Alcohol Problems Index (RAPI; White 1989).

Primary outcomes

- cease of substance use measured by self-report, report by collaterals, urine analysis, or blood samples, etc.
- reduction in substance abuse measured as above.

Outcomes are typically recorded as a posttest immediately after the interventions ended, short-term follow-ups until six months after the intervention ended, medium-term follow-ups of between six and 12 months, and long-term follow-ups of 12 months or longer. The exact follow-up durations are recorded for each study.

Secondary outcomes

- Retention in treatment.
- Improve motivation for change, e.g. measured by the Readiness to Change Questionnaire (RCQ; Heather 1993).
- Number of repeat convictions (for convicted substance abusers).

Search methods for identification of studies

Electronic searches

We searched the following electronic databases: Medline (1950 to November Week 3, 2010), Embase (1980 to 2010, week 4), PsycInfo (1806 to November week 4, 2010), PsychExtra (1908 to January 14, 2008), Cochrane Central Register of Controlled Trials (search date: November 30, 2010), C2-SPECTR (Search date: November 23, 2009), International Bibliography of the Social Sciences (1951 to November week 3, 2009), Sociological Abstracts (search date: November 30, 2010), ISI Web of Science (search date: November 30, 2010), SveMed+ (search date: November 30, 2010), CINCH (search date: November 30, 2010) , NCJRS (search date: November 30, 2010), SpringerLink (search date: October 2, 2010), Wiley Interscience (search date: October 2, 2010), DrugScope Library (search date: October 2, 2010), Electronic Library of the National Documentation Centre on Drug Use (search date: October 2, 2010), Google Scholar, and Google (search date: February 2, 2010). Year of publication was limited to 1983 and later.

Databases were searched using a strategy developed incorporating the filter for the identification of RCTs (Higgins 2009) combined with selected MeSH terms and free text terms relating to substance abuse and motivational interviewing. The MEDLINE search strategy was translated into the other databases using the appropriate controlled vocabulary as applicable. The search strategies for all databases are shown in Appendix 1.

We searched the following web sites and mailing lists:

Websites:

- www.motivationalinterview.org (bibliography updated November 2009)
- http://nrepp.samhsa.gov/programfulldetails.asp?PROGRAM_ID=182 (accessed June 7th, 2010)
- http://www.controlled-trials.com (accessed August 24th, 2010)
- http://clinicalstudyresults.org (accessed August 24th, 2010
- http://centrewatch (accessed August 24th, 2010).

Mailinglists:

- MINT-listserv; a mailing list available to members of MINT (Motivational Interviewing Network of Trainers)
- Australian Criminology Listserv
- Campbell Crime& Justice Group Steering Committee
- Crimnet. http://www.law.usyd.edu.au/mailman/listinfo/crimnet.

We had no language restrictions.

Searching other resources

References in obtained reviews and included primary studies were searched (in June 2010) to identify new leads.

Data collection and analysis

Dealing with dependent data

When there was more than one intervention group that was compared with a single control group, we did not include both comparisons in the same meta-analysis. When there were several follow-up times, we categorised them into post, short, medium or long follow-up as described above. In cases when there were data from more than one follow-up time within one of our categories, we used the mean value. When there was more than one measure of the same outcome, we used the standardised mean value.

Selection of studies

The screening of studies proceeded in 3 levels. At Level 1, two reviewers who were methodologists scanned the titles of each reference. Each reviewer scored either "promote to next level", "exclude" or "can't tell". Only if both reviewers scored "exclude" was the reference excluded. If at least one reviewer scored "can't tell" or "include", the reference was promoted to Level 2. At Level 2, the titles and abstracts were read, and the same promotion rules applied. References promoted to Level 3 were ordered in full text. Two reviewers read the full texts and scored "include" or "exclude".

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If there were disagreement, and the two reviewers could not agree, a third reviewer decided whether to include the study.

Data extraction and management

Data from each study were extracted by two reviewers using a specifically developed data extraction form (available on request). The reviewers had full access to details about authors, institutions, and journals at all times. The same rules for tackling disagreement as at Level 3 applied. If information about primary outcomes or other vital information was missing from the original reports, we contacted the corresponding author by e-mail (up to three times) in an attempt to retrieve the necessary data for the analysis. In cases where effect size information could not be obtained from the authors of the primary studies, we used effect size data from published systematic reviews and meta-analyses, when available. If necessary, we contacted the authors of the systematic reviews/ meta-analyses for additional information.

Assessment of risk of bias in included studies

The risk of bias assessment for RCTs and CCTs (controlled clinical trials) in this review was performed using the six criteria recommended by the Cochrane Handbook (Higgins 2009). The recommended approach for assessing risk of bias in studies included in Cochrane Reviews is a two-part tool, addressing six specific domains (sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting, and other issues). The first part of the tool involves describing what was reported to have happened in the study. The second part of the tool involves assigning a judgement , in terms of "low ", "high" or "unclear", relating to the risk of bias for that entry. To make these judgments we used the criteria indicated by the handbook adapted to the addiction field.

Blinding of participants and providers was assessed as one item, while blinding of outcome assessor was assessed as another item.

Incomplete outcome data (avoidance of attrition bias) were considered for all outcomes except for the drop out from the treatment, which is very often the primary outcome measure in trials on addiction. It is assessed separately for results at the end of the study period and for results at follow up.

The criteria for assessing other bias were: differences between groups at baseline, collateral and biological measurement to corroborate self-reports of substance abuse, differences in providers' time spent in training between conditions, and contamination of conditions. In addition, we looked for other sources of bias in each study.

Grading of evidence

The quality of evidence was assessed according to a systematic and explicit method (Guyatt 2008). In order to indicate the extent to which one can be confident that an estimate of effect is correct, judgments about the quality of evidence are made for each comparison and outcome. These judgments consider study design (RCT, quasi RCT or observational study), study quality (detailed study design and execution), consistency of results (similarity of estimates of effect across studies), precision of estimates, and directness (the extent to which people, interventions and outcome measures are similar to those of interest). The following definitions in grading the quality of evidence for each outcome are used: High: further research is very unlikely to change our confidence in the estimate of effect. Moderate: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. Low: further research is very likely to have an important impact on our confidence in the estimate of effect and may change the estimate. Very low: any estimate of effect is very uncertain.

Measures of treatment effect

We compared the treatment and control groups for outcomes at post-test and at different follow-up times. Post-intervention data were collected immediately after the intervention ended. Short follow-up was until (but not including) 6 months. Medium follow-up was from 6 months until (but not including) 12 months. Long follow-up was 12 months and longer. For dichotomous data, we computed relative risks (risk ratios). For continuous data we computed standardised mean differences. 95 percent confidence intervals were used as measures of the amount of random errors influencing the outcome estimations. We used the **optimal information size (OIS)** (Pogue 1997) for assessing whether there is a sufficient sample size for concluding that there is a statistically significant effect in a meta-analysis. Using a two-sided alpha of 0.01 and power of 0.95 we calculated that a total sample size of 1,786 is necessary for detecting a small standardised mean difference (SMD = 0.2). For SMDs of 0.5 (medium) and 0.8 (large), the OIS are 290 and 116, respectively.

Unit of analysis issues

In cluster-randomised trials, the elements are groups of individuals (e.g. prisons, geographical areas, clinics), rather than individuals themselves. In such studies, care should be taken to avoid unit-of-analysis errors. If there for instance are a total of 100 substance abusers with 25 abusers in each of four clinics, and two clinics are randomised to receive the intervention and the other two are randomised to receive the control, the correct N to use in the analysis is not 100 but smaller. The effective sample size of a single intervention group in a cluster-randomised trial is its original sample size divided by a quantity called the *design effect*. A common design effect is usually assumed across intervention groups. The design effect is 1+(m - 1)r, where m is the average cluster size and r is the *intra cluster correlation coefficient* (ICC). If we include any cluster randomised controlled trials in this review, we try to measure the intra-cluster correlation. The total variance in the outcome can be partitioned into variance between groups (VBG) and variance within groups (VWG).The intra cluster correlation is calculated

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as VBG/(VBG+VWG). But the ICC is seldom reported in the primary studies. The number of participants can be used in the analyses if the ICC is used as a correcting factor. For dichotomous data both the number of participants and the number experiencing the event can be divided by the same design effect (Higgins 2008).

Dealing with missing data

We contacted authors by email (up to three times) to collect missing data. Statisticians often use the terms 'missing at random', and 'not missing at random' to represent different scenarios. Data are said to be 'missing at random' if the fact that they are missing is unrelated to actual values of the missing data. Data are said to be 'not missing at random' if the fact that they are missing is related to the actual missing data. In cases where we assumed that data were missing at random, we analysed only the available data. If we assumed that the data were not missing at random, we planned to impute the missing data with replacement values, and treat these as if they were observed. We planned to do this in different ways and compare the results (e.g. last observation carried forward, imputing an assumed outcome such as assuming all were poor outcomes, imputing the mean, imputing based on predicted values from a regression analysis). For the included studies in this review we did not impute data.

Assessment of heterogeneity

Statistically significant heterogeneity among primary outcome studies was assessed with Chi-squared (Q) test and I-squared (Higgins 2003). A significant Q ($p<.05$) and I-squared of at least 50% was considered as statistical heterogeneity.

Assessment of reporting biases

We used funnel plots for information about possible publication bias. But asymmetric funnel plots are not necessarily caused by publication bias (and publication bias does not necessarily cause asymmetry in a funnel plot). Whenever asymmetry was present, likely reasons were explored.

Data synthesis

When meta-analyses were performed, we reported random effects meta-analyses. If meta-analyses were not judged to be appropriate, we reported the results for each individual study.

Subgroup analysis and investigation of heterogeneity

We investigated the following factors with the aim of explaining observed heterogeneity (if present): Students or non-students as participants, type of fidelity check, type of substance, intensity or length/period of the intervention, whether Intervention was MI or MET, whether a manual was used, profession of therapist. We also compared results for studies with or without the developers of MI William R. Miller or Stephen Rollnick on the author list or mentioned as mentors or trainers (including training by a member of MINT [Motivational Interviewing Network of Trainers]). We analysed effects separately for MI alone, MI integrated with other therapy, and MI given as a prelude to other therapy.

When there were many primary studies, we classified them according to these variables in order to identify possible sources of heterogeneity. We considered performing moderator analyses (stratification on subgroups, meta-analysis analogue to ANOVA, meta-regression) to explore how observed variables were related to heterogeneity.

Sensitivity analysis

When there was significant unexplained heterogeneity and the number of included studies was sufficient (more than 10), we assessed the impact of differing risk of bias by sensitivity analyses. The following sensitivity analyses were planned *a priori:* Generation of allocation sequence, concealment of allocation, blinding of patients and providers, blinding of assessors, incomplete outcome data addressed, selective reporting, and other bias.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of studies awaiting classification; Characteristics of ongoing studies.

See Characteristics of included studies; Characteristics of excluded studies.

Results of the search

Our electronic search in November 2009 returned 1,801 records, and an updated search in November 2010 produced an additional 518 records. One record (Emmen 2005) was located through www.motivationalinterview.org. No additional records were found while searching reference lists of included studies (in June 2010), thus making the total 2,320. We excluded 2077 records on the basis of title and abstract. We acquired full reports of 243 records (describing 208 studies). A total of 153 excluded records (describing 149 studies) are listed in the Characteristics of excluded studies.

Included studies

We identified 59 studies (reported in 90 articles) published between 1993 and 2010 for inclusion in this review, covering 13,342

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participants. 57 studies were RCTs, and two studies were quasi-RCTs (Bazargan-Hejazi 2005; Freyer-Adam 2008). We did not locate any cluster-RCTs. Full details of all the included studies are given in a table (Characteristics of included studies). In 29 studies the participants seemed to be exclusively alcohol abusers, and in eight studies they were cannabis abusers. In four studies the participants were exclusively cocaine abusers, and in the remaining 18 studies, the participants were abusing more than one substance. We were not able to assess the severity of substance abuse across studies from the information reported in the included articles. There were 44 studies from the USA, five from Australia, three each from the Netherlands and UK, two from Canada, and one each from Germany and New Zealand.

Excluded studies

We excluded 149 studies (reported in 153 articles) read in full text. 39 studies did not report fidelity checks using video- or audio recordings. For 31 studies, substance abuse was not an outcome, and 28 studies did not seem to have given MI, MET or AMI. There were 21 studies that were not randomised trials, and 14 were not individualized, face-to-face interventions. Nine studies did not have substance abusers as participants, three studies did not compare MI with another condition, one study recruited and treated participants with one session MI in an emergency room, and two publications reported no results. One study had use of prescription drugs as outcome. The excluded trials are listed in the table Characteristics of excluded studies, with main reasons for their exclusion.

Risk of bias in included studies

Full details of risk of bias assessments are given for each trial within the Characteristics of included studies table. Overall summary results of all the risk of bias assessments are displayed in Figure 1. A summary of the risk of bias for each study and each domain is given in Figure 2.

Figure 1. Methodological quality graph: review authors' judgements about each methodological quality item presented as percentages across all included studies.

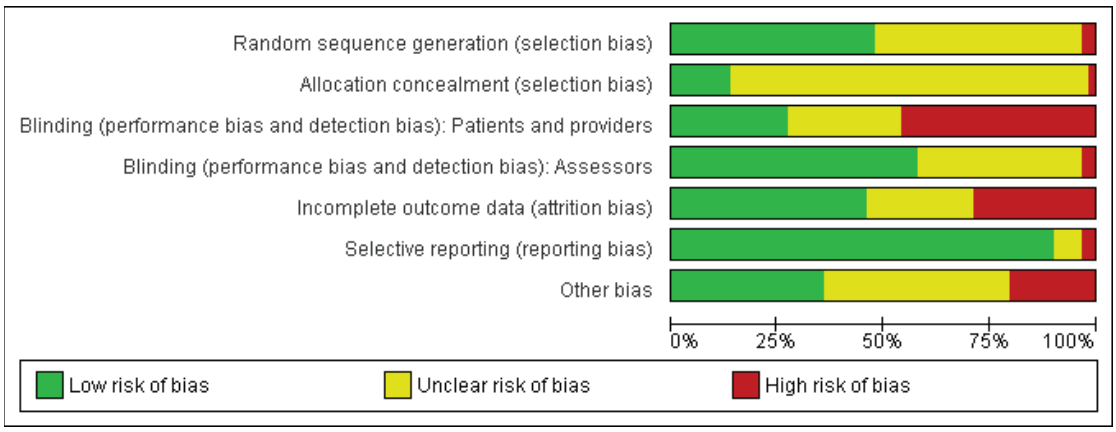

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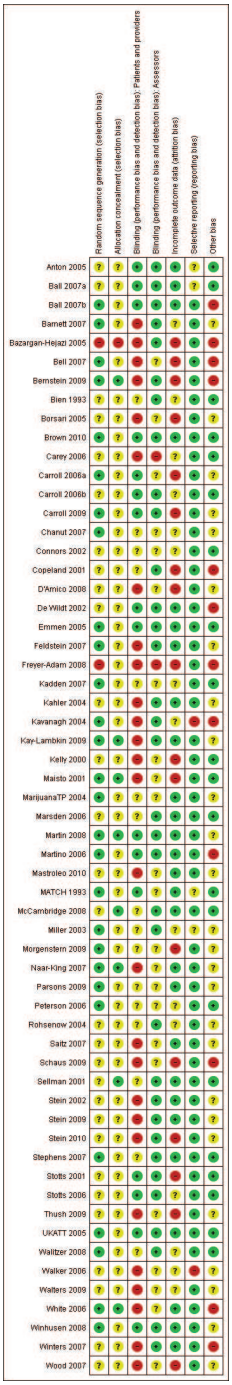
Figure 2. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.



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Allocation

28 studies were at low risk of selection bias because they used an adequate method of sequence generation, but for 29 studies the generation method is unclear. A minority of studies have obviously not used adequate generation of allocation (n=2). For most of the studies there is an inadequate description of what, if anything, was done to conceal the allocation (n=50) and were therefore judged as having unclear risk of bias.

Blinding

In psychological therapies like MI, it is not possible to blind the people giving the intervention. It is also not generally possible to blind the participants. An exception might be if there is an active control, like another type of psychological therapy. In 27 of the 59 studies we believe that there was a high risk of bias because participants and/or providers knew who were in the intervention group. In the majority of studies (n=31) it was unclear whether the assessors were blinded. In 22 studies the assessors appear to have been adequately blinded.

For the primary outcomes we have treated physiological and non-physiological outcomes separately. Non-blinding of physiological outcomes produces less risk of bias than the non-physiological ones. The secondary outcomes (retention in treatment, readiness for change, and re conviction) were all non-physiological.

Incomplete outcome data

We used the following rules of thumb for the judgement of risk of bias: loss-to-follow-up equal to or greater than 20 percent, different rates of follow-up across intervention arms, reasons for loss-to-follow-up not reported, and intention-to-treat not performed. 27 studies had adequately accounted for incomplete outcome data. For 15 studies it was unclear, and for 17 studies there was a high risk of bias for this item.

Selective reporting

Most studies (n=53) were judged to be free of selective reporting.

Other potential sources of bias

A small number of studies (n=12) was judged to have other potential sources of bias. 21 studies were judged to be of low risk of bias, and 26 studies were judged to be of unclear risk with respect to other sources of bias.

Publication bias

Figure 3; Figure 4; Figure 5; Figure 6 show funnel plots of the four main meta-analyses. For MI versus no intervention and for MI versus treatment as usual, it appears that smaller studies tend to have larger effect sizes in favour of MI. This could be (but not necessarily) a sign of publication bias. There is a possibility that small studies with non-significant results are less likely to be published. For MI versus assessment and feedback and for MI versus other active treatment, the funnel plots look more symmetric.

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Figure 3. Funnel plot of comparison: 1 MI versus no intervention, outcome: 1.1 Amount of substance use.

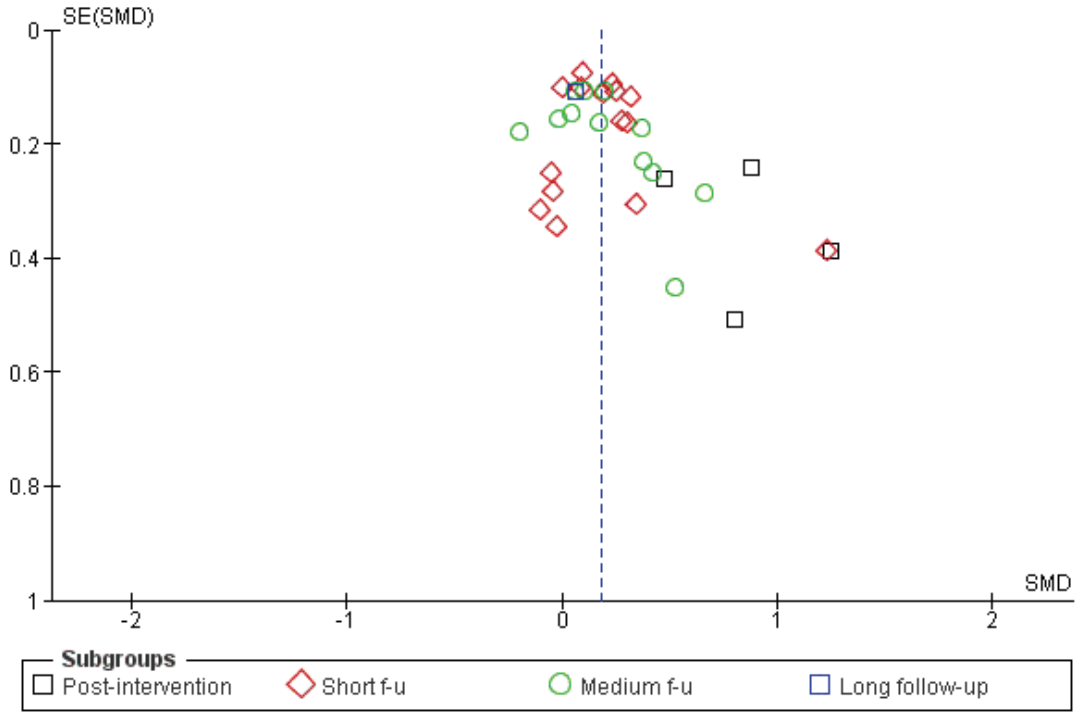

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Figure 4. Funnel plot of comparison: 4 MI versus treatment as usual, outcome: 4.1 Amount of substance use.

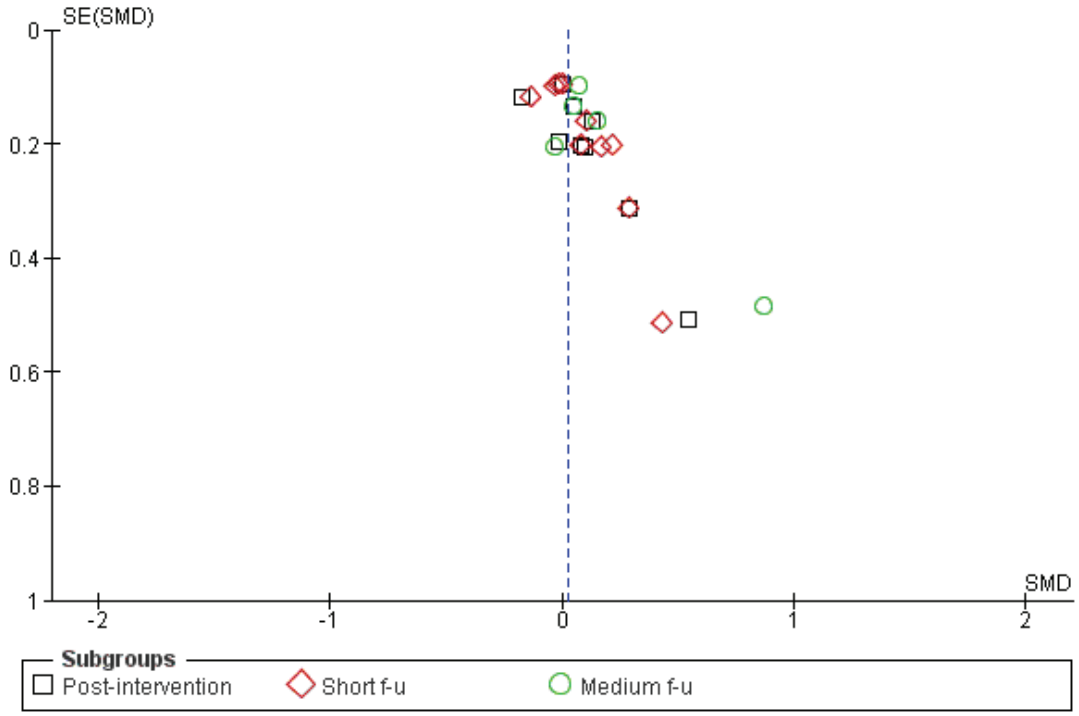

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Figure 5. Funnel plot of comparison: 2 MI versus assessment and feedback, outcome: 2.1 Amount of substance use.

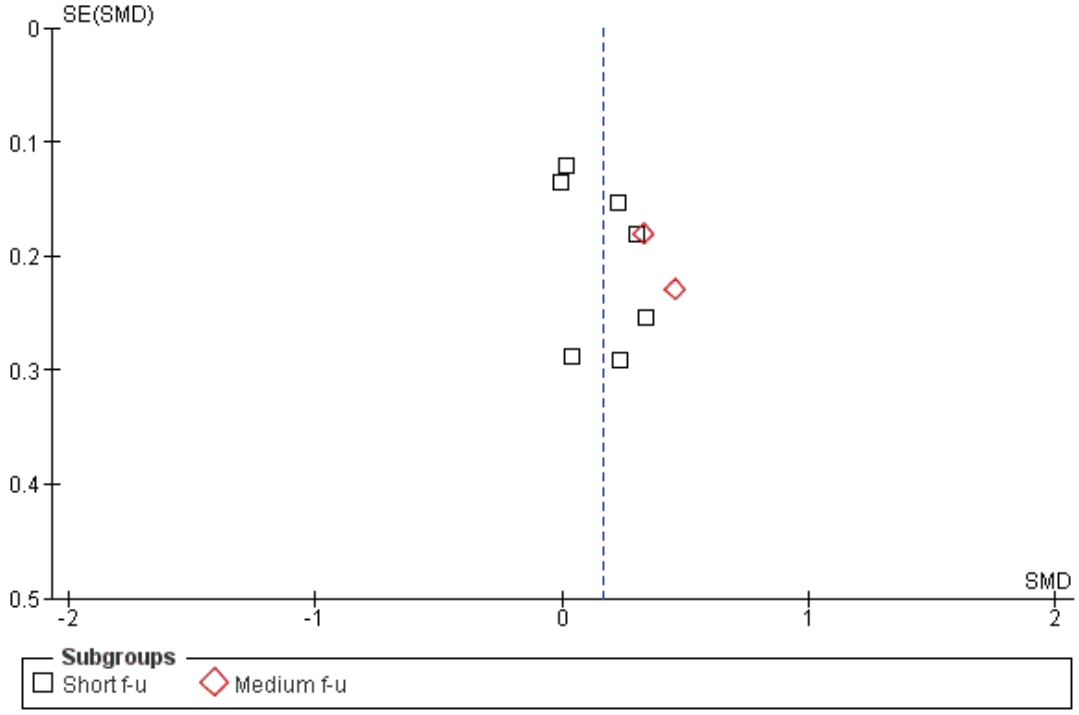

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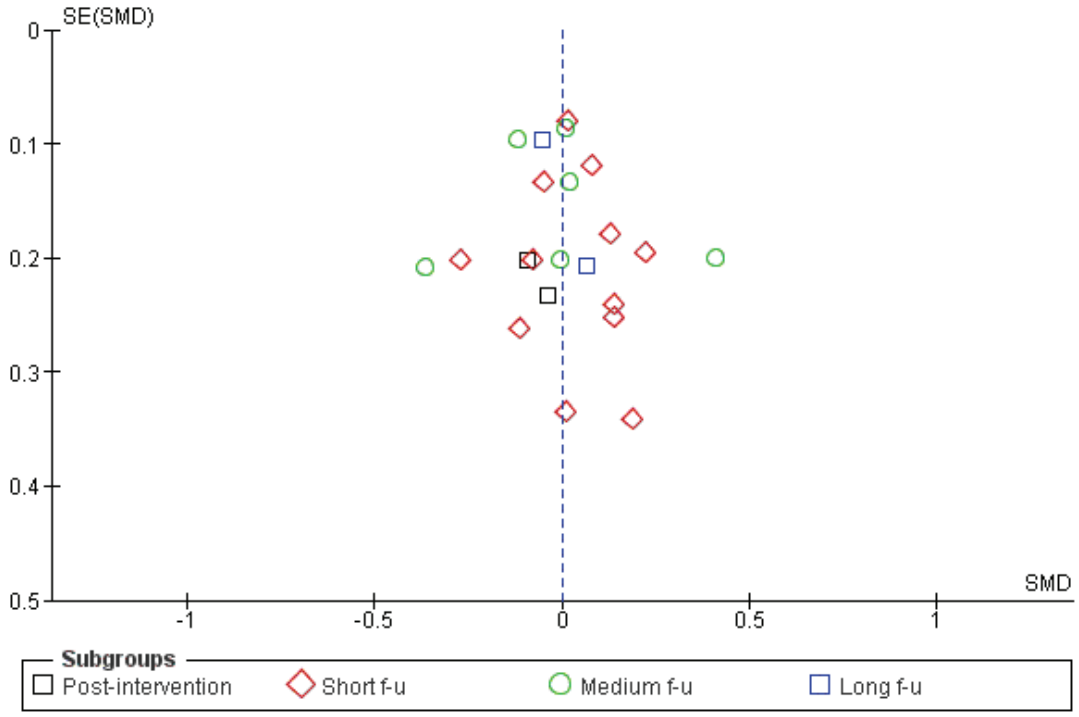
Figure 6. Funnel plot of comparison: 3 MI versus other active intervention, outcome: 3.1 Amount of substance use.



Effects of interventions

See: **Summary of findings for the main comparison** motivational interviewing compared to no treatment control group for substance abuse; **Summary of findings 2** motivational interviewing compared to treatment as usual for substance abuse; **Summary of findings 3** motivational interviewing compared to assessment and feedback for substance abuse; **Summary of findings 4** motivational interviewing compared to other active intervention for substance abuse

Of the 59 included studies, we were able to extract outcome data from 55. For the remaining four studies (Parsons 2009; Rohsenow 2004; Stotts 2001; Thush 2009), the data in the articles were not reported in the form of an effect size and it was not possible to compute one, even after contacting the authors. Two studies (Walitzer 2008; Wood 2007) included two types of comparisons. The substance abuse outcomes were reported as a large number of different outcomes (e.g. drinks per drinking day, number of abstinent days, proportion of participants who were abstinent). Moreover, for each outcome the data were reported in a number of ways (e.g. means and SDs, number of events, p-values, F-values). We entered all the data in *Comprehensive Meta-Analysis 2.0* (Borenstein 2005), which can accept data input in 100 different formats, and converted all outcome data into standardised mean differences. If a study had more than one substance abuse outcome at the same follow-up time or if a study reported the same outcome at more than one follow-up within our follow-up categories, we computed the mean. Finally, the data were entered into RevMan as generic inverse variance data. As a control procedure, we have grouped the outcomes into amount of use, frequency of use, and proportion abstinent. These analyses did not reveal any significant differences between the subgroups, and we do not report the results of meta-analyses.

In the following we have divided comparisons into (1) MI versus no intervention, (2) MI versus treatment as usual, (3) MI versus assessment and feedback, and (4) MI versus other active intervention. Within each comparison we have subgroups according to follow-up time: (a) post-intervention, (b) short follow-up until 6 months, (c) medium follow-up 6-12 months, and (d) long follow-up of 12 or more months.

Comparison 1: MI versus no intervention

There were 24 studies that compared MI with a no-treatment control.

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Primary outcomes

1.1 Extent of substance use:

Post-intervention: Four studies, 202 participants showed that MI did significantly better than the control on reducing the amount of substance use with a standardized mean difference of 0.79 (95% CI 0.48, to 1.09). Heterogeneity was low (I-square: 1%). **Short follow-up:** 15 studies, 2327 participants, showed that MI did significantly better than the control group SMD 0.17 (95% CI 0.09 to 0.26). There was some variability in effect sizes (Chi-squared =18.4, df=14, P=0.19, I-square = 24%), but not exceeding our predetermined criteria for significant heterogeneity. **Medium follow-up:** Twelve studies, 2326 participants, showed a significant difference in favour of MI SMD 0.15 (95% CI 0.04 to 0.25). The results varied somewhat (Chi-squared =14.06, df=11, I-squared = 22%) but again not exceeding our criteria. **Long follow-up:** One study, 363 participants, found no significant differences between the groups SMD 0.06 (95% CI -0.16 to 0.28). *See* Analysis 1.1

Secondary outcomes

1.2 Readiness for change:

Five studies (Analysis 1.2) . There was no significant effect SMD 0.05 (95%CI -0.11 to 0.22), and heterogeneity was moderate with I-square of 48%.

1.3 Retention in treatment:

Five studies considered this outcome, but we could only compute effect sizes for two studies, 427 participants (Analysis 1.3). The effect was not significant SMD 0.26 (95%CI -0.0 to 0.52).

Comparison 2. MI versus treatment as usual (TAU)

Primary outcomes

2.1 Extent of substance use:

en studies considered this outcome . **Post-intervention:** Nine studies, 1495 participants, showed a non-significant effect SMD 0.01 (95% CI -0.09 to 0.11) with an I-squared of 0%. **Short follow-up:** Ten studies, 2102 participants, showed a non-significant effect SMD 0.01 (95% CI-0.08 to 0.10]) with an I-squared of 0%. **Medium follow-up:** Five studies, 890 participants, showed a non-significant effect 0.08 (95% CI -0.05 to 0.21]) with an I-squared of 0%. *See* Analysis 2.1

Secondary outcomes

2.2 Retention in treatment:

Five studies reported retention in treatment, but we were able to compute an effect size for only four of them, 1354 participants (Analysis 2.2). The effects were heterogenous (I-sqared: 64%) and not significant SMD -0.11 (95%CI -0.41 to 0.19]).

Comparison 3. MI versus assessment and feedback

Primary outcomes

3.1 Extent of substance use:

Short follow-up: There were seven studies, 986 participants, that compared MI with a group that was only assessed and/or received feedback with substance abuse outcomes at short follow-up . The overall effect was not significant SMD0.12 (95%CI -0.01, 0.24). The studies were homogenous (I-squared = 0%). **Medium follow-up:** There were two studies, 265 participants, with outcomes at medium follow-up, and the effect was significant in favour of MI SMD0.38 (95%CI 0.10 to 0.66]). I-squared was 0%. *See* (Analysis 3.1)

Secondary outcomes

One study (Bien 1993) reported retention in treatment for a comparison between MI and assessment and feedback. We were not able to compute an effect size. No studies reported readiness to change for this comparison

MI versus other active intervention

Primary outcomes

4.1 Extent of substance use:

There were 13 studies that compared MI with a group that received another active intervention . **Post-intervention:** Two studies, 185 participants, found a non-significant effect SMD-0.07 (95%CI -0.37 to 0.23]) with an I-squared of 0%. **Short follow-up:** 12 studies, 2137 participants, found a non-significant effect SMD 0.02 (95%CI -0.07 to 0.12]) with an I-squared of 0%. **Medium follow-up:** six studies, 1586 participants, showed a non-significant effect SMD-0.02 (95%CI-0.16 to 0.13]) with an I-squared of 41%. **Long follow-up:** Two studies, 437 participants, showed a non-significant effect SMD -0.03 (95%CI -0.21 to 0.14]) with and I-squared of 0%. See (Analysis 4.1)

Secondary outcomes

4.2 Readiness for change:

A meta-analysis of the two studies, 350 participants, on readiness for change showed an SMD of -0.03 with a 95% confidence interval from -0.24 to 0.18 (Analysis 4.2). The results were homogenous (I-squared: 0%). One study (Winhusen 2008) had assessed readiness for change, but we were not able to compute an effect size. No study reported repeat convictions as an outcome.

4.3 Retention in treatment:

Five studies, 447 participants, reported retention in treatment (Analysis 4.3). The effect was not significant SMD 0.01 (95%CI -0.45 to 0.47). I-squared was 73%.

Subgroup analyses

We did not perform any subgroup analyses because no meta-analysis was significantly heterogeneous.

Sensitivity analyses

We did not perform any sensitivity analyses because no meta-analysis was significantly heterogeneous.

Grading of the evidence

The summary of findings tables 1-4 (Summary of findings for the main comparison, Summary of findings 2, Summary of findings 3, Summary of findings 4) show that the evidence was mostly of low quality. A few of the comparisons were of moderate quality. The downgrading of the evidence was undertaken because of risk

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of bias in the design of the studies. The randomisation was unclear in many studies. Lack of blinding of participants, providers, and outcome assessors could have caused bias, especially for the non-physiological outcomes. There was also some uncertainty regarding incomplete outcome reporting, selective reporting, and other possible bias. Apart from the problems with risk of bias, the consistency, precision, and directness were not downgraded. There were no large effects. Dose-response gradients or plausible confounders were not discernable.

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ADDITIONAL SUMMARY OF FINDINGS *[Explanation]*

motivational interviewing compared to treatment as usual for substance abuse

Patient or population: patients with substance abuse
Settings:
Intervention: motivational interviewing
Comparison: treatment as usual

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	treatment as usual	motivational interviewing				
amount of substance abuse post intervention		The mean amount of substance abuse post intervention in the intervention groups was **0.01 standard deviations higher** (0.09 lower to 0.11 higher)		1940 (9 studies)	⊕⊕⊕○ **moderate**[1]	
amount of substance abuse short follow-up Follow-up: 1-6 months		The mean amount of substance abuse short follow-up in the intervention groups was **0.01 standard deviations higher** (0.08 lower to 0.1 higher)		2102 (10 studies)	⊕⊕⊕○ **moderate**[1]	

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amount of substance abuse medium follwo-up Follow-up: median 12 months		The mean amount of substance abuse medium follwo-up in the intervention groups was **0.08 standard deviations higher** (0.05 lower to 0.21 higher)	890 (5 studies)	⊕⊕○○ **low**[1]
Retention Follow-up: 0-12 months		The mean Retention in the intervention groups was **0.11 standard deviations lower** (0.41 lower to 0.19 higher)	1190 (4 studies)	⊕○○○ **very low**[2,3,4]

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Unclear randomisation and blinding of assessor. Unclear completeness of outcome reporting.
[2] Unclear allocation concealment and incomplete outcome data.
[3] I-squared = 64%.
[4] Wide confidence interval.

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motivational interviewing compared to assessment and feedback for substance abuse

Patient or population: patients with substance abuse
Settings:
Intervention: motivational interviewing
Comparison: assessment and feedback

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	assessment and feedback	motivational interviewing				
amount of substance abuse short follow-up Follow-up: 1-6 months		The mean amount of substance abuse short follow-up in the intervention groups was **0.12 standard deviations higher** (0.01 lower to 0.24 higher)		986 (7 studies)	⊕⊕○○ **low**[1,2]	
amount of substance abuse medium follow-up Follow-up: 7-12 months		The mean amount of substance abuse medium follow-up in the intervention groups was **0.38 standard deviations higher** (0.1 to 0.66 higher)		265 (2 studies)	⊕⊕○○ **low**[1,2]	

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval;

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GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Unclear randomisation and blinding of outcome assessor.
[2] Unclear whether outcome reporting is complete.

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motivational interviewing compared to other active intervention for substance abuse

Patient or population: patients with substance abuse
Settings:
Intervention: motivational interviewing
Comparison: other active intervention

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	other active intervention	motivational interviewing				
amount of substance abuse post intervention		The mean amount of substance abuse post intervention in the intervention groups was **0.07 standard deviations lower** (0.37 lower to 0.23 higher)		185 (2 studies)	⊕⊕○○ **low**[1]	
amount of substance abuse short follow-up Follow-up: 1-6 months		The mean amount of substance abuse short follow-up in the intervention groups was **0.02 standard deviations higher** (0.07 lower to 0.12 higher)		2137 (12 studies)	⊕⊕⊕○ **moderate**[2]	

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amount of substance abuse medium follow-up Follow-up: 6-12 months		The mean amount of substance abuse medium follow-up in the intervention groups was **0.02 standard deviations lower** (0.16 lower to 0.13 higher)	1586 (6 studies)	⊕⊕⊕○ **moderate**[2]
amount of substance abuse long follow-up Follow-up: median 12 months		The mean amount of substance abuse long follow-up in the intervention groups was **0.03 standard deviations lower** (0.21 lower to 0.14 higher)	437 (2 studies)	⊕⊕○○ **low**[1,2]
Retention Follow-up: 0-6 months		The mean Retention in the intervention groups was **0.01 standard deviations higher** (0.45 lower to 0.47 higher)	447 (5 studies)	⊕⊕○○ **low**[2,3,4]
Readiness for change		The mean Readiness for change in the intervention groups was **0.03 standard deviations lower** (0.24 lower to 0.18 higher)	350 (2 studies)	⊕⊕○○ **low**[1,5]

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval;

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GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Unclear randomisation and blinding of assessor.
[2] Unclear randomisation.
[3] I-squared = 29%.
[4] Wide confidence interval.
[5] Wide confidence interval.

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DISCUSSION

Summary of main results

Extent of substance abuse

The main finding of this review is that compared to a no treatment control MI has shown a significant effect on extent of substance abuse. The effect was strongest at post-intervention SMD 0.79 (95%CI 0.48 to 1.09) and weaker at short follow-up SMD0.17 (95%CI 0.09 to 0.26]), and medium follow-up SMD 0.15 (95%CI 0.04 to 0.25]). For long follow-up, the effect was not significant SMD 0.06 (95%CI -0.16 to 0.28).

MI did better than assessment and feedback for medium follow-up regarding extent of substance abuse SMD 0.38 (95%CI0.10, 0.66]). For short follow-up, there was no significant effect of MI SMD 0.12 (95% CI -0.01 to 0.24]). We found no data on the effect of MI vs assessment and feedback for post-treatment or for follow-up times longer than 12 months.

There was no significant difference between MI and other active intervention at any follow-up time on extent of substance abuse. Neither was there a difference between MI and treatment as usual.

Type of substance and level of substance use

We were interested in studying whether MI is more effective in treating abuse of one type of substance (e. g. alcohol) versus other types of substances (e.g. cocaine), but there were not enough studies to perform such comparisons. We also wanted to summarize possibly different effects of MI on severe abuse versus less severe abuse, but we were not able to assess severity across studies from the available information reported in the included articles.

Secondary outcomes

There were not enough data to conclude about the effects of MI on retention in treatment, readiness to change, or repeat convictions.

Overall completeness and applicability of evidence

We believe that we have obtained most of the existing evidence from randomised controlled trials on the effects of motivational interviewing on substance abuse published through 2010. The research field is highly active with new randomised studies being published almost monthly. Because of this, it is difficult for this Cochrane review to be up to date all the time. The web site motivationalinterview.org is a continuous source of information about new publications, and the Motivational Interviewing Network of Trainers (MINT) is an addition to electronic literature searches. A more serious problem is that the trials mostly try to measure specific effects of MI. Among both clinicians and researchers, there seems to be a tacit overemphasis on the importance of treatment method and less focus on the impact of the individual who delivers the treatment (therapist) and who receives it (the patient). By the same token, some studies may have failed to pay sufficient attention to whether the patient and/or therapist is positive towards the treatment and whether they like and respect each other. We believe that MI certainly has large nonspecific effects, which may be much larger than the specific ones (Walach 2001).

Quality of the evidence

We strived to include only evidence from high-quality randomised controlled trials with integrity checks. Nevertheless, there are some inherent problems with research in this field. One possible source of bias is that it is impossible to blind therapists to treatment condition. And it is almost impossible to blind the patients.

Potential biases in the review process

There may not always be good correspondence between the methodological quality of a study and the quality of reporting of the study. Most scientific journals have strict word limits on articles, so authors of papers may have been unable to report important information about the study. We have applied stringent criteria when grading the evidence. Other reviewers might have reached other conclusions about the strength of evidence, but we have aimed for being explicit and transparent regarding the judgements leading to our decisions.

Agreements and disagreements with other studies or reviews

We found a moderate effect size for comparisons between MI and no intervention, while there were no differences between MI and other active treatments. This has also previously been reported by Burke (Burke 2003; Burke 2004). Similarly, our range of effect sizes are compatible with Dunn et al's (Dunn 2001) range of effect sizes. Dunn also found that most comparisons between MI and a no-treatment control favoured MI. The meta-analysis by Lundahl et al (Lundahl 2010) reported an effect size of g=0.28 for MI against weak comparison groups, similar to our findings. Lundahl found g=0.09 for comparisons with other active interventions, which is also close to what we have found. In common with us, Hettema et al (Hettema 2005) reported a large variation in effect sizes across studies.

Motivational interviewing is a brief intervention. With only one to four sessions, one should not expect too much regarding changes in drug abuse outcomes. Nevertheless, results from randomised controlled trials have shown that MI compared to no intervention or minimal intervention can significantly reduce drug and alcohol consumption. When MI is compared to other interventions such as giving feedback on assessments or other types of psychotherapy, MI has not shown any superiority (or inferiority). This is probably because MI shares with these other interventions a number of nonspecific therapeutic factors such as attention and therapeutic

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alliance. These factors may have a much greater influence on outcome than the contribution made by approach-specific theory and technique; in Lambert's (Lambert 1986) review of empirical studies, common therapeutic factors accounted for 30% of the therapeutic effect, technique 15%, expectancy (placebo-effect) 15% and spontaneous remission 40%.

AUTHORS' CONCLUSIONS

Implications for practice

Motivational interviewing is a brief intervention, typically lasting for 1-4 sessions. If therapists are comfortable with this style of working with clients they should feel confident that providing MI will be more effective than doing nothing. But if they for instance prefer giving cognitive behavior therapy (CBT), the evidence (of low to moderate quality) is too weak to conclude that CBT will be more effective, equally effective or less effective than MI.

Implications for research

This is a field where there is no lack of randomised controlled trials. Perhaps it is time to move from only studying **whether** MI works to also studying **how** it works, that is to study the mechanisms behind MI. Apodaca and Longabaugh (Apodaca 2009) have e.g. published a review in which they collected empirical data from various parts of the causal chain in a model that they developed.

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* *Indicates the major publication for the study*

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Anton 2005

Methods	RCT.
Participants	160 outpatient alcoholics from the USA.
Interventions	1. naltrexone + MET (n= 41) 2. placebo + MET (n= 39) 3. naltrexone + CBT (n= 39) 4. placebo + CBT (n= 41)
Outcomes	**Physiological primary:** Blood GGT, CDT, urine drug screen. **Non-physiological primary:** Number relapsed, drinks per drinking day, percent abstinent. **Secondary:** None.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Subjects were randomly assigned to 1 of 4 treatment conditions".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	15% attrition at 12 weeks post-treatment. Balanced across conditions. Reasons addressed. ITT performed. "All outcome analyses were conducted under an intent-to-treat analysis plan on all subjects who had at least 1 postrandomization outcome measurement."
Selective reporting (reporting bias)	Unclear risk	The published report included all expected outcomes based on the stated hypotheses.

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Anton 2005 (*Continued*)

Other bias	Low risk	Used collateral and biological measurement to corroborate self-reports of substance use. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Ball 2007a

Methods	RCT.
Participants	Community sample of 98 non-dependent heavy drinking adults from the USA.
Interventions	1. brief MET (n= 34) 2. brief coping skills (n= 35) 3. wait-list control (n= 29)
Outcomes	**Physiological primary:** Alcohol breath testing. **Non-physiological primary:** Frequency of days drinking, amount of drinks per drinking day. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...participants were randomised to a 3-week waiting list control (WLC) group or one of two manual-guided brief interventions."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding. The non-blinding may have caused bias regarding the interviews, but the hand-held computer assessment is unlikely to have caused bias.
Incomplete outcome data (attrition bias) All outcomes	Low risk	7% attrition at 3 weeks post-treatment. Balanced across conditions. Used ITT and the non-completers were all accounted for.
Selective reporting (reporting bias)	Unclear risk	The published report included all expected outcomes based on the stated hypotheses.

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Ball 2007a (*Continued*)

Other bias	Low risk	Alcohol breath testing used as check of self-report. Differences between groups at baseline were not reported. No additional sources of bias appear to be present.

Ball 2007b

Methods	Multisite RCT (5 sites).
Participants	461 outpatients from five outpatient substance abuse programs in the USA.
Interventions	MET (n= 216) vs. counselling as usual (n= 245).
Outcomes	**Physiological primary:** Urinary drug analysis. **Non-physiological primary:** Days per week of primary substance use. **Secondary:** Retention in treatment (days enrolled at treatment program, % enrolled at program at 4-month follow-up).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"The randomisation used a computerized program...This program involved a process of urn allocation".
Allocation concealment (selection bias)	Unclear risk	"The randomisation used a computerized program that was managed by off-site personnel, but accessed locally by a research staff who communicated the assigned therapy condition".
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	32% attrition at 8 weeks post-treatment. 32% attrition at 16 weeks post-treatment. "There were no significant differences between therapy conditions or Therapy condition x Program Site interactions in the rates of follow-up or in the presence or frequency of missing data points." Reasons for loss-to-follow-up are not stated. The researchers performed an intention-to-treat analysis.

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Ball 2007b (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	High risk	Time spent in training was not balanced across conditions. Some contamination of therapy conditions may have occurred. Differences between groups at baseline were not reported.

Barnett 2007

Methods	RCT.
Participants	225 US college students referred to attend alcohol education following an alcohol-related incident.
Interventions	Brief MI (n= 112) vs. computer-delivered education (Alcohol 101 CD ROM, [n=113]) .
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of drinking days, number of heavy drinking days, average number of drinks per drinking day, average estimated BAC, alcohol problems. **Secondary:** Motivation to change alcohol use (Contemplation Ladder).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Random numbers table.
Allocation concealment (selection bias)	Unclear risk	"The counsellor opened an envelope containing the baseline condition assignment, prepared by the project coordinator". It remains unclear whether envelopes were sequentially numbered, opaque and sealed.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"A research assistant who was blind to intervention condition conducted the 3- and12-month follow-up assessments in person, or by phone and mail..."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	5% attrition at 3 months follow-up and 6% attrition at 12 months follow-up with no differences between conditions. Reasons for missing data not stated. ITT not performed.

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Barnett 2007 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. There were no differences between groups at baseline.

Bazargan-Hejazi 2005

Methods	Quasi-RCT.
Participants	295 emergency department patients 18 years or older who screened positive for at-risk drinking. USA.
Interventions	Brief MI + booster telephone call at 10 days post enrolment (n = 144) vs usual care (n= 151).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinks per drinking day, more than 6 drinks per occasion at least weekly, and AUDIT score. **Secondary:** None. Follow-up was 3 months after enrolment.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	"Each of the 3 health promotion advocates performed random allocation for their own enrollees, assigning the first participant by a flip of a coin, and alternating status thereafter."
Allocation concealment (selection bias)	High risk	"Each of the 3 health promotion advocates performed random allocation for their own enrollees, assigning the first participant by a flip of a coin, and alternating status thereafter."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"To guard against interviewer bias and to ensure that health promotion advocates were blinded to the patients' randomization allocation for the 3-month follow-up assessments, enrollees were not followed up by the same health promotion advocate who assessed them initially. Patients were notified not to reveal their group assignment to any project staff at any time."

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Bazargan-Hejazi 2005 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	37% attrition at the 3 month follow-up, balanced between groups. Reasons for attrition explained. ITT was not performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	High risk	Only self-reported outcomes. The intervention group had a higher rate of drug use and lower mean age at baseline.

Bell 2007

Methods	RCT.
Participants	60 veterans enrolled in substance abuse treatment at the New Mexico Veterans Affairs Health Care System, USA.
Interventions	MI + TAU (n=40) vs TAU (n=20).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinks per day, number of drinking days, percent within safe drinking limits, substance use per day, and number of substance use days. **Secondary:** None. Follow-up was at 2 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Participants were assigned to condition by a computerized urn randomisation program which balanced for distribution to the groups by the following factors: age, education, presence or absence of history of head injury with loss of consciousness, gender, and enrolment (yes/no) in the six standard treatments..."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.

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Bell 2007 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	22% were lost to follow-up at 2 months. Not ITT. Reasons for loss to follow-up stated, but reasons for removal were that they were disqualified because of lack of baseline drinking (n=7). Loss was balanced.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	High risk	Only self-reported outcomes. More females received MI.

Bernstein 2009

Methods	Pilot RCT.
Participants	210 patients aged 14-21 years in an urban, academic paediatric emergency department. USA.
Interventions	Brief MI (n = 68) vs assessed control (n=71) vs non assessed control (n = 71).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Marijuana consumption including a 30-day self-report of marijuana use, attempts to quit, cut back, or change conditions of use, and risk factor questions repeated at follow-up. **Secondary:** None. Follow-up was at 12 months.
Notes	We do not report data on the non assessed control because baseline data on this group were not reported.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Randomization was based on computer-generated random numbers in blocks of 100 stratified by age group (14-17 and 18-21 years)."
Allocation concealment (selection bias)	Low risk	"A double opaque envelope system enabled blinding of the research assistants who performed the assessment to randomisation status. The first envelope, with randomisation to assessed (Int, AC) or non assessed (NAC) status, was opened immediately after enrolment. A second envelope indicating Int or AC status was not opened until after assessment."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.

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Bernstein 2009 (*Continued*)

Blinding (performance bias and detection bias) Assessors	Low risk	"Participants were cautioned not to reveal to the research assistants at the time of follow-up whether or not they had received any further testing after enrolment"
Incomplete outcome data (attrition bias) All outcomes	High risk	30% lost to follow-up at 3 months in the assessed groups, not balanced between groups. 29% lost to follow-up at twelve months across all groups, not balanced across groups. Reasons for loss not stated. Not ITT, but worst-case scenario analysis.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	High risk	Only self-reported outcomes. The intervention group used marijuana on more days per month than the AC group at baseline.

Bien 1993

Methods	RCT.
Participants	32 US outpatients from VA outpatient substance abuse treatment program.
Interventions	Brief MI + standard outpatient treatment (n= 16) vs. attention placebo interview + standard outpatient treatment (n= 16).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** SEC (standard drink units), BAL, percent days abstinent. **Secondary:** VA treatment attendance.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...half were assigned at random to receive a motivational interview, while the rest served as a control group."
Allocation concealment (selection bias)	Unclear risk	"...the experimenter opened a sealed envelope..." It is not stated whether the envelopes were sequentially numbered or opaque.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Low risk	Assessors "were kept blind to group assignment".

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Bien 1993 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	19% attrition at 6 months follow-up, balanced between groups. Reasons for attrition explained. Unclear whether ITT was performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Low risk	Collateral report as check of self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Borsari 2005

Methods	Multisite RCT (2 sites).
Participants	64 US students mandated to a substance use prevention program.
Interventions	Brief MI (n= 34) vs. alcohol education session (n= 30).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinks per week, binge drinking episodes, typical BAC, peak BAC, RAPI. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Randomly assigned".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	11% loss-to-follow-up after 3 months and 25% lost to follow-up after 6 months. Balance in numbers not stated. Reasons for missing data not stated. ITT not performed.

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Borsari 2005 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Collateral report as check of self-report. There were baseline differences in AUDIT, typical BAC, and number of drinks per week.

Brown 2010

Methods	RCT.
Participants	184 men and women who had been driving while impaired (DWI) with drinking problems, who were recidivists, and who were not currently engaged in DWI interventions. Canada.
Interventions	Brief MI (n= 92) vs. information-advice (n= 92).
Outcomes	**Physiological primary:** Biomarkers of alcohol abuse (GGT, AST, ALT, MCV) by blood assay. **Non-physiological primary:** Alcohol abuse-related behaviours (percent risky drinking days) using the MMPI-Mac Scale. **Secondary:** Subsequent substance abuse treatment service utilization (data not reported) . Readiness to change.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computerized urn randomisation.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding (performance bias and detection bias) Patients and providers	Low risk	"Participants, interviewers who administered the baseline and follow-up assessments, the statistician who conducted the initial analyses to test the main hypotheses, and investigators were blind to participant assignment."
Blinding (performance bias and detection bias) Assessors	Low risk	"Participants, interviewers who administered the baseline and follow-up assessments, the statistician who conducted the initial analyses to test the main hypotheses, and investigators were blind to participant assignment."

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Brown 2010 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	7% were lost after randomisation and intervention. They were excluded from further analyses (not intention to treat). No reasons for attrition. A further 6% were lost and data were estimated.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Low risk	Threat of invalidity in self-report was addressed by corroboration from bio markers and measurement of social desirability in response styles. There were no differences between groups at baseline.

Carey 2006

Methods	RCT.
Participants	509 US heavy drinking students.
Interventions	1. Timeline Follow-Back control (n= 89) 2. TLFB basic MI (n= 87) 3. TLFB enhanced MI (n= 86) 4. control (n= 81) 5. basic BMI (n= 85) 6. enhanced BMI (n= 81).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinks per week, drinking per drinking day, heavy drinking frequency, peak BAC, RAPI score. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Assigned randomly".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.

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Carey 2006 (*Continued*)

Blinding (performance bias and detection bias) Assessors	High risk	Assessors "were not blind to condition."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	3% lost to follow-up at one month, 23% at 6 months and 22% at 12 months. Balanced across conditions. Reasons for missing data addressed but not detailed. Unclear whether ITT was used.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Low risk	Collateral report as check of self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Carroll 2006a

Methods	Multisite RCT (5 sites).
Participants	423 US substance users entering outpatient treatment in five community-based treatment settings.
Interventions	MI + standard intake evaluation (n= 173) vs standard intake evaluation (n= 178).
Outcomes	**Physiological primary:** Urine test + breath test. **Non-physiological primary:** Days of use of primary substance. **Secondary:** Readiness for change (URICA [data not reported]). Retention in treatment (percent retained at site, number of sessions completed).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"...participants were randomised to condition (MI or standard evaluation) using an urn randomisation."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.

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Carroll 2006a (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	24% attrition at one month, 27% attrition at 3 months balanced by condition. No reasons for attrition reported. ITT not done.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Urine and breath samples to check on self-report. Time spent in training was not balanced across conditions, and clinicians assigned to MI received more training and supervision. There were no differences between groups at baseline.

Carroll 2006b

Methods	RCT.
Participants	136 US marijuana-dependent young adults referred by the criminal justice system.
Interventions	1. MET/contingency management (n= 33) 2. drug counselling/contingency management (n= 34) 3. MET (n= 35) 4. drug counselling (n= 33).
Outcomes	**Physiological primary:** Marijuana positive urine specimens (%). **Non-physiological primary:** Days of marijuana use (%), longest duration of continuous abstinence, **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...were randomised to one of the four treatment conditions"
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.

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Carroll 2006b (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	38% attrition at 3 months and 21% attrition at 6 months. Imbalance between groups. Reasons for missing data not stated. ITT was performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Low risk	Urine toxicology screens and breath samples to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Carroll 2009

Methods	Multisite RCT (5 sites) in the USA.
Participants	436 Hispanic substance abusers from the USA.
Interventions	MET (n = 214) vs counselling as usual (n =222).
Outcomes	**Physiological primary:** Percent positive urine specimens. **Non-physiological primary:** Days of substance use by week, percent days abstinent from alcohol. **Secondary:** Treatment retention (days enrolled in treatment at community treatment program through week 16).
Notes	The design paralleled that of Ball 2007b.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn allocation.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.

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Carroll 2009 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	28 % lost to follow-up. Reasons for attrition not described but similar between groups. Not ITT even though they reported an intention to treat sample.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences at baseline were not reported.

Chanut 2007

Methods	Pilot RCT.
Participants	51 offenders convicted of driving under the influence (DUI). Canada.
Interventions	MI (n = 24) vs psycho-education (n =27).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Heavy drinking days (>6 units/day) and AUDIT. **Secondary:** Service utilization. Follow-ups were at 3 months and 6 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn randomisation ("Un protocole de randomisation par urnes assisté par ordinateur (Project MATCH Research Group, 1993) a été utilisé pour assigner les participants à l'une des deux conditions.").
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Attrition was 22% at 3 months and 29% at 6 months. Balanced across groups. Reasons for loss to follow-up not reported. Use of

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Chanut 2007 (*Continued*)

		ITT was reported but it is unclear whether all reported analyses used ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Used collaterals to verify self-report. There were baseline differences in days of hazardous drinking and the Drug Abuse Screening Test.

Connors 2002

Methods	RCT.
Participants	126 US clients entering outpatient alcoholism treatment.
Interventions	MI (n =40) vs Role induction (n = 37) vs non-preparatory session control group (n = 36).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Abstinent days, heavy drinking days. **Secondary:** Retention in treatment (therapy session attendance).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Clients were randomly assigned to one of three preparatory intervention conditions".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	13 (10%) did not provide Timeline Follow-Back Interview data at the 12 month point. Of these 13, 12 actively withdrew from the study or ceased cooperation with follow-up efforts and 1 moved and could not be located. We do not know the attrition for the post-treatment and the 3, 6, and 9 month follow-ups. Balance between conditions was not stated and ITT was not

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Connors 2002 (*Continued*)

		performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	Low risk	Collateral report to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Copeland 2001

Methods	RCT.
Participants	229 Australian cannabis users.
Interventions	1. 6-session CBT (including elements of MI) (n= 78) 2. 1-session CBT (including elements of MI) (n= 82) 3. delayed treatment control group (n= 69).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Daily amount of cannabis use in last month, cannabis dependence, proportion of cannabis related problems. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...randomised to one of three conditions".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Low risk	"...follow-up was conducted by an independent researcher "blind" to the subject's treatment allocation."
Incomplete outcome data (attrition bias) All outcomes	High risk	26% attrition at a median of 237 days follow-up (individual follow-up durations, range: 102-553 days). Drop out was balanced across groups. No reasons for drop-out were stated. "Analyses were conducted on an intention-to-treat basis." A best-case scenario was reported.

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Copeland 2001 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	High risk	17% had sought assistance to moderate their use in the time between their participation in this study and follow-up. They used urinalysis of cannabinoid levels as a validation of self-reported cannabis use. Differences between groups at baseline were not reported.

D'Amico 2008

Methods	Pilot RCT.
Participants	64 high-risk teens in a primary care clinic that provides health care for underserved populations. USA.
Interventions	15 minutes of MI (n = 38) or usual care (n =26).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of days last month drank alcohol. Number of times used marijuana on days used. Number of alcoholic drinks consumed on days drinking. Number of days consumed more than 3 drinks. Number of days used marijuana. **Secondary:** None.
Notes	Project CHAT.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Insufficient information to permit judgement.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	Mailed questionnaire used for follow up.
Incomplete outcome data (attrition bias) All outcomes	High risk	34% of those randomised did not complete the final survey (unequal numbers). 8 participants did not want to participate, but the rest could not be reached. No ITT.

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D'Amico 2008 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not reported.

De Wildt 2002

Methods	Multisite RCT (14 sites).
Participants	248 Dutch patients meeting DSM-IV criteria for alcohol dependence or abuse.
Interventions	1. Acamprosate + MET (n= 86) 2. Acamprosate + CBT (n= 78) 3. Acamprosate (n= 77).
Outcomes	**Physiological primary:** GGT. **Non-physiological primary:** Number abstinent, number relapsed, time to first relapse, number of abstinent days, rate of continuous abstinence. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Sealed envelope randomisation with balancing by blocks of 15 was used to obtain equal numbers of patients per treatment group from each centre."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	30% attrition at 6 months follow-up. Balanced drop-out and reasons for drop-out stated. ITT completed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.

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De Wildt 2002 (*Continued*)

Other bias	High risk	23% of patients consulted some other professional for alcohol-related problems during the treatment. Blood samples were drawn to check on self-report. There were no differences between groups at baseline.

Emmen 2005

Methods	RCT.
Participants	123 Dutch patients who visited an outpatient clinic for problem drinking.
Interventions	Dutch version of Drinker's Checkup (n= 61) vs care as usual (n= 62).
Outcomes	**Physiological primary:** Serum carbohydrate-deficient transferrin. **Non-physiological primary:** Units per day in previous six months. **Secondary:** Motivation to change.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"...balanced block randomisation. The main researcher (M.J.E) used sealed envelopes to generate the allocation sequence."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Not blinded, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	9% lost-to-follow-up at 6 months. Balanced drop-out. Reasons stated. ITT performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Serum carbohydrate-deficient transferrin (CDT) was measured (biological data). There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Feldstein 2007

Methods	RCT.
Participants	55 US under aged heavy drinkers.
Interventions	1 session MI (n= 40) vs no treatment control (n= 15).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Binge drinking last 2 weeks, RAPI. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Used a random number list.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"Undergraduate assistants blind to the randomization collected participant data at the follow-up."
Incomplete outcome data (attrition bias) All outcomes	Low risk	7% lost-to-follow-up at 2 months, balanced across groups. Reasons stated. Not ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not reported.

Freyer-Adam 2008

Methods	Quasi-RCT.
Participants	595 general hospital patients. 25% were alcohol abusers, 57% at -risk drinkers, and 18% heavy episodic drinkers. Germany.
Interventions	1. MI by liaison service (n= 249) 2. MI by hospital physicians (n= 121) 3.TAU (n= 225).

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Freyer-Adam 2008 (*Continued*)

Outcomes	**Physiological primary:** None. **Non-physiological primary:** Gram alcohol per day, gram alcohol past week. **Secondary:** Readiness to change drinking.
Notes	It was not possible to monitor the fidelity of the intervention in physician arm.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	"...randomisation was conducted by time-frame, based on the date of admission."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	High risk	"...the staff was not blind to the study group to which the participants had been assigned."
Incomplete outcome data (attrition bias) All outcomes	High risk	29% lost to follow-up at 12 months, not balanced, reasons provided. Not ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	High risk	Only self-reported outcomes. Because staff became more experienced over time, they might have recruited different patients in the first period when they recruited the controls than in the later period when they recruited to the intervention groups. There were differences between groups at baseline on satisfaction with health, age, and having an intimate partner.

Kadden 2007

Methods	RCT (dismantling design).
Participants	240 adult marijuana smokers meeting DSM-IV criteria for cannabis dependence. USA.
Interventions	9 weeks of one of four conditions: 1. case management control condition (n= 62) 2. MET/CBT coping skills training (n= 61) 3. contingency management (n= 54) 4. MET/CBT + Contingency management (n= 63).

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Kadden 2007 (*Continued*)

Outcomes	**Physiological primary:** None. **Non-physiological primary:** Total 90-day continuous abstinence. Proportion of days abstinent. **Secondary:** Readiness to change (Readiness to Change Questionnaire). Follow-up was at 2 months posttreatment.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerized urn randomisation.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Unclear risk	Insufficient information to tell if assessor was blinded, but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	17% lost to follow-up with reasons stated. Different attrition across groups. No ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	Low risk	Urine samples were collected to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Kahler 2004

Methods	RCT.
Participants	48 US patients undergoing inpatient detoxification for alcohol dependence.
Interventions	MET for 12-step involvement (n= 24) vs brief advice to attend AA (n= 24).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Percent of days abstinent, drinks per drinking day. **Secondary:** AA/NA attendance and involvement.

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Kahler 2004 (*Continued*)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Eight cohorts of 6 participants were run to obtain the desired sample with treatment conditions for each cohort determined randomly."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"RAs (research assistants) were blind to treatment assignment of individuals and cohorts."
Incomplete outcome data (attrition bias) All outcomes	Low risk	48 were randomised. Attrition was 4%, 4%, 6%, 6%, 12%, and 12% at 1,2,3,4,5, and 6 months follow-up, respectively. No reasons for insufficient data reported. No ITT performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Collateral reports were used. However, because the two treatments were of different length, it is not possible to determine whether treatment intensity rather than treatment content caused the observed effects. There were no differences between groups at baseline.

Kavanagh 2004

Methods	RCT.
Participants	25 Australian inpatients with current misuse of non-opioid drugs.
Interventions	Start Over and Survive (n= 13) vs standard care (n= 12).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Abstinent or improved on all substances. **Secondary:** None.
Notes	

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Kavanagh 2004 (*Continued*)

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"...participants were allocated randomly to conditions using a separate table of random permutations for each site."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"The final assessment was undertaken by research staff who were blind to treatment conditions."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Attrition was 4% at 6 months and 32% at 12 months. Balanced. We do not know the attrition at 6 weeks and 3 months. Reasons for loss were not reported. ITT was performed.
Selective reporting (reporting bias)	High risk	Not separate results for AUDIT, Severity of Dependence Scale and the Drug Check. Results for number abstinent and number improved were collapsed.
Other bias	High risk	Only self-reported outcomes. Groups were significantly different at baseline. Because there was no contact control it is possible that the positive results were due to contact alone. Participants in the Start Over and Survive group had longer length of stay and less confidence in controlling substance abuse, and were living with fewer family members than participants in the standard care group at baseline.

Kay-Lambkin 2009

Methods	RCT
Participants	97 Australian people with comorbid major depression and alcohol/cannabis misuse.
Interventions	Brief intervention for depressive symptoms followed by randomisation into 3 different groups: 1. therapist-delivered MI/CBT (n= 35) 2. computer-delivered MI/CBT (n= 32) 3. no further treatment (n= 30)
Outcomes	Alcohol/cannabis use and hazardous substance use index scores measured at baseline, and 3, 6 and 12 months post-baseline assessment using the Opiate Treatment Index

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Kay-Lambkin 2009 (*Continued*)

	(OTI) and the SCID-RV.	
Notes	In one condition, MI/CBT was delivered by computer (not considered in this review) . Intervention is called SHADE therapy (Self-Help for Alcohol and other drug use and Depression).	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"A permuted block randomisation approach was used so that the distribution of participants across treatment conditions could be maintained regardless of the final sample size."
Allocation concealment (selection bias)	Low risk	"Treatment allocations were transferred from this list by an administrative assistant and concealed in individual envelopes labelled with the relevant participant code. Neither of these processes was conducted by personnel involved with the assessment or treatment phases of the study. Prior to the BI session, the research clinicians were issued with a new randomisation envelope by the administrative assistant, which displayed the participant number on the outside of the envelope with the treatment allocation sealed inside. The envelope was opened by the participant at the conclusion of the BI session."
Blinding (performance bias and detection bias) Patients and providers	High risk	Patients and providers were not blinded.
Blinding (performance bias and detection bias) Assessors	Low risk	"At the conclusion of the treatment period all participants, regardless of treatment completion, met with an independent research clinician, blind to treatment allocation, to complete follow-up assessments."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition was 16% at 3 months follow-up, 19% at 6 months, and 16% at 12 months. Reasons provided. Not stated whether attrition was balanced. ITT was performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not fully reported. Age and gender were similar. No additional sources of bias appear to be present.

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Kelly 2000

Methods	RCT.	
Participants	32 Australian women with alcohol and marital problems.	
Interventions	Alcohol focused treatment (including MI, CBT strategies and relapse prevention) (n= 16) vs 1 month waiting list control group (n= 16).	
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Standard drinks per drinking day. **Secondary:** None.	
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...assigned randomly."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	28% attrition at 1 month, 31% attrition at 6 months, and 38% attrition at the 12 months follow-up. Balanced across groups. Not clear whether ITT was performed. Reasons for loss not reported.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Collateral report to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Maisto 2001

Methods	Multisite RCT (12 sites).
Participants	301 hazardous alcohol using elderly US patients who presented for treatment at a primary care clinic.
Interventions	1. MET (n= 101) 2. brief advice (n= 100) 3. standard care (n= 100).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Days abstinent, number of drinks, drinks per drinking day, days 1-6 drinks. **Secondary:** Readiness to change (Stages of Change Readiness and Treatment Eagerness Scale [SOCRATES]). Data not reported. Follow-up at 1,3,6,9, and 12 months.
Notes	We do not have follow-up data on 1, 3, and 9 months.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Random numbers table.
Allocation concealment (selection bias)	Low risk	"The schedule was kept in an envelope in a locked drawer and was used only by the project coordinator."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition was 5%, 8%, 14%, 15%, and 17% at 1 month, 3 months, 6 months, 9 months, and 12 months, respectively. Reasons for loss not reported. We don't know if loss was balanced across groups. No ITT reported.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Collateral reports were used to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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MarijuanaTP 2004

Methods	Multisite RCT (3 sites).
Participants	450 US cannabis dependent adults.
Interventions	1. 2 session MET (n= 146) 2. 9 session MET (n= 156) 3 4 month delayed treatment (n= 148).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Percent of days smoking, periods smoked per day, joints per day, dependence symptoms, abuse symptoms, marijuana problems. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn randomisation.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Unclear risk	"Research assistants were not blinded to the participants' experimental conditions." But the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up at 4 months, 9 months and 15 months were 11%, 13% and 17%, respectively. Balanced. No reasons for loss reported. ITT performed (analysis of missing cases using baseline values.)
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Collateral interviews and urine specimens to check on self-report. Numbers of sessions were confounded with differential content and process. Different expectancies of success were created by the differences in treatment length. There were no differences between groups at baseline.

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Marsden 2006

Methods	Multisite RCT (5 sites).
Participants	342 UK adolescent and young adult stimulant users.
Interventions	BMI (n= 166) vs written health risk information (n= 176).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Ecstasy number of days, ecstasy tablets, cocaine powder number of days, cocaine g/day, crack number of days, crack g/day, cannabis number of days, cannabis g/day, alcohol number of days, alcohol g/weekday, alcohol g/weekend. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"two-group randomised controlled trial".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Low risk	"To guard against bias, all follow-up interviews were conducted by a different worker from the one who administered the participant's recruitment protocol."
Incomplete outcome data (attrition bias) All outcomes	Low risk	13% attrition at 6 months follow-up, balanced across conditions. Reasons not provided. "The analysis of outcome was conducted on an intention-to-treat (ITT) basis (involving all participants who were randomly assigned) and baseline scores were substituted for cases lost to follow-up."
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Stimulant toxicology testing on a random 30%. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Martin 2008

Methods	RCT.	
Participants	40 non-treatment-seeking adolescent cannabis users from Australia aged 14-19 years.	
Interventions	Two-session brief intervention (n= 20) vs a 3-month delayed-treatment control condition (n= 20).	
Outcomes	**Physiological primary:** Urine test. **Non-physiological primary:** Days of cannabis use, mean quantity of cannabis used weekly, and number of DSM-IV dependence symptoms. **Secondary:** None.	
Notes	Intervention is referred to as ACCU (Adolescent Cannabis Check-up).	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"The randomisation sequence was generated by a computer random number generator."
Allocation concealment (selection bias)	Low risk	"...participants were randomly allocated to one of the two conditions by means of a sequence of labelled cards contained within numbered sealed (opaque) envelopes that were prepared by an independent researcher and opened in the presence of the participant."
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"Participants were followed up by an independent researcher 3 months after their last involvement with the project." Most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	20% were lost to follow-up. Equal attrition across groups. Intention to treat conducted. Reasons for attrition not reported.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	Unclear risk	Urinanalysis to validate self-report. The treatment group reported significantly more days of cannabis use in the past 90 days than the control group.

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Martino 2006

Methods	Pilot RCT.
Participants	44 dually diagnosed psychotic and drug-related disordered patients. USA.
Interventions	Two sessions of MI (n=24) vs a two-session standard psychiatric interview (n=20).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Days of primary drug use, secondary drug use, alcohol use. **Secondary:** Retention in treatment. Readiness to change (URICA). Data not reported. Follow-ups were at posttreatment, 1, 2, and 3 months.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Urn randomisation.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Low risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Low risk	"...two research staff members administered the assessments in a non-blinded fashion."
Incomplete outcome data (attrition bias) All outcomes	Low risk	14% were lost to at least one follow up, balanced across groups. Reasons for loss not stated. ITT performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	High risk	Only self-reported outcomes. There were differences at baseline in alcohol composite score and legal involvement.

Mastroleo 2010

Methods	RCT.
Participants	122 US heavy drinking college students.

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Mastroleo 2010 (*Continued*)

Interventions	1. peer counselled MI with supervision (n= 74) 2. peer counselled MI without supervision (n= 82) 3. no treatment control (n= 82).
Outcomes	Daily Drinking Questionnaire (total drinks per week, peak BAC, heavy drinking behaviours).
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No mention of allocation method.
Allocation concealment (selection bias)	Unclear risk	No mention of allocation concealment.
Blinding (performance bias and detection bias) Patients and providers	High risk	Patient and providers were not blinded to treatment allocation.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	16% attrition at 3 months. Balanced. No reasons stated. ITT (imputed missing data).
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study purposes.
Other bias	Unclear risk	Only self-reported outcomes. 61/156 (39%) of randomised participants did not receive the intervention. Differences between groups at baseline were not reported.

MATCH 1993

Methods	Multisite RCT (9 clinical research units and a coordinating centre).
Participants	1726 US inpatients and outpatients.
Interventions	Motivational Enhancement Therapy (MET) vs Cognitive Behavioral Therapy (CBT) vs Twelve-Step Facilitation Therapy (TSF). Not reported how many people were randomised to each condition.

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MATCH 1993 (*Continued*)

Outcomes	**Physiological primary:** Gamma-glutamyl transferase. **Non-physiological primary:** Percent days abstinent, drinks per drinking day, drinking consequences, **Secondary:** None.	
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Randomization to treatment was performed using a computerized urn balancing program designed to minimize differences on critical demographic and matching variables".
Allocation concealment (selection bias)	Unclear risk	Randomization process centrally controlled by the coordination centre.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition was less than 10% at the 3, 6, 9, 12, and 15 months follow-ups in the aftercare and outpatient groups. Balanced. Reasons for 3-year attrition in the outpatient group given. The authors state that all randomised participants are included in the analyses, but in a results table they included only data for subjects who had non missing values at all three time points.
Selective reporting (reporting bias)	Unclear risk	Primary outcomes measures (PDA and DDD) reported incompletely (only by graphs). Outcome for drinking consequences only reported in tables for 9- and 15 months follow-up.

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MATCH 1993 (*Continued*)

Other bias	Low risk	Collateral report, laboratory tests (blood and urine) as check on self-report. Breathalyzer at each assessment point. Inclusion criteria contained no planned involvement for additional treatment during the study period. There were no differences between groups at baseline. No additional sources of bias appear to be present.

McCambridge 2008

Methods	RCT.
Participants	326 young cannabis users aged 16-19 years not seeking help from eleven London Further Education colleges. UK.
Interventions	Single session intervention of MI (n= 164) vs drug information and advice giving (n= 162).
Outcomes	**Physiological primary:** None (but bogus pipeline). **Non-physiological primary:** 30-day frequency of cannabis use (joints past week), 30-day alcohol consumption (units of alcohol past week + AUDIT score). **Secondary:** None. Follow-ups were at 3 and 6 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Computerised individual randomisation was undertaken by the local clinical trials unit."
Allocation concealment (selection bias)	Low risk	"Decisions were communicated on an individual basis via telephone or e-mail to researchers after recruitment and baseline data collection to preserve allocation concealment."
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but bogus pipeline.
Blinding (performance bias and detection bias) Assessors	Low risk	"Study participants self-completed questionnaires which were distributed by a researcher who was blind to study allocation."

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McCambridge 2008 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	17% and 19% lost to follow-up at 3 and 6 months, respectively. Unequal between groups. Reasons for loss-to-follow-up not stated. Intention to treat using last observation carried forward.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Low risk	A bogus pipeline approach was used in addition to self-report. There were no differences between groups at baseline. No additional sources of bias appears to be present.

Miller 2003

Methods	Multisite RCT (2 sites).
Participants	208 US outpatients and inpatients entering public agencies for treatment of drug problems.
Interventions	1 session MI (n= 104) vs treatment as usual (n= 104).
Outcomes	**Physiological primary:** Urine toxicology. **Non-physiological primary:** Percent days abstinent from illicit drugs and alcohol. **Secondary:** Retention (frequency of therapy sessions attended).
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn randomisation.
Allocation concealment (selection bias)	Unclear risk	The urn randomisation was performed while the client was completing baseline assessment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but urine toxicology.
Blinding (performance bias and detection bias) Assessors	Low risk	"Assessment for all participants was conducted by experienced interviewing staff of CASAA's Program Evaluation Services unit, who were unaware of treatment group assignment."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	At 3, 6, 9, and 12 months, attrition was 7%, 14%, 20% and 21%, respectively. Loss was balanced across groups. Reasons not reported. ITT not performed.

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Miller 2003 (*Continued*)

Selective reporting (reporting bias)	Unclear risk	Addiction Severity Index was reported in the methods section, but it was not reported in the results section.
Other bias	Unclear risk	Urine drug screens and collateral reports were used to check on self-report. There is a possibility that the standard care group had received MI. The MI group received one additional session. There were no differences between groups at baseline.

Morgenstern 2009

Methods	RCT.
Participants	150 non-treatment-seeking men who have sex with men. USA.
Interventions	4 sessions of MI (n= 70) vs a 4-session educational control condition (n= 80).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Days of any club drug use (Timeline Followback). **Secondary:** None. Follow-ups were at 3, 6, 9, and 12 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Used an urn randomisation procedure.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Unclear risk	Insufficient information to tell if assessor was blinded, but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Incomplete outcome data (attrition bias) All outcomes	High risk	23% attrition at 12 months. Not different between conditions. No reasons stated. No ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.

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Morgenstern 2009 (*Continued*)

Other bias	Unclear risk	Self-report was confirmed by urine toxicology testing. There was more marijuana use in the treatment group at baseline.

Naar-King 2007

Methods	RCT.
Participants	65 youth (ages 16-25 years) living with HIV. USA.
Interventions	MET(n= 32) vs wait list (n= 33).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of standard drinks in one week and number of times used marijuana in one week (via Timeline Follow-Back). **Secondary:** None. Follow-ups were at baseline, 3, and 6 months.
Notes	The intervention is known as "Healthy Choices".

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Random numbers were generated by the project manager using an Internet based random number generator and were placed in sealed envelopes."
Allocation concealment (selection bias)	Low risk	"The data collector received sealed envelopes revealing randomisation status, which were opened after the baseline assessment so that the intervention sessions could be scheduled immediately for the treatment group."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition at 6 months was 23% for the whole sample. No reasons stated. Balanced. ITT conducted.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.

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Naar-King 2007 (*Continued*)

Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not reported.

Parsons 2009

Methods	RCT.
Participants	143 HIV-positive men and women who were on antiretroviral medication and met criteria for hazardous drinking. USA.
Interventions	MI + cognitive-behavioral skills building (n= 65) vs a time- and content-equivalent educational condition (n= 78).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Standard drinks in the past and drinks per drinking day. **Secondary:** Medication adherence. Follow-up at baseline and at 3- and 6-month follow-ups.
Notes	Intervention is known as Project PLUS (Positive Living Through Understanding and Support).

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn randomisation procedures were used.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	"An intent-to-treat analysis was used in which participants who completed the first follow-up assessments were analyzed according to their original assigned study condition irrespective of the number of sessions attended." Attrition was 9% at the 3-month follow-up and 10% at the 6-month follow-up with no significant difference in attrition between the 2 conditions. Reasons for attrition provided.

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Parsons 2009 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the stated hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not reported.

Peterson 2006

Methods	RCT.
Participants	285 US homeless adolescents recruited from drop-in centres and from street intercept.
Interventions	1. Brief ME (n= 92) 2. assessment at follow-up (n= 94) 3. assessment only (n= 99).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Marijuana drug use days, other illicit drug use days. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"...a two-step urn randomizations on gender and ethnicity."
Allocation concealment (selection bias)	Unclear risk	Randomization at central location.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Unclear risk	"Follow-up interviewers... were not blind to condition." The outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	18% and 20% attrition at 1 and 3 month follow-up, respectively. Balanced. Reasons for loss to-follow-up not stated. Use of ITT was stated by the authors but not reported.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.

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Peterson 2006 (*Continued*)

Other bias	Low risk	Urine samples collected at 3 month follow-up. There were no differences between groups at baseline. No additional sources of bias appear to be present.

Rohsenow 2004

Methods	RCT.
Participants	165 US cocaine dependent patients.
Interventions	1. MET followed by group coping skills (n= 44) 2. MET followed by drug education (n= 39) 3. meditation relaxation followed by group coping skills (n= 44) 4. mediation relaxation followed by drug education (n= 38).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of cocaine use days, percentage of days alcohol used. **Secondary:** Readiness to change (Cocaine Change Assessment Questionnaire). Data not reported. Retention in treatment (days treated in partial hospital [data not reported]).
Notes	Results data are not available. Mail from Dr. Rohsenow May 19th 2010.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Stratified randomisation balanced gender and cocaine use frequency."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Low risk	"Research assistants blind to treatment condition conducted assessments."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	10% attrition at 12 months follow-up. We do not know the attrition at 3 and 6 months. Reasons for attrition unclear. Unclear if attrition was balanced across groups. Use of ITT was reported, but analyses were not reported with the full sample.

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Rohsenow 2004 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Urine drug screens and collateral reports to check on self-report. The MET group reported drinking on more days at baseline.

Saitz 2007

Methods	RCT.
Participants	341 US medical inpatients who were drinking risky amounts of alcohol.
Interventions	Motivational counselling (n= 172) vs usual care (n= 169).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinking risky amounts, heavy drinking episodes, abstinence. **Secondary:** Readiness to change (Taking Steps Scale on the Stages of Change Readiness and Treatment Eagerness Scale). Data not reported. Received alcohol assistance.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...permuted block (size 8) randomisation procedure stratified by AUDIT score."
Allocation concealment (selection bias)	Unclear risk	Used sealed opaque envelopes. It is unclear whether the envelopes were opaque and/or sequentially numbered.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	At 3 months follow-up, the attrition was 17% in the usual care group and 24% in the brief intervention group. At 12 months, the attrition was 14% in the usual care group and 18% in the brief intervention group. Flow chart with reasons for attrition reported. It appears that ITT was performed ("...analyzed all patients in the groups to which they were randomly assigned.)

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Saitz 2007 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Baseline imbalances (gender, alcohol-attributable medical diagnoses, received alcohol assistance, drug use) existed despite randomization. Biological breath tests were conducted at follow-ups.

Schaus 2009

Methods	RCT.
Participants	363 college students who screened positive for high-risk drinking. USA.
Interventions	MI + a brochure (n = 181) vs a control group receiving only the brochure (n = 182).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Typical BAC, peak BAC, average number of drinks per sitting, number of days with heavy episodic drinking, peak number of drinks in one sitting, average number of drinks per week, and number of times drunk in a typical week. **Secondary:** Readiness to change (Readiness to Change Questionnaire). Follow-ups were at 3, 6, 9, and 12 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Subjects were block randomised using SPSS Version 15.0 ...to either the control or intervention group, where the order of the interventions varied randomly within each block."
Allocation concealment (selection bias)	Unclear risk	"The group assignment was placed into a sealed envelope by the data manager and was not available to those recruiting subjects until after informed consent was obtained."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.

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Schaus 2009 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	High risk	Percent lost to follow-up after 3, 6, 9, and 12 months were 24%, 42%, 41%, and 35%, respectively. Follow-up did not differ significantly between groups. Reasons for attrition not provided. ITT probably performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	High risk	Only self-reported outcomes. The variable "number of times drove after ≥3 drinks." was higher in the control group at baseline.

Sellman 2001

Methods	RCT.
Participants	125 patients from New Zealand with mild to moderate alcohol dependence.
Interventions	1. MET (n= 42) 2. non-directive reflective listening (n= 40) 3. no further counselling (n= 40).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Broke abstinence, exceeded national guidelines at least once, exceeded national guidelines six or more times, drank 10+ standard drinks at least once, drank 10+ standard drink six or more times. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...randomly constructed list of therapies."
Allocation concealment (selection bias)	Low risk	"An administrative person who was independent of the assessment and treatment of the study was contacted regarding the therapy to be undertaken."
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Low risk	"A senior research assistant, who was blind to the treatment received, successfully completed follow-up."

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Sellman 2001 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	1% attrition at 6 months follow-up. Attrition was balanced across conditions, but no reasons were reported. It is unclear whether ITT was performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Collateral to check on self-report. There were differences between groups at baseline for GAS score. No additional sources of bias appear to be present.

Stein 2002

Methods	RCT.
Participants	187 US AUDIT-positive active injection drug users.
Interventions	MI (n= 95) vs control (assessment only) (n= 92).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of drinking days. **Secondary:** None.
Notes	BRAINE study.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Subjects were assigned to treatments using a randomisation schedule created with permuted blocks of eight assignments."
Allocation concealment (selection bias)	Unclear risk	"The data manager prepared the randomisation schedule before the first patient enrolled."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"At each follow-up assessment, research assistants were blinded to the treatment condition of the subject."
Incomplete outcome data (attrition bias) All outcomes	Low risk	3% loss to follow-up at 6 months. Balanced. No reasons provided. ITT performed. Missing data were imputed using a 'worst case scenario' strategy.

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Stein 2002 (*Continued*)

Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. There were no differences between groups at baseline.

Stein 2009

Methods	RCT.
Participants	198 persons who used cocaine at least weekly and who were not in treatment. USA.
Interventions	4-session motivational intervention (n= 97) or an assessment only control group (n= 101). Both groups received a written handout list of treatment resources. Each session lasted 20 to 40 minutes.
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Any reduction in cocaine use, more than 50% reduction, and abstinence. **Secondary:** Treatment attendance (inpatient therapy, attended NA or CA, any drug treatment). Follow-up at 6 months.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Randomization and concealment were overseen by the study methodologist."
Allocation concealment (selection bias)	Unclear risk	"Randomization and concealment were overseen by the study methodologist."
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"Follow-up interviews were performed by research staff blinded to study conditions."
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT performed. Attrition was 19% at 6 months. Reasons not stated.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.

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Stein 2009 (*Continued*)

Other bias	Unclear risk	Only self-reported outcomes. There were no differences between groups at baseline.

Stein 2010

Methods	RCT.
Participants	245 incarcerated women with hazardous drinking.
Interventions	MI (n= 125) vs assessment only (n= 120).
Outcomes	90-day drinking (probability of an abstinent day, drinks per drinking day) using Timeline Followback at 1, 3 and 6 months follow-up.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Randomization and concealment were overseen by the study methodologist (B.J.A.)".
Allocation concealment (selection bias)	Unclear risk	"Randomization and concealment were overseen by the study methodologist (B.J.A.)".
Blinding (performance bias and detection bias) Patients and providers	High risk	Patients and providers were not blinded to the interventions.
Blinding (performance bias and detection bias) Assessors	Low risk	"...research staff performing the assessments were blinded to the participant's assigned condition."
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition was 24% at 1 month, 21% at 3 months and 21% at 6 months. Balanced. Not ITT. No reasons.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. There were no differences between groups at baseline.

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Stephens 2007

Methods	RCT.
Participants	188 US marijuana users.
Interventions	1. Personalized feedback (utilising MI) (n= 62) 2. educational control (multi-media feedback) (n= 62) 3. delayed feedback (n= 64).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Days of marijuana use per week, periods smoked per day, dependence symptoms. **Secondary:** Motivation (Readiness to Change Questionnaire). Data not reported.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Used an urn randomisation program.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	No blinding but the outcome measurements are not likely to be influenced by lack of blinding due to validation with physiological measurement.
Blinding (performance bias and detection bias) Assessors	Low risk	"...research staff...was not aware of assigned condition".
Incomplete outcome data (attrition bias) All outcomes	Low risk	Attrition was 5% at 7 weeks, 10% at 6 months, and 19% at 12 months follow-up. Balanced across conditions. No reasons. ITT probably performed (missing data were replaced with baseline values).
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Urine specimens were collected at each assessment point and analysed for the presence of drug metabolites via enzyme immunoassay tests. Differences between groups at baseline were not reported. No additional sources of bias appear to be present.

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Stotts 2001

Methods	RCT.
Participants	105 US cocaine-dependent men and women aged 18-50 years admitted to a university medical centre.
Interventions	MI vs detox-only. The group sizes were not reported. The detox only conditions was "...a multi component intervention consisting of daily visits, interaction with research assistants, education, and graphing and feedback of daily urine results, as well as bonus money and further treatment contingent on successful completion of the program."
Outcomes	**Physiological primary:** Cocaine-positive urine samples. **Non-physiological primary:** Cocaine use. **Secondary:** Treatment retention (completion of detox program). Readiness to change (Processes of Change Scale).
Notes	We sent an email on April 29th 2010 requesting the group sizes. On June 4th we contacted Brad Lundahl, author of a systematic review for effect size information. He gave us effect size data.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...randomly assigned..."
Allocation concealment (selection bias)	Unclear risk	"...randomly assigned..."
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	High risk	Intention to treat of the full sample (N =105) were conducted on completion of the DP. The number of participants randomised to each condition is not reported. Analysis of urine samples were conducted on 51 completers.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Urineanalysis to validate self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Stotts 2006

Methods	Pilot RCT.
Participants	31 male treatment-seeking cocaine abusers. USA.
Interventions	Two-session MI intervention with informative biological EEG/ERP feedback (n=17) or a minimal control condition who had two brief meetings with an experienced research assistant weekly over two weeks (n=14).
Outcomes	**Physiological primary:** Cocaine-positive urine screens. **Non-physiological primary:** Proportion of self-reported cocaine use days. **Secondary:** Readiness to change (URICA). Data not reported.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"randomised".
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"Posttreatment assessment was conducted at 1-week post-study by clinic staff blind to study condition."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Only subjects with data at both time points were analysed (27/31 = 13% attrition). Reasons for missing data not reported. ITT not performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	EEG screening to validate self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Thush 2009

Methods	RCT.
Participants	125 Dutch at-risk adolescents.
Interventions	MI plus information flyers (n=61) vs information flyers only (n=64).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Alcohol use. **Secondary:** Readiness to change using a readiness-to-change ruler. Data not reported. Follow-ups at 1 month and 6 months.
Notes	Email sent to Thush requesting raw outcome data on May 28th 2010. Thush replied immediately promising to look into it. They have computed a log transformed standardized alcohol use index score out of six different correlated alcohol use outcome measures. A reminder was sent on August 30th. An out of office reply informed that Thush had resigned.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"randomly assigned"
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	10% lost to follow-up at 1 month and 41% lost to follow-up at 6 months. Reasons not provided. Balanced at 1 month. Not known whether loss was balanced at 6 months. Not ITT.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. Differences between groups at baseline were not reported.

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UKATT 2005

Methods	Multisite RCT (7 sites).
Participants	742 UK clients with alcohol problems.
Interventions	MET(n= 442) vs social behavior and network therapy (n= 320).
Outcomes	**Physiological primary:** Gamma-glutamyl transferase **Non-physiological primary:** Days abstinent, number of drinks per drinking day, Leeds Dependence Questionnaire score, alcohol problems score. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"The remote randomisation service at York used a computer "on line" to allocate consenting participants between therapy groups."
Allocation concealment (selection bias)	Unclear risk	"Treatment was concealed until allocation."
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Assessors blinded at 12 months but not at 3 months. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	7% attrition at 3 months follow-up and 17% attrition at 12 months follow-up. Balanced. Reasons provided. ITT using last observation carried forward performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Gamma GT used to check on self-report. There were no differences between groups at baseline. No additional sources of bias appear to be present.

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Walitzer 2008

Methods	RCT.
Participants	169 alcoholic outpatients. USA.
Interventions	(1) a motivational approach to facilitating AA (n=58), (2) a 12-step directive approach to facilitating AA (n=53), or (3) treatment as usual with no special emphasis on AA (n=58). All conditions received 12 sessions.
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Percentage of days abstinent, percentage of days heavy drinking via the Timeline Followback. **Secondary:** Attendance at AA meetings.
Notes	On 11 October 2010 we sent an email to Kim Walitzer (walitzer@ria.buffalo.edu) requesting data on retention in treatment.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Random assignment to conditions was conducted by the third author via urn randomisation...".
Allocation concealment (selection bias)	Unclear risk	"Random assignment to conditions was conducted by the third author via urn randomisation...". Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	Unclear risk	Blinding of providers was not possible, but participants could have been blinded.
Blinding (performance bias and detection bias) Assessors	Low risk	"Research interviewers were blind to intervention condition."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	10% attrition on interview and 15% on questionnaire data. No reasons stated. Similar across conditions. Not ITT in primary analysis.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Low risk	Used collateral interviews to check on self-report. Differences between groups at baseline were not reported. No additional sources of bias appear to be present.

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Walker 2006

Methods	Multisite RCT (4 sites).
Participants	97 US adolescents.
Interventions	2 session MET (n= 47) vs 3 months delayed condition (n= 50).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of days of marijuana use. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...randomly assigned."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	"Baseline and 3-month follow-up assessments were administered by an audio-computer-assisted self-interviewing program." But "a different HE (health educator) was assigned to conduct the follow-up."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Attrition was 5% overall at 3 months follow-up (9% in the MET group and 2% in the DFC group). Unbalanced across conditions. Reasons not reported. Stated use of ITT but reported only actual data.
Selective reporting (reporting bias)	High risk	Authors stated alcohol and other drugs as outcomes but reported only marijuana use in the results. Some results were only claimed as "not significant" but not reported explicitly.
Other bias	Unclear risk	Only self-reported outcomes. There were more whites in the immediate treatment group than in the delayed treatment group at baseline.

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Walters 2009

Methods	Dismantling RCT.
Participants	279 heavy drinking college students. USA.
Interventions	(1) A single MI session without feedback (MIO, n=70), (2) a single MI session with feedback (MIF, n=73), (3) web feedback only (FBO, n=67), or (4) assessment only (AO, n=69).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Drinks per week, estimated peak BAC. **Secondary:** None.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Randomization, stratified by sex and heavy-drinking frequency (i.e., one heavy episode in the past 2 weeks vs. more than one heavy episode), was completed automatically after the students entered their screening data."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	10% attrition at 3 months and 14% attrition at 6 months. Different across groups. No reasons. ITT not conducted.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	The feedback format varied (i. e. online vs. face-to-face) and MIO and MIF conditions varied in contact time because of the feedback component. There were no differences between groups at baseline.

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White 2006

Methods	RCT.
Participants	222 mandated college students. USA.
Interventions	Brief motivational interview (n = 180) vs written feedback only (n = 168).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Past month alcohol frequency, number of occasions of heavy episodic drinking, number of drinks and number of hours of drinking each day in a typical week in the last month. Frequency of marijuana use in the past month. **Secondary:** None. Follow-up at 3 months post-intervention.
Notes	White 2007 is the same study with further recruitment (n=348). The follow-ups were at 4 and 15 months.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomly assigned by the flip of a coin.
Allocation concealment (selection bias)	Low risk	Randomly assigned by the flip of a coin.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	5% lost to follow-up. Reasons not stated. Balanced. ITT not conducted.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	High risk	Only self-report but included the Social Desirability Scale. Participants in the BMI group were in an earlier college year and had higher RAPI scores than participants in the written feedback group at baseline.

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Winhusen 2008

Methods	Multisite RCT (4 sites).	
Participants	200 US pregnant substance users.	
Interventions	3 session MET (n= 102) vs treatment as usual (n= 98).	
Outcomes	**Physiological primary:** Urine toxicology **Non-physiological primary:** Days of use alcohol/drugs. **Secondary:** Readiness to change (URICA).	
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Used urn randomisation.
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	Low risk	No blinding, but most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	Insufficient information to know whether assessors were blinded. But most outcomes were physiological and also used to validate self-reports, and not likely to be influenced by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	14% attrition at 1 month follow-up and 20% attrition at 3 months. Balanced. Reasons for dropout stated. ITT was performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Urine samples were collected and tested for opiates, cocaine, methamphetamines, benzodiazepines, and marijuana at screening, weekly during the active phase of the study phase, and at the two follow-up visits. The MET group used more cocaine and the TAU group used more marijuana at baseline. There were also baseline differences in age, ethnicity, education and pressure to attend treatment.

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Winters 2007

Methods	RCT.
Participants	Students (n = 53) identified in a school setting as drug abusers. USA.
Interventions	2 sessions of MI with the adolescent only (n=26) vs assessment only control (n=27).
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of alcohol use days, number of binge days, number of illicit drug use days. **Secondary:** Additional treatment. Follow-up at 6 months.
Notes	There was also a third group that received 2 sessions with the adolescent and one with the parent (n=26). This group did not meet our inclusion criteria. 1 student in the control group dropped out, so each group in the analyses contain 26 students.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"...randomly assigned..."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgement.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Low risk	"An experienced research assistant, who was blind to treatment condition, completed the intake, 1-month, and 6-months follow-up interviews."
Incomplete outcome data (attrition bias) All outcomes	Low risk	1% attrition at 6 months follow-up.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	High risk	"During the 6-months TSR interview, those in the BI-AP condition reported more additional treatment (27%) compared with those in the BI-A condition (16%)". Only self-report. There were no differences between groups at baseline.

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Wood 2007

Methods	RCT (2x2 factorial design).	
Participants	335 US heavy drinking college students.	
Interventions	1. Brief MI (BMI) (n= 84) 2. Alcohol Expectancy Challenge (AEC) (n= 87) 3. BMI and AEC (n= 81) assessment only (n= 83). AEC involved 2 sessions with a group discussion about alcohol expectancies in a simulated bar environment.	
Outcomes	**Physiological primary:** None. **Non-physiological primary:** Number of drinks per week, number of heavy drinking episodes in the past 30 days. Hangovers, blackouts, increased subjective tolerance. **Secondary:** None.	
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"...randomized, separately by gender."
Allocation concealment (selection bias)	Unclear risk	Insufficient information to permit judgment.
Blinding (performance bias and detection bias) Patients and providers	High risk	No blinding.
Blinding (performance bias and detection bias) Assessors	Unclear risk	It is not stated whether the assessors were blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	"Cumulative participant attrition was 18%, 25%, and 28% at 1-, 3-, and 6 month follow-ups, respectively. Not balanced. 21 in the AEC group and 24 in the BMI-AEC group were dropped by design because it was not possible to schedule them for at least one of two group AEC sessions. ITT was not performed.
Selective reporting (reporting bias)	Low risk	The published report included all expected outcomes based on the study hypotheses.
Other bias	Unclear risk	Only self-reported outcomes. There were no differences between groups at baseline.

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Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Adamson 2001	Substance abuse was not an outcome.
Allsop 1997	Group MI.
Anderson 1992	Intervention was not MI.
Aubrey 1998	Not fidelity check using video or audio.
Baer 2001	Not fidelity check using video or audio.
Baker 1993	Substance abuse was not an outcome.
Baker 2001	Not fidelity check using video or audio.
Baker 2002	Not fidelity check using video or audio.
Baker 2002b	Substance abuse was not an outcome.
Baker 2005	Not fidelity check using video or audio.
Baker 2006	Not fidelity check using video or audio.
Barrowclough 2000	No results reported. Ongoing study in 2000.
Barrowclough 2001	Not individual face-to-face intervention.
Becka 2004	Not a randomized controlled trial.
Beckham 2007	Not fidelity check using video or audio.
Bellack 2006	Intervention was not MI.
Bernstein 2005	Not fidelity check using video or audio.
Bethea 2006	Intervention was not MI.
Booth 1998	Substance abuse was not an outcome.
Borsari 2000	Not fidelity check using video or audio.
Borsari 2003	Intervention was not MI.
Brown 1993	Not a randomized controlled trial.
Brown 2007	Not individual face-to-face intervention. (Telephone and mail intervention).

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(*Continued*)

Brown 2009	Not fidelity check using video or audio.
Butler 2009	Not fidelity check using video or audio.
Bux 2005	Intervention was not MI.
Ceperich 2002	No data reported.
Chapman 2009	Not individual face-to-face intervention.
Chavez 2003	Substance abuse was not an outcome.
Clinton-Sherrod 2008	Substance abuse was not an outcome.
Corrigan 2005	Substance use was not an outcome.
D'Angelo 2005	Not fidelity check using video or audio.
Daeppen 2007	Not MI
Daley 1998	Substance use was not an outcome.
Davidson 2007	Did not compare MI with alternative. Both conditions received MI.
Davis 2003	Not fidelity check using video or audio.
Demmel 2003	Not a randomized controlled trial.
Dench 2000	Substance abuse was not an outcome.
Dent 2008	Not fidelity check using video or audio. Main references to Miller and Rollnick are missing.
Dermen 2000	Not MI
Disney 2005	Substance abuse was not an outcome.
Dunn 1997	Not a randomised controlled trial.
Dunn 2004	Substance abuse was not an outcome.
Easton 2000	Substance abuse was not an outcome.
Edwards 2006	Not fidelity check using video or audio.
Fergusin 1998	Not MI.
Floyd 2007	Not fidelity check using video or audio.

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(*Continued*)

Gauthier-Faille 2006	Not MI.
Gentilello 2001	Substance abuse was not an outcome (outcomes were injuries and traumas.)
Ginsburg 2001	Substance abuse was not an outcome.
Godley 2010	Not individual face-to-face intervention. (Part of the intervention involved the family.)
Gogineni 2005	Not MI.
Goti 2010	Not fidelity check using video or audio.
Gray 2005	Not a randomized controlled trial.
Gregory 2001	Not MI. Not substance abusers.
Gwadz 2008	Not MI.
Handmaker 1999	Not substance abusers.
Harper 2000	Not a randomized controlled trial.
Haug 2004	Substance abuse was not an outcome.
Hayes 2007	Not substance abusers.
Heather 1996	Not a randomized controlled trial.
Hester 2005	Not individual face-to-face intervention.
Hickman 1999	Not fidelity check using video or audio.
Hicks 1999	Not fidelity check using video or audio.
Holder 2000	Not a randomized controlled trial.
Hulse 2003	Substance abuse was not an outcome.
Johnson 2006	Intervention was not MI.
Juarez 2006	Not substance abusers.
Jungerman 2007	Not fidelity check using video or audio.
Kanouse 2005	Not a randomized controlled trial.
Kidorf 2005	Substance abuse was not an outcome.

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(*Continued*)

Kidorf 2009	Not fidelity check using video or audio.
Kinlock 2005	Substance abuse was not an outcome.
Kuchipudi 1990	Not fidelity check using video or audio.
Lachance 2004	Not MI.
Larimer 2001	Not substance abusers.
Longabaugh 2001	Not substance abusers.
Longabaugh 2009	Not fidelity check using video or audio.
Lozano 2006	Intervention was not MI.
Magill 2009	Not fidelity check using video or audio.
Mahmood 2002	Substance abuse was not an outcome.
Marlatt 1998	Not fidelity check using video or audio.
Martino 2000	Not fidelity check using video or audio.
Mausbach 2007	Substance abuse was not an outcome.
McCambridge 2004	Not fidelity check using video or audio.
McDowell 2006	Intervention was not MI.
Mckee 2007	Not fidelity check using video or audio.
McNally 2005	Not fidelity check using video or audio.
Michael 2006	Not individual face-to-face intervention.
Miller 2005	Not a randomized controlled trial.
Mitcheson 2007	Not MI.
Monti 1999	Not substance abusers.
Monti 2007	Not substance abusers.
Morgenstern 2007	Did not compare MI with alternative intervention.
Mullins 2004	Substance abuse was not an outcome.

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(*Continued*)

Murphy 2001	Does not compare MI with alternative intervention.
Murphy 2003	Not MI.
Murphy 2004	Not fidelity check using video or audio.
Noonan 2001	Not individual face-to-face intervention (Group MI.)
Oliveira 2008	Not fidelity check using video or audio.
Ondersma 2007	Not individual face-to-face intervention. (Computer-delivered.)
Parsons 2007	Not fidelity check using video or audio.
Patterson 2008	Not a randomized controlled trial.
Pavone 2002	Not a randomized controlled trial.
Rao 1999	Not individual face-to-face intervention.
Reid 2005	Not MI.
Rimmele 1998	Not a randomized controlled trial.
Samet 2005	Substance abuse was not an outcome.
Sanchez 2001	Not MI.
Sanchez-Craig 1996	Not fidelity check using video or audio.
Santa Ana 2005	Not MI.
Santa Ana 2007	Not individual face-to-face intervention. (Group MI.)
Saunders 1995	Not fidelity check using video or audio.
Schilling 2002	Not a randomized controlled trial.
Scott 2002	Substance abuse was not an outcome.
Scott 2009	Not MI.
Sears 2006	Substance abuse was not an outcome.
Sinha 2003	Not fidelity check using video or audio.
Sitharthan 1999	Not a randomized controlled trial.

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Sobell 2002	Not individual face to face intervention.
Soderstrom 2007	Not substance abusers.
Stein 2002a	Not a randomized controlled trial.
Stein 2006	Substance abuse was not an outcome.
Stein 2006a	Substance abuse was not an outcome.
Stephens 2000	Not fidelity check using video or audio.
Stephens 2002	Not a randomized controlled trial.
Stockwell 1986	Not a randomized controlled trial.
Stotts 2004	Not MI.
Swanson 1999	Substance abuse was not an outcome.
Tapert 2003	Not substance abusers.
Tevyaw 2007	Not individual face-to-face intervention.
Thevos 1998	Not a randomized controlled trial.
Thush 2007	Not fidelity check using video or audio.
Tirado 2005	Not MI.
Vanderburg 2003	Substance abuse was not an outcome.
Velasquez 2009	Not individual face-to-face intervention. (Both individual and group MI.)
Wain 2006	Substance abuse was not an outcome.
Walters 2000	Intervention was not MI.
Walton 2010	Intervention is opportunistic one-session MI in emergeny room.
Weinrieb 2005	Not MI.
Wells 1998	Not a randomized controlled trial.
Wells 2004	Not MI.
Wertz 1994	Not fidelity check using video or audio.
Whitten 2006	Substance abuse was not an outcome.

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Wilbourne 2005	Not a randomized controlled trial.
Woodall 2007	Not fidelity check using video or audio.
Woody 2001	Not MI.
Yonkers 2009	Not a randomized controlled trial.
Zahradnik 2009	Not acceptable drug (prescription drugs).
Zule 2009	Not fidelity check using video or audio.

Characteristics of studies awaiting assessment *[ordered by study ID]*

Barrowclough 2010

Methods	RCT.
Participants	Patients with psychosis and substance abuse.
Interventions	Integrated MI and CBT treatment vs standard psychiatric care.
Outcomes	Frequency of substance abuse.
Notes	

Walters 2010

Methods	Randomized effectiveness trial.
Participants	380 probationers.
Interventions	MI vs waiting list control.
Outcomes	Probability of having a drug-positive urinalysis or an otherwise poor outcome after 6 months.
Notes	Study was located while preparing to submit the review.

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Characteristics of ongoing studies *[ordered by study ID]*

Dubertret 2010

Trial name or title	Effect of motivational therapy on schizophrenia with cannabis misuse.
Methods	RCT.
Participants	Schizophrenia or schizo-affective disorder according to DSM-IV criteria.
Interventions	MI vs usual care.
Outcomes	Cannabis consumption evaluated by the Time-Line Follow Back at 6 months inclusion, 3 month, 6 month, 12 month.
Starting date	November 2008.
Contact information	Caroline Dubertret (caroline.dubertret@lmr.aphp.fr) Assistance Publique - Hopitaux de Paris. Telephone: +33 (0) 14760 6413
Notes	

Forsberg 2010

Trial name or title	Effects of Motivational Interviewing in Prison.
Methods	RCT.
Participants	Alcohol abusers.
Interventions	MI vs usual planning interview routine.
Outcomes	Number of days with substance use of the last 30 days. Alcohol- or drug use as measured by the Addiction Severity Index (ASI) at intake and at 10 months after release.
Starting date	April 2004.
Contact information	Lars G Forsberg Karolinska Institutet, Dep Clin. Neuroscience, Stockholm, Sweden.
Notes	

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Hansen 2010

Trial name or title	Brief intervention for heavy drinkers.
Methods	RCT.
Participants	Alcohol abusers.
Interventions	MI vs leaflets about alcohol.
Outcomes	Reduction of 25% in self reported alcohol consumption.
Starting date	January 2008.
Contact information	Anders B. Gottlieb Hansen University of Southern Denmark, National Institute of Public Health.
Notes	

Morken 2010

Trial name or title	Motivational interviewing to acutely admitted psychiatric patients with comorbid substance use
Methods	Single-blind RCT.
Participants	Adult patients with substance use acutely admitted to psychiatric hospital.
Interventions	MI vs standard treatment.
Outcomes	Substance use and function questionnaire. Admissions to hospital. Number of contacts with primary health care.
Starting date	October 2004.
Contact information	Gunnar Morken (gunnar.morken@ntnu.no) Norwegian University of Science and Technology.
Notes	

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DATA AND ANALYSES

Comparison 1. MI versus no intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Extent of substance use	25		Std. Mean Difference (Random, 95% CI)	Subtotals only
1.1 Post-intervention	4	202	Std. Mean Difference (Random, 95% CI)	0.79 [0.48, 1.09]
1.2 Short f-u	15	2327	Std. Mean Difference (Random, 95% CI)	0.17 [0.09, 0.26]
1.3 Medium f-u	12	2326	Std. Mean Difference (Random, 95% CI)	0.15 [0.04, 0.25]
1.4 Long follow-up	1	363	Std. Mean Difference (Random, 95% CI)	0.06 [-0.16, 0.28]
2 Readiness to change	5	1495	Std. Mean Difference (Random, 95% CI)	0.05 [-0.11, 0.22]
3 Retention in treatment	2	427	Std. Mean Difference (Random, 95% CI)	0.26 [-0.00, 0.52]

Comparison 2. MI versus treatment as usual

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Extent of substance use	11		Std. Mean Difference (Random, 95% CI)	Subtotals only
1.1 Post-intervention	9	1940	Std. Mean Difference (Random, 95% CI)	0.01 [-0.09, 0.11]
1.2 Short f-u	10	2102	Std. Mean Difference (Random, 95% CI)	0.01 [-0.08, 0.10]
1.3 Medium f-u	5	890	Std. Mean Difference (Random, 95% CI)	0.08 [-0.05, 0.21]
2 Retention in treatment	4	1354	Std. Mean Difference (Random, 95% CI)	-0.11 [-0.41, 0.19]

Comparison 3. MI versus assessment and feedback

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Extent of substance use	7		Std. Mean Difference (Random, 95% CI)	Subtotals only
1.1 Short f-u	7	986	Std. Mean Difference (Random, 95% CI)	0.12 [-0.01, 0.24]
1.2 Medium f-u	2	265	Std. Mean Difference (Random, 95% CI)	0.38 [0.10, 0.66]

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Comparison 4. MI versus other active intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Extent of substance use	14		Std. Mean Difference (Random, 95% CI)	Subtotals only
1.1 Post-intervention	2	185	Std. Mean Difference (Random, 95% CI)	-0.07 [-0.37, 0.23]
1.2 Short f-u	12	2137	Std. Mean Difference (Random, 95% CI)	0.02 [-0.07, 0.12]
1.3 Medium f-u	6	1586	Std. Mean Difference (Random, 95% CI)	-0.02 [-0.16, 0.13]
1.4 Long f-u	2	437	Std. Mean Difference (Random, 95% CI)	-0.03 [-0.21, 0.14]
2 Readiness to change	2	350	Std. Mean Difference (Random, 95% CI)	-0.03 [-0.24, 0.18]
3 Retention in treatment	5	447	Std. Mean Difference (Random, 95% CI)	0.01 [-0.45, 0.47]

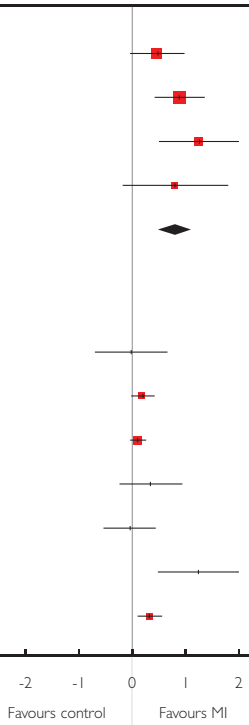
Analysis 1.1. Comparison 1 MI versus no intervention, Outcome 1 Extent of substance use.

Review: Motivational interviewing for substance abuse

Comparison: 1 MI versus no intervention

Outcome: 1 Extent of substance use

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Weight	Std. Mean Difference IV,Random,95% CI
1 Post-intervention					
Ball 2007a	29	34	0.47 (0.26)	34.7 %	0.47 [-0.04, 0.98]
Connors 2002	36	40	0.878 (0.241)	40.2 %	0.88 [0.41, 1.35]
Kelly 2000	16	16	1.245 (0.386)	15.9 %	1.25 [0.49, 2.00]
Stotts 2006	14	17	0.801 (0.507)	9.2 %	0.80 [-0.19, 1.79]
Subtotal (95% CI)				**100.0 %**	**0.79 [0.48, 1.09]**
Heterogeneity: Tau^2 = 0.00; Chi^2 = 3.04, df = 3 (P = 0.39); I^2 =1%					
Test for overall effect: Z = 5.10 (P < 0.00001)					
2 Short f-u					
Bell 2007	20	40	-0.028 (0.346)	1.4 %	-0.03 [-0.71, 0.65]
Carey 2006	81	81	0.19 (0.111)	9.8 %	0.19 [-0.03, 0.41]
Carroll 2006a	178	173	0.097 (0.076)	15.4 %	0.10 [-0.05, 0.25]
Feldstein 2007	15	40	0.345 (0.305)	1.8 %	0.35 [-0.25, 0.94]
Kay-Lambkin 2009	30	35	-0.048 (0.25)	2.6 %	-0.05 [-0.54, 0.44]
Kelly 2000	16	16	1.23 (0.386)	1.2 %	1.23 [0.47, 1.99]
MarijuanaTP 2004	148	146	0.32 (0.118)	9.0 %	0.32 [0.09, 0.55]



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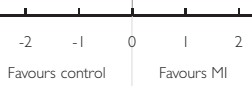
Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Martin 2008	20	20	-0.099 (0.317)		1.7 %	-0.10 [-0.72, 0.52]
Mastroleo 2010	82	82	0.276 (0.161)		5.6 %	0.28 [-0.04, 0.59]
Morgenstern 2009	80	70	0.299 (0.162)		5.6 %	0.30 [-0.02, 0.62]
Naar-King 2007	26	25	-0.041 (0.283)		2.1 %	-0.04 [-0.60, 0.51]
Peterson 2006	94	92	-0.004 (0.102)		11.0 %	0.00 [-0.20, 0.20]
Schaus 2009	182	181	0.25 (0.11)		10.0 %	0.25 [0.03, 0.47]
Stein 2002	92	95	0.084 (0.103)		10.9 %	0.08 [-0.12, 0.29]
Wood 2007	83	84	0.231 (0.095)		12.0 %	0.23 [0.04, 0.42]
Subtotal (95% CI)					**100.0 %**	**0.17 [0.09, 0.26]**
Heterogeneity: Tau^2 = 0.01; Chi^2 = 18.40, df = 14 (P = 0.19); I^2 =24%						
Test for overall effect: Z = 4.08 (P = 0.000046)						
3 Medium f-u						
Brown 2010	92	92	0.042 (0.148)		9.8 %	0.04 [-0.25, 0.33]
Carey 2006	81	81	-0.019 (0.157)		8.9 %	-0.02 [-0.33, 0.29]
Connors 2002	36	40	0.38 (0.232)		4.7 %	0.38 [-0.07, 0.83]
Copeland 2001	69	78	0.525 (0.453)		1.3 %	0.53 [-0.36, 1.41]
Emmen 2005	62	61	-0.2 (0.181)		7.1 %	-0.20 [-0.55, 0.15]
Freyer-Adam 2008	249	225	0.064 (0.109)		15.0 %	0.06 [-0.15, 0.28]
Kay-Lambkin 2009	30	35	0.424 (0.252)		4.0 %	0.42 [-0.07, 0.92]
Marsden 2006	176	166	0.099 (0.108)		15.1 %	0.10 [-0.11, 0.31]
Morgenstern 2009	80	70	0.37 (0.172)		7.7 %	0.37 [0.03, 0.71]
Schaus 2009	182	181	0.2 (0.11)		14.8 %	0.20 [-0.02, 0.42]
Stein 2009	92	95	0.173 (0.164)		8.3 %	0.17 [-0.15, 0.49]
Winters 2007	27	26	0.657 (0.287)		3.2 %	0.66 [0.09, 1.22]
Subtotal (95% CI)					**100.0 %**	**0.15 [0.04, 0.25]**
Heterogeneity: Tau^2 = 0.01; Chi^2 = 14.06, df = 11 (P = 0.23); I^2 =22%						
Test for overall effect: Z = 2.78 (P = 0.0055)						
4 Long follow-up						
Schaus 2009	182	181	0.06 (0.11)		100.0 %	0.06 [-0.16, 0.28]
Subtotal (95% CI)					**100.0 %**	**0.06 [-0.16, 0.28]**
Heterogeneity: not applicable						
Test for overall effect: Z = 0.55 (P = 0.59)						



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Analysis 1.2. Comparison 1 MI versus no intervention, Outcome 2 Readiness to change.

Review: Motivational interviewing for substance abuse

Comparison: 1 MI versus no intervention

Outcome: 2 Readiness to change

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Brown 2010	92	92	-0.22 (0.19)		13.9 %	-0.22 [-0.59, 0.15]
Carroll 2006a	178	173	0.18 (0.08)		32.2 %	0.18 [0.02, 0.34]
Emmen 2005	62	61	0.38 (0.22)		11.3 %	0.38 [-0.05, 0.81]
Freyer-Adam 2008	249	225	-0.11 (0.18)		15.0 %	-0.11 [-0.46, 0.24]
Schaus 2009	182	181	0 (0.1)		27.7 %	0.0 [-0.20, 0.20]
Total (95% CI)					**100.0 %**	**0.05 [-0.11, 0.22]**

Heterogeneity: Tau^2 = 0.02; Chi^2 = 7.67, df = 4 (P = 0.10); I^2 =48%

Test for overall effect: Z = 0.63 (P = 0.53)

Analysis 1.3. Comparison 1 MI versus no intervention, Outcome 3 Retention in treatment.

Review: Motivational interviewing for substance abuse

Comparison: 1 MI versus no intervention

Outcome: 3 Retention in treatment

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Carroll 2006a	178	173	0.18 (0.08)		75.2 %	0.18 [0.02, 0.34]
Connors 2002	36	40	0.488 (0.233)		24.8 %	0.49 [0.03, 0.94]
Total (95% CI)					**100.0 %**	**0.26 [0.00, 0.52]**

Heterogeneity: Tau^2 = 0.02; Chi^2 = 1.56, df = 1 (P = 0.21); I^2 =36%

Test for overall effect: Z = 1.93 (P = 0.054)

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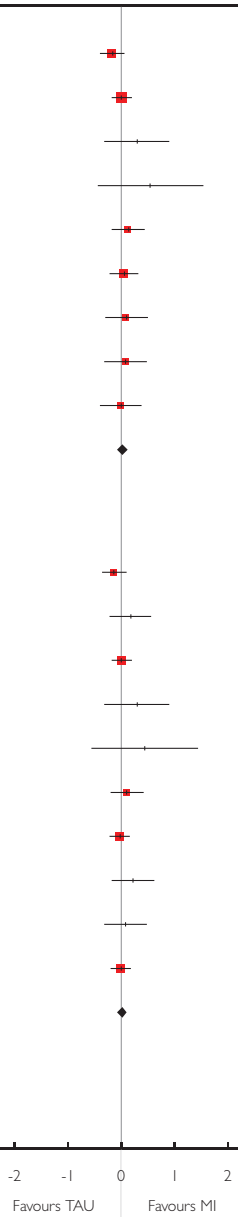
Analysis 2.1. Comparison 2 MI versus treatment as usual, Outcome 1 Extent of substance use.

Review: Motivational interviewing for substance abuse

Comparison: 2 MI versus treatment as usual

Outcome: 1 Extent of substance use

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
1 Post-intervention						
Ball 2007b	245	216	-0.172 (0.117)		20.1 %	-0.17 [-0.40, 0.06]
Carroll 2009	222	214	0 (0.096)		29.8 %	0.0 [-0.19, 0.19]
D'Amico 2008	26	38	0.286 (0.311)		2.8 %	0.29 [-0.32, 0.90]
Kavanagh 2004	12	13	0.539 (0.505)		1.1 %	0.54 [-0.45, 1.53]
Maisto 2001	100	100	0.127 (0.16)		10.7 %	0.13 [-0.19, 0.44]
Saitz 2007	169	172	0.047 (0.135)		15.1 %	0.05 [-0.22, 0.31]
Walitzer 2008	58	58	0.092 (0.204)		6.6 %	0.09 [-0.31, 0.49]
Walker 2006	50	47	0.078 (0.203)		6.7 %	0.08 [-0.32, 0.48]
Winhusen 2008	98	102	-0.014 (0.197)		7.1 %	-0.01 [-0.40, 0.37]
Subtotal (95% CI)					**100.0 %**	**0.01 [-0.09, 0.11]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 5.21, df = 8 (P = 0.73); I^2 =0.0%						
Test for overall effect: Z = 0.20 (P = 0.84)						
2 Short f-u						
Ball 2007b	245	216	-0.137 (0.118)		13.9 %	-0.14 [-0.37, 0.09]
Bazargan-Hejazi 2005	151	144	0.165 (0.204)		4.6 %	0.17 [-0.23, 0.56]
Carroll 2009	222	214	0 (0.096)		21.0 %	0.0 [-0.19, 0.19]
D'Amico 2008	26	38	0.286 (0.311)		2.0 %	0.29 [-0.32, 0.90]
Kavanagh 2004	12	13	0.43 (0.512)		0.7 %	0.43 [-0.57, 1.43]
Maisto 2001	100	100	0.101 (0.16)		7.6 %	0.10 [-0.21, 0.41]
Miller 2003	104	104	-0.028 (0.098)		20.1 %	-0.03 [-0.22, 0.16]
Walitzer 2008	58	58	0.214 (0.201)		4.8 %	0.21 [-0.18, 0.61]
Walker 2006	50	47	0.078 (0.203)		4.7 %	0.08 [-0.32, 0.48]
Winhusen 2008	98	102	-0.014 (0.097)		20.6 %	-0.01 [-0.20, 0.18]
Subtotal (95% CI)					**100.0 %**	**0.01 [-0.08, 0.10]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 5.28, df = 9 (P = 0.81); I^2 =0.0%						
Test for overall effect: Z = 0.24 (P = 0.81)						
3 Medium f-u						



(*Continued . . .*)

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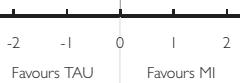
(. . . *Continued*)

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Kavanagh 2004	12	13	0.865 (0.484)		1.9 %	0.87 [-0.08, 1.81]
Maisto 2001	100	100	0.152 (0.16)		17.3 %	0.15 [-0.16, 0.47]
Miller 2003	104	104	0.071 (0.098)		46.1 %	0.07 [-0.12, 0.26]
Saitz 2007	169	172	0.047 (0.135)		24.3 %	0.05 [-0.22, 0.31]
Walitzer 2008	58	58	-0.03 (0.207)		10.3 %	-0.03 [-0.44, 0.38]
Subtotal (95% CI)					**100.0 %**	**0.08 [-0.05, 0.21]**

Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 3.18$, df = 4 (P = 0.53); $I^2 = 0.0\%$

Test for overall effect: Z = 1.26 (P = 0.21)



Analysis 2.2. Comparison 2 MI versus treatment as usual, Outcome 2 Retention in treatment.

Review: Motivational interviewing for substance abuse

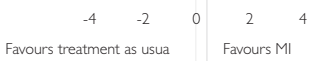
Comparison: 2 MI versus treatment as usual

Outcome: 2 Retention in treatment

Study or subgroup	Control N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Ball 2007b	245	216	-0.1 (0.13)		34.2 %	-0.10 [-0.35, 0.15]
Carroll 2009	222	214	0.14 (0.1)		38.1 %	0.14 [-0.06, 0.34]
Saitz 2007	169	172	-1.424 (0.811)		3.3 %	-1.42 [-3.01, 0.17]
Walitzer 2008	58	58	-0.35 (0.21)		24.4 %	-0.35 [-0.76, 0.06]
Total (95% CI)					**100.0 %**	**-0.11 [-0.41, 0.19]**

Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 8.39$, df = 3 (P = 0.04); $I^2 = 64\%$

Test for overall effect: Z = 0.74 (P = 0.46)



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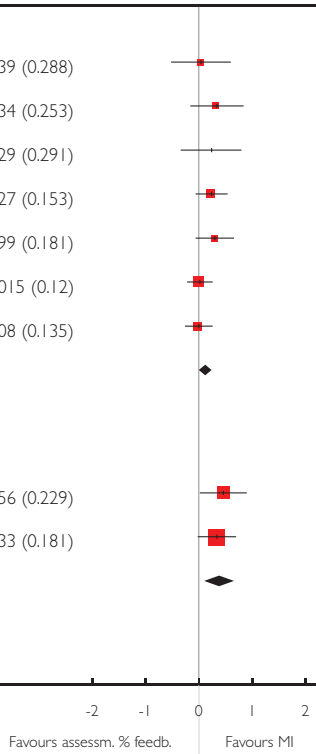
Analysis 3.1. Comparison 3 MI versus assessment and feedback, Outcome 1 Extent of substance use.

Review: Motivational interviewing for substance abuse

Comparison: 3 MI versus assessment and feedback

Outcome: 1 Extent of substance use

Study or subgroup	Assessment and feedback N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
1 Short f-u						
Bernstein 2009	71	68	0.039 (0.288)		5.1 %	0.04 [-0.53, 0.60]
Bien 1993	16	16	0.334 (0.253)		6.6 %	0.33 [-0.16, 0.83]
Sellman 2001	40	42	0.229 (0.291)		5.0 %	0.23 [-0.34, 0.80]
Stein 2010	120	125	0.227 (0.153)		18.0 %	0.23 [-0.07, 0.53]
Stephens 2007	64	62	0.299 (0.181)		12.9 %	0.30 [-0.06, 0.65]
Walters 2009	67	73	0.015 (0.12)		29.3 %	0.02 [-0.22, 0.25]
White 2006	104	118	-0.008 (0.135)		23.1 %	-0.01 [-0.27, 0.26]
Subtotal (95% CI)					**100.0 %**	**0.12 [-0.01, 0.24]**
Heterogeneity: Tau² = 0.0; Chi² = 4.06, df = 6 (P = 0.67); I² =0.0%						
Test for overall effect: Z = 1.81 (P = 0.071)						
2 Medium f-u						
Bernstein 2009	71	68	0.456 (0.229)		38.5 %	0.46 [0.01, 0.90]
Stephens 2007	64	62	0.333 (0.181)		61.5 %	0.33 [-0.02, 0.69]
Subtotal (95% CI)					**100.0 %**	**0.38 [0.10, 0.66]**
Heterogeneity: Tau² = 0.0; Chi² = 0.18, df = 1 (P = 0.67); I² =0.0%						
Test for overall effect: Z = 2.68 (P = 0.0074)						



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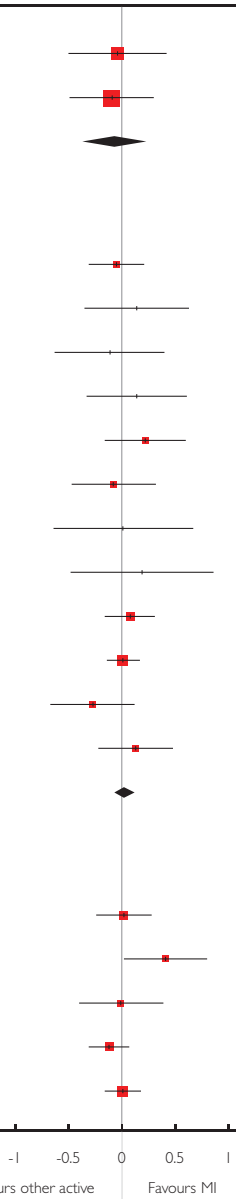
Analysis 4.1. Comparison 4 MI versus other active intervention, Outcome 1 Extent of substance use.

Review: Motivational interviewing for substance abuse

Comparison: 4 MI versus other active intervention

Outcome: 1 Extent of substance use

Study or subgroup	Other intervention N	MI N	Std. Mean Difference (SE)	Weight	Std. Mean Difference IV,Random,95% CI
1 Post-intervention					
Anton 2005	41	39	-0.04 (0.233)	42.7 %	-0.04 [-0.50, 0.42]
Kadden 2007	50	55	-0.094 (0.201)	57.3 %	-0.09 [-0.49, 0.30]
Subtotal (95% CI)				**100.0 %**	**-0.07 [-0.37, 0.23]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 0.03, df = 1 (P = 0.86); I^2 =0.0%					
Test for overall effect: Z = 0.47 (P = 0.64)					
2 Short f-u					
Barnett 2007	113	112	-0.049 (0.133)	12.4 %	-0.05 [-0.31, 0.21]
Borsari 2005	30	34	0.14 (0.251)	3.5 %	0.14 [-0.35, 0.63]
Carroll 2006b	34	33	-0.114 (0.262)	3.2 %	-0.11 [-0.63, 0.40]
Chanut 2007	27	24	0.14 (0.24)	3.8 %	0.14 [-0.33, 0.61]
De Wildt 2002	77	86	0.222 (0.195)	5.8 %	0.22 [-0.16, 0.60]
Kadden 2007	50	55	-0.079 (0.202)	5.4 %	-0.08 [-0.47, 0.32]
Kahler 2004	24	24	0.012 (0.334)	2.0 %	0.01 [-0.64, 0.67]
Martino 2006	20	24	0.189 (0.341)	1.9 %	0.19 [-0.48, 0.86]
McCambridge 2008	162	164	0.078 (0.119)	15.5 %	0.08 [-0.16, 0.31]
UKATT 2005	320	442	0.014 (0.08)	34.3 %	0.01 [-0.14, 0.17]
Walitzer 2008	53	58	-0.271 (0.202)	5.4 %	-0.27 [-0.67, 0.12]
Wood 2007	87	84	0.127 (0.178)	6.9 %	0.13 [-0.22, 0.48]
Subtotal (95% CI)				**100.0 %**	**0.02 [-0.07, 0.12]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 5.24, df = 11 (P = 0.92); I^2 =0.0%					
Test for overall effect: Z = 0.51 (P = 0.61)					
3 Medium f-u					
Barnett 2007	113	112	0.019 (0.133)	18.0 %	0.02 [-0.24, 0.28]
Chanut 2007	27	24	0.41 (0.2)	10.4 %	0.41 [0.02, 0.80]
Kadden 2007	50	55	-0.005 (0.202)	10.2 %	-0.01 [-0.40, 0.39]
MATCH 1993	164	168	-0.116 (0.097)	24.7 %	-0.12 [-0.31, 0.07]
UKATT 2005	320	442	0.01 (0.087)	26.9 %	0.01 [-0.16, 0.18]



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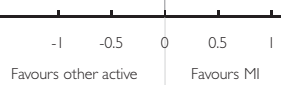
(. . . *Continued*)

Study or subgroup	Other intervention N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Walitzer 2008	53	58	-0.364 (0.208)		9.8 %	-0.36 [-0.77, 0.04]
Subtotal (95% CI)					**100.0 %**	**-0.02 [-0.16, 0.13]**
Heterogeneity: Tau^2 = 0.01; Chi^2 = 8.55, df = 5 (P = 0.13); I^2 =41%						
Test for overall effect: Z = 0.22 (P = 0.83)						
4 Long f-u						
Kadden 2007	50	55	0.063 (0.206)		18.1 %	0.06 [-0.34, 0.47]
MATCH 1993	164	168	-0.055 (0.097)		81.9 %	-0.06 [-0.25, 0.14]
Subtotal (95% CI)					**100.0 %**	**-0.03 [-0.21, 0.14]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 0.27, df = 1 (P = 0.60); I^2 =0.0%						
Test for overall effect: Z = 0.38 (P = 0.70)						



Analysis 4.2. Comparison 4 MI versus other active intervention, Outcome 2 Readiness to change.

Review: Motivational interviewing for substance abuse

Comparison: 4 MI versus other active intervention

Outcome: 2 Readiness to change

Study or subgroup	Other intervention N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Barnett 2007	113	112	-0.02 (0.13)		69.2 %	-0.02 [-0.27, 0.23]
Kadden 2007	62	63	-0.051 (0.195)		30.8 %	-0.05 [-0.43, 0.33]
Total (95% CI)					**100.0 %**	**-0.03 [-0.24, 0.18]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 0.02, df = 1 (P = 0.89); I^2 =0.0%						
Test for overall effect: Z = 0.27 (P = 0.78)						

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Analysis 4.3. Comparison 4 MI versus other active intervention, Outcome 3 Retention in treatment.

Review: Motivational interviewing for substance abuse

Comparison: 4 MI versus other active intervention

Outcome: 3 Retention in treatment

Study or subgroup	Other intervention N	MI N	Std. Mean Difference (SE)	Std. Mean Difference IV,Random,95% CI	Weight	Std. Mean Difference IV,Random,95% CI
Anton 2005	41	39	-0.79 (0.72)		7.9 %	-0.79 [-2.20, 0.62]
De Wildt 2002	78	86	0.06 (0.17)		26.2 %	0.06 [-0.27, 0.39]
Kahler 2004	24	24	-0.3 (0.31)		19.9 %	-0.30 [-0.91, 0.31]
Martino 2006	20	24	0.87 (0.27)		21.7 %	0.87 [0.34, 1.40]
Walitzer 2008	53	58	-0.31 (0.21)		24.4 %	-0.31 [-0.72, 0.10]
Total (95% CI)					**100.0 %**	**0.01 [-0.45, 0.47]**

Heterogeneity: Tau^2 = 0.18; Chi^2 = 14.76, df = 4 (P = 0.01); I^2 =73%

Test for overall effect: Z = 0.03 (P = 0.98)

APPENDICES

Appendix 1. Ovid MEDLINE

1950 to November Week 3 2010
Date: 30.11.2010
1 Interview, Psychological/
2 Feedback, Psychological/
3 (interview$ or feedback$ or enhancement).tw.
4 or/1-3
5 Motivation/
6 motivational$.tw.
7 or/5-6
8 4 and 7
9 exp Substance-Related Disorders/
10 ((drug or substance$ or alcohol or opioid$ or amphetamine$ or cocaine or marijuana or cannabis or phencyclidine or benzodiaz$) adj2 (misuse or abuse$ or addict$ or depend$)).tw.
11 (alcoholi$ or drinker$ or drinking$).tw.
12 exp benzodiazepines/
13 or/9-12
14 8 and 13
15 clinical trial.pt.
16 randomized controlled trial.pt.
17 controlled clinical trial.pt.

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18 randomized.ti,ab.
19 placebo.ti,ab.
20 dt.fs.
21 randomly.ti,ab.
22 trial.ti,ab.
23 groups.ti,ab.
24 control$.ti,ab.
25 quasi$.ti,ab.
26 cluster$.ti,ab.
27 or/15-26
28 Animals/
29 Humans/
30 28 not (28 and 29)
31 27 not 30
32 31 and 14

Appendix 2. Ovid EMBASE

1980 to 2010 Week 46
Date: 30.11.2010
1. exp interview/
2. (interview$ or feedback$ or enhancement).tw.
3. or/1-2
4. motivation/
5. Motivational$.tw.
6. or/4-5
7. Substance Abuse/
8. exp drug abuse/
9. exp Alcohol Abuse/
10. exp Drug Dependence/
11. Alcoholism/
12. Addiction/
13. Withdrawal Syndrome/
14. ((drug or substance$ or alcohol or opioid$ or amphetamine$ or cocaine or marijuana or cannabis or phencyclidine or benzodiaz$) adj2 (misuse or abuse$ or addict$ or depend$)).tw.
15. (alcoholi$ or drinker$ or drinking$).tw.
16. or/7-15
17. 3 and 6 and 16
18. Clinical Trial/
19. Randomized Controlled Trial/
20. Randomization/
21. Double Blind Procedure/
22. Single Blind Procedure/
23. Crossover Procedure/
24. PLACEBO/
25. placebo$.tw.
26. randomi?ed controlled trial$.tw.
27. rct.tw.
28. random allocation.tw.
29. randomly allocated.tw.
30. allocated randomly.tw.
31. (allocated adj2 random).tw.

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32. single blind$.tw.
33. double blind$.tw.
34. ((treble or triple) adj blind$).tw.
35. Prospective study/
36. or/18-35
37. Case study/
38. case report.tw.
39. Abstract report/
40. Letter/
41. Human/
42. Nonhuman/
43. ANIMAL/
44. Animal Experiment/
45. 42 or 43 or 44
46. 45 not (41 and 45)
47. or/37-40,46
48. 36 not 47
49. control$.ti,ab.
50. quasi$.ti,ab.
51. cluster$.ti,ab.
52. or/49-51
53. 36 or 52
54. 53 not 47
55. 54 and 17

Appendix 3. Ovid PsycINFO

Date: 30.11.2010
1806 to November Week 4 2010
1 exp motivational interviewing/
2 (interview$ or feedback$ or enhancement$).tw.
3 Motivational$.tw.
4 2 and 3
5 1 or 4
6 exp drug abuse/
7 exp addiction/
8 ((drug or substance$ or alcohol or opioid$ or amphetamine$ or cocaine or marijuana or cannabis or phencyclidine or benzodiaz$) adj2 (misuse or abuse$ or addict$ or depend$)).tw.
9 (alcoholi$ or drinker$ or drinking$).tw.
10 or/6-9
11 methodology/
12 data collection/
13 empirical methods/
14 Experimental methods/
15 Quasi experimental methods/
16 experimental design/
17 between groups design/
18 followup studies/
19 exp longitudinal studies/
20 repeated measures/
21 experimental subjects/
22 experiment controls/

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23 experimental replication/
24 exp "sampling (experimental)"/
25 placebo/
26 clinical trials/
27 exp treatment outcomes/
28 treatment effectiveness evaluation/
29 empirical study.md.
30 experimental replication.md.
31 followup study.md.
32 longitudinal study.md.
33 meta analysis.md.
34 prospective study.md.
35 retrospective study.md.
36 treatment outcome clinical trial.md.
37 placebo$.tw.
38 randomi?ed controlled trial$.tw.
39 rct.tw.
40 random allocation.tw.
41 (randomly adj1 allocated).tw.
42 (allocated adj2 random).tw.
43 ((singl$ or doubl$ or treb$ or tripl$) adj (blind$3 or mask$3)).tw.
44 (clinic$ adj (trial? or stud$3)).tw.
45 or/11-44
46 comment reply.dt.
47 editorial.dt.
48 letter.dt.
49 clinical case study.md.
50 nonclinical case study.md.
51 animal.po.
52 human.po.
53 51 not (51 and 52)
54 or/46-50,53
55 45 not 54
56 control$.ti,ab.
57 quasi$.ti,ab.
58 cluster$.ti,ab.
59 or/56-58
60 45 or 59
61 60 not 54
62 5 and 10 and 61

Appendix 4. Wiley; Cochrane Library

Clinical Trials
Date: 30.11.2010
#1 MeSH descriptor Interview, Psychological explode all trees
#2 MeSH descriptor Feedback, Psychological explode all trees
#3 (interview* or feedback* or enhancement):ab,ti
#4 (#1 OR #2 OR #3)
#5 MeSH descriptor Motivation explode all trees
#6 motivational*:ti,ab
#7 (#5 OR #6)

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#8 (#4 AND #7)
#9 MeSH descriptor Substance-Related Disorders explode all trees
#10 MeSH descriptor Benzodiazepines explode all trees
#11 ((drug or substance* or alcohol or opioid* or amphetamine* or cocaine or marijuana or cannabis or phencyclidine or benzodiaz*) near/2 (misuse or abuse* or addict* or depend*)):ti,ab
#12 (alcoholi* or drinker* or drinking*):ti,ab
#13 (#9 OR #10 OR #11 OR #12)

Appendix 5. Ovid PsychExtra

1908 to January 14, 2008
Date: 21.01.2008
Note: RCT-filter not used
1 exp CRIMINALS/
2 exp CRIME/
3 exp Correctional Institutions/
4 exp PRISONERS/
5 (prison$ or imprison$ or offender$ or offence$ or incarcerat$ or crim$ or jail$ or delinq$ or punish$ or convict$ or penitentiar$ or correctional or penal or inmate$ or captive$).tw.
6 or/1-5
7 Motivational Interviewing/
8 (interview$ or feedback$ or enhancement therap$).tw.
9 Motivational$.tw.
10 8 and 9
11 7 or 10
12 exp drug abuse/
13 exp addiction/
14 ((drug or substance$ or alcohol or opioid$ or amphetamine$ or cocaine or marijuana or cannabis or phencyclidine or benzodiaz$) adj2 (misuse or abuse$ or addict$ or depend$)).tw.
15 or/12-14
16 6 and 11 and 15
17 11 and 15

Appendix 6. International Bibliography of the Social Sciences

1951 to November Week 3 2009
Note: RCT-filter not used
1 exp motivation/
2 motivational*.tw.
3 or/1-2
4 exp interviews/
5 (interview* or feedback* or enhancement).tw.
6 or/4-5
7 3 and 6
8 exp drug addiction/ or exp drug addicts/
9 exp "drug use"/
10 exp drug users/
11 ((drug or substance* or alcohol or opioid* or amphetamine* or cocaine or marijuana or cannabis or phencyclidine or benzodiaz*) adj2 (misuse or abuse* or addict* or depend*)).tw.
12 exp cannabis/
13 exp drugs/
14 exp alcohol/

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15 exp alcoholism/
16 addiction/ or addicts/
17 exp "substance use"/
18 (alcoholi* or drinker* or drinking*).tw.
19 or/8-18
20 7 and 19

Appendix 7. ISI Web of Science (Thomson)

Date: 30.11.2010
Note: RCT-filter not used
7 #6 AND #3
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
6 #5 AND #4
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
5 Topic=(motivational*)
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
4 Topic=(interview* or feedback* or enhancement)
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
3 #2 OR #1
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
2 Topic=(alcoholi* or drinker* or drinking*)
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years
1 Topic=((((drug or substance* or alcohol or opioid* or amphetamine* or cocaine or marijuana or cannabis or phencyclidine or benzodiaz*) same (misuse or abuse* or addict* or depend*))))
Databases=SCI-EXPANDED, SSCI, A&HCI Timespan=All Years

Appendix 8. C2-SPECTR

Date: 23.11.2009
Note: RCT-filter not used
interview or enhancement or feedback AND (motivational or motivation)

Appendix 9. Sociological Abstracts

CSA Illumina
Date: 30.11.2010
Note: RCT-filter not used
(((drug or substance* or alcohol or opioid* or amphetamine* or cocaine or marijuana or cannabis or phencyclidine or benzodiaz*) within 2 (misuse or abuse* or addict* or depend*)) or (alcoholi* or drinker* or drinking*) or (DE=("addiction" or "drug addiction" or "drug injection" or "drugs" or "narcotic drugs" or "opiates" or "heroin" or "psychedelic drugs" or "lysergic acid diethylamide" or "tranquilizing drugs")) or (DE=("substance abuse" or "alcohol abuse" or "drug abuse" or "drug addiction"))) and (((interview* or feedback* or enhancement) or (DE="feedback") or (DE="interviews")) and ((motivational*) or (DE="motivation")))

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Appendix 10. SveMed+

Date: 30.11.2010
Note: RCT-filter not used
Search term: motivational

Appendix 11. Bibliograpy of Nordic Criminology

Date: 23.11.2009
Note: RCT-filter not used
Search term: motivational

Appendix 12. CINCH

Date: 30.11.2010
Note: RCT-filter not used
Search term: +motivational

Appendix 13. NCJRS

Date: 30.11.2010
Note: RCT-filter not used
Search term:
Subject: motivational (Site search)

Appendix 14. Springerlink

Date: 02.10.2010
Note: RCT-filter not used
Search terms:
Summary: motivational and (interview* or feedback* or enhancement*)

Appendix 15. Wiley Interscience

Date: 02.12.2010
Note: RCT-filter not used
Search terms:
motivational and (interview* or feedback* or enhancement*) in Article Titles

Appendix 16. Drug Data (formerly DrugScope Library)

Date: 02.12.2010
Note: RCT-filter not used
Search terms:
Title or Subject: motivational interview* or motivational feedback* or motivational enhancement*

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Appendix 17. Electronic Library of the National Documentation Centre on DRug Use (NCD)

Date: 02.12.2010
Note: RCT-filter not used
Search term:
Motivational

Appendix 18. Google

Date: 02.02.2009
research OR evaluation OR evaluations OR outcome OR outcomes OR effect OR effects OR trial OR trials OR study OR studies "motivational interviewing"
First 100 hits

Appendix 19. Google Scholar

Date: 02.02.2009
research OR evaluation OR evaluations OR outcome OR outcomes OR effect OR effects OR trial OR trials OR study OR studies "motivational interviewing"
First 100 hits

Appendix 20. Drug Data

Date 02.12.2010

HISTORY

Protocol first published: Issue 4, 2009

Review first published: Issue 5, 2011

Date	Event	Description
13 January 2011	Amended	First draft of this review.

CONTRIBUTIONS OF AUTHORS

Karlsen conceived of the idea and commissioned the review. All reviewers were involved in planning the review. Smedslund wrote the methods section of the protocol. Karlsen and Smedslund wrote the background. Hammerstrøm developed the search strategy, performed the original searches and the final search in November 2010. All authors were involved with screening of studies. Smedslund and Berg did the risk of bias and data extraction. Berg and Smedslund graded the results. Smedslund did the analyses and wrote the results and discussion.

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DECLARATIONS OF INTEREST

None.

SOURCES OF SUPPORT

Internal sources

- Norwegian Knowledge Centre for the Health Services, Norway.

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We excluded studies that recruited participants in emergency rooms and provided one session of MI during the stay in the emergency room. Some of the searches in electronic databases are not up to date. PsychExtra (search date January 14, 2008) and International Bibliography of the Social Sciences (November 2009) were not searched in November 2010 because we did not have access. C2 SPECTR and Bibliography of Nordic Criminology were searched on November 23, 2009, and these databases have not been updated since this date. Google and Google Scholar were searched on February 2, 2009, and we did not believe that a new search was worthwhile in November 2010.

In cases where effect size information could not be obtained from the authors of the primary studies, we used effect size data from published systematic reviews and meta-analyses. If necessary, we contacted the authors of the systematic reviews/meta-analyses for more information.

We do not report fixed-effect meta-analyses because we believe that there are systematic differences between studies related to differences in interventions given, populations studied, comparison groups, and outcome measures.

We did not do separate analyses for persons with and without mental problems. There was only one study (Martino 2006), in which the participants were explicitly described as having mental problems, but mental problems are so frequently co-occurring with substance abuse that we did not believe it was meaningful to do separate analyses for this variable.

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