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Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

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[Intervention Review]

Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

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ABSTRACT

Background

Smoking rates in people with alcohol and other drug dependencies are two to four times those of the general population. Concurrent treatment of tobacco dependence has been limited due to concern that these interventions are not successful in this population or that recovery from other addictions could be compromised if tobacco cessation was combined with other drug dependency treatment.

Objectives

To evaluate whether interventions for tobacco cessation are associated with tobacco abstinence for people in concurrent treatment for or in recovery from alcohol and other drug dependence.

Search methods

We searched the Cochrane Tobacco Addiction Group Specialised Register, the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, and clinicaltrials.gov databases, with the most recent search completed in August 2016. A grey literature search of conference abstracts from the Society on Nicotine Research and Treatment and the ProQuest database of digital dissertations yielded one additional study, which was excluded.

Selection criteria

We included randomised controlled trials assessing tobacco cessation interventions among people in concurrent treatment for alcohol or other drug dependence or in outpatient recovery programmes.

Data collection and analysis

Two review authors independently assessed study risk of bias and extracted data. We resolved disagreements by consensus. The primary outcome was abstinence from tobacco use at the longest period of follow-up, and the secondary outcome was abstinence from alcohol or other drugs, or both. We reported the strictest definition of abstinence. We summarised effects as risk ratios and 95% confidence intervals (CI). Two clustered studies did not provide intraclass correlation coefficients, and were excluded from the sensitivity analysis. We used the I^2 statistic to assess heterogeneity.

Main results

Thirty-five randomised controlled trials, one ongoing, involving 5796 participants met the criteria for inclusion in this review. Included studies assessed the efficacy of tobacco cessation interventions, including counselling, and pharmacotherapy consisting of nicotine replacement therapy (NRT) or non-NRT, or the two combined, in both inpatient and outpatient settings for participants in treatment and in recovery. Most studies did not report information to assess the risk of allocation, selection, and attrition bias, and were classified as unclear.

Analyses considered the nature of the intervention, whether participants were in treatment or recovery and the type of dependency. Of the 34 studies included in the meta-analysis, 11 assessed counselling, 11 assessed pharmacotherapy, and 12 assessed counselling in combination with pharmacotherapy, compared to usual care or no intervention. Tobacco cessation interventions were significantly associated with tobacco abstinence for two types of interventions. Pharmacotherapy appeared to increase tobacco abstinence (RR 1.88, 95% CI 1.35 to 2.57, 11 studies, 1808 participants, low quality evidence), as did combined counselling and pharmacotherapy (RR 1.74, 95% CI 1.39 to 2.18, 12 studies, 2229 participants, low quality evidence) at the period of longest follow-up, which ranged from six weeks to 18 months. There was moderate evidence of heterogeneity (I^2 = 56% with pharmacotherapy and 43% with counselling plus pharmacotherapy). Counselling interventions did not significantly increase tobacco abstinence (RR 1.33, 95% CI 0.90 to 1.95).

Interventions were significantly associated with tobacco abstinence for both people in treatment (RR 1.99, 95% CI 1.59 to 2.50) and people in recovery (RR 1.33, 95% CI 1.06 to 1.67), and for people with alcohol dependence (RR 1.47, 95% CI 1.20 to 1.81) and people with other drug dependencies (RR 1.85, 95% CI 1.43 to 2.40).

Offering tobacco cessation therapy to people in treatment or recovery for other drug dependence was not associated with a difference in abstinence rates from alcohol and other drugs (RR 0.97, 95% CI 0.91 to 1.03, 11 studies, 2231 participants, moderate evidence of heterogeneity (I^2 = 66%)).

Data on adverse effect of the interventions were limited.

Authors' conclusions

The studies included in this review suggest that providing tobacco cessation interventions targeted to smokers in treatment and recovery for alcohol and other drug dependencies increases tobacco abstinence. There was no evidence that providing interventions for tobacco cessation affected abstinence from alcohol and other drugs. The association between tobacco cessation interventions and tobacco abstinence was consistent for both pharmacotherapy and combined counselling and pharmacotherapy, for participants both in treatment and in recovery, and for people with alcohol dependency or other drug dependency. The evidence for the interventions was low quality due primarily to incomplete reporting of the risks of bias and clinical heterogeneity in the nature of treatment. Certain results were sensitive to the length of follow-up or the type of pharmacotherapy, suggesting that further research is warranted regarding whether tobacco cessation interventions are associated with tobacco abstinence for people in recovery, and the outcomes associated with NRT versus non-NRT or combined pharmacotherapy. Overall, the results suggest that tobacco cessation interventions incorporating pharmacotherapy should be incorporated into clinical practice to reduce tobacco addiction among people in treatment for or recovery from alcohol and other drug dependence.

PLAIN LANGUAGE SUMMARY

Do tobacco cessation interventions provided during substance abuse treatment or recovery help tobacco users to quit?

Background

Tobacco use is a leading preventable cause of death worldwide, and smoking rates are especially high among people who are dependent on alcohol or other drugs. People who are being treated for alcohol or other drug addictions have not usually been offered treatment to help them stop smoking at the same time. There has been concern that trying to stop smoking might make people in treatment less likely to recover from other addictions.

Study characteristics

We looked for studies that enrolled adult smokers who were either in treatment or had completed treatment for substance abuse, in hospital, outpatient or community settings and randomised them to either a treatment to help them stop smoking or a control. We last searched for evidence in August 2016. We found 34 published studies. The types of smoking cessation treatment tested included:

counselling (which might be a brief advice session or multiple sessions of behavioural support, either individually or in a group); medicine (called pharmacotherapy; including any type of nicotine replacement therapy, with or without other medicines that help smokers to stop smoking); or a combination of counselling and pharmacotherapy. We combined the results of trials separately for each of these types of treatment, although different trials used different treatments. People who were in the control groups received usual care, brief advice about quitting smoking, or were put on a waiting list to receive treatment later. Most trials assessed the number of people who had quit smoking at least six months after beginning treatment although we also included some studies with a shorter time.

Key results

Eleven studies with 1808 people tested the effects of various types of pharmacotherapy. There was evidence that people given pharmacotherapy were more successful at quitting smoking. Twelve studies with 2229 participants tested treatments that combined pharmacotherapy and counselling. There was evidence that people given combined treatments were more successful at quitting smoking. Eleven studies with 1759 people tested the effect of counselling compared to usual care. Combining these results did not show evidence of a benefit of counselling alone.

Eleven studies with 2231 people reported whether people remained abstinent from alcohol and other drugs. Providing tobacco cessation interventions did not make people more likely to return to using alcohol or other drugs.

We found no evidence that it made a difference whether people were given treatment to quit smoking when they were just starting treatment for other drug use or after they were in recovery. Results were also similar for people who were treated for alcohol use and for people who were treated for other drugs such as heroin.

Quality of the evidence

We judged the quality of the evidence to be low. Many studies did not give enough details about the methods that they used. The studies also considered very different types of treatment, making comparisons challenging.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON [Explanation]

Tobacco cessation interventions compared to placebo or usual care for people in treatment for or recovery from alcohol or other drug dependency

Patient or population: people in treatment for or recovery from alcohol or other drug dependency
Setting: inpatient and outpatient treatment programmes
Intervention: tobacco cessation interventions
Comparison: placebo or usual care

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with placebo or usual care	Risk with tobacco cessation interventions				
Tobacco abstinence after counselling (counselling) assessed with: biochemical validation Follow-up: range 6 weeks to 12 months	Study population		RR 1.33 (0.90 to 1.95)	1759 (11 RCTs)	⊕⊕◯◯ Low [1,2]	Baseline risk assessed in study outcomes
	47 per 1000	62 per 1000 (42 to 91)				
Tobacco abstinence after pharmacotherapy (pharmacotherapy) assessed with: biochemical validation Follow-up: range 8 weeks to 6 months	Study population		RR 1.88 (1.37 to 2.57)	1808 (11 RCTs)	⊕⊕◯◯ Low [1,3]	Baseline risk assessed in study outcomes
	58 per 1000	109 per 1000 (96 to 167)				
Tobacco abstinence after combined counselling and pharmacotherapy (combined) assessed with: biochemical validation Follow-up: range 13	Study population		RR 1.74 (1.39 to 2.18)	2229 (12 RCTs)	⊕⊕◯◯ Low [1,2]	Baseline risk assessed in study outcomes

weeks to 18 months				
	92 per 1000	160 per 1000 (128 to 201)		

*__The risk in the intervention group__ (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; **RCT:** randomised controlled trial; **RR:** risk ratio.

GRADE Working Group grades of evidence
High quality: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

[1] Limited information provided regarding study designs; some cluster-randomised studies and waiting list controls.
[2] Clinical interventions had substantial variance, ranging from one-time to daily counselling sessions and individual or group therapy.
[3] Evidence of publication bias.

BACKGROUND

Tobacco kills up to half its users, accounting for nearly six million deaths annually worldwide (WHO 2016a). Tobacco-related disease is the leading preventable cause of death in the US (USDHSS 2014), and smoking rates in alcohol and drug-dependent people, as well as people with mental health disorders, are two to four times that of the general population (Kalman 2005). Estimates suggest these groups account for approximately half of all smoking-related deaths (Mauer 2006; Schroeder 2009; Williams 2004). In the US, less than one-quarter of the population smokes and overall smoking rates have declined since the 1960s (Schroeder 2004). Among people with drug dependency and mental health disorders, however, smoking rates have remained constant (Lamberg 2004).

The health risks of smoking in these high-risk populations have frequently been viewed as less relevant than the perceived therapeutic benefits of smoking, which were presumed to calm people with psychiatric disorders and reduce the risk of relapse for people recovering from alcohol and other drug dependence. The expectation that smoking was beneficial for these populations has persisted despite empirical findings showing the opposite effects (Guydish 2007; Philip Morris 1994; Psychiatric News 1994), and has discouraged the enactment of policy interventions that would reduce the disproportionate deaths from tobacco use that these high-risk populations experience (Apollonio 2005; Gudrais 2008).

This review specifically addresses tobacco cessation interventions for people diagnosed with alcohol and other drug dependence (other Cochrane Reviews address populations with mental health disorders, see Tsoi 2013 and Van der Meer 2013). The World Health Organization estimates that over 15 million people worldwide have substance use disorders (WHO 2016b). In the US, studies estimate that nearly 13% of the population is addicted to alcohol, other drugs, or both (CASA 2012; NIDA 2012). The median smoking rate among adults in treatment for drug dependency is 76% (Guydish 2011). Due to high smoking rates, people in these populations face a disproportionate risk of death due to tobacco use. People with alcohol dependency, for example, have a 51% risk of dying from tobacco-related disease, compared to a 34% risk of dying from alcohol-related causes (Hurt 1996). Surveys also suggest that participants in treatment for or recovery from alcohol and other drug dependency want to quit smoking and are interested in receiving smoking cessation therapy (Joseph 2003). As a result, increasing numbers of researchers now argue that access to tobacco cessation therapy during treatment and recovery would be clinically appropriate as a means of reducing smoking-related deaths in these populations (Abrams 2010; Baca 2009; Levy 2010).

Despite these findings, neglect of tobacco addiction in high-risk populations remains common. This neglect is sometimes attributed to the stigma faced by people experiencing mental health disorders or drug dependency (Schroeder 2008). In addition, questions remain as to how to treat tobacco comorbidity and whether tobacco cessation therapy should be offered during treatment for other drug dependencies or delayed until recovery. Concurrent treatment of tobacco addiction with treatment for other drug dependencies has been limited due to staff fears that recovery could be compromised if clients tried to simultaneously quit smoking (Goldsmith 1993; Richter 2006). For example, in the US, only one-third of respondents representing alcohol treatment programmes agreed that clients in treatment should be encouraged to quit smoking (Bobo 1995); similar results have been reported for providers in Australia and Switzerland (Walsh 2005; Zullino 2000).

Description of the condition

Tobacco use in populations dealing with alcohol and other drug dependency causes significant morbidity and mortality. It is not clear how or when to address tobacco addiction in these populations. Alcohol and other drug dependency is highly correlated with mental health disorders (dual diagnosis); 60% of people with substance use disorder also experience mental illness (NIDA 2007). Smokers with a history of alcoholism are more nicotine dependent than smokers without a history of alcoholism (Hurt 2003; Ward 2012), and these people are also less likely to quit smoking (Hays 1999). Former alcoholics that seek to quit smoking request more pharmacotherapy than smokers without a history of alcoholism (Hughes 2000).

Description of the intervention

Tobacco cessation treatment can be in the form of counselling, pharmacotherapy, both, or other interventions (e.g. contingency payments, increased doses of medications intended to treat other diagnoses). In this review, we assess the effects of different types of interventions: counselling, pharmacotherapy consisting of nicotine replacement therapy (NRT) with or without non-NRT pharmacotherapy, or a combination of these. Counselling could include individual or group (or both) counselling to encourage behavioural change, for single or multiple sessions, based on methods including the trans-theoretical model of readiness to change, motivational interventions (5-A framework), cognitive behavioural therapy (CBT), and behavioural counselling, which may include education or the provision of information. Pharmacotherapy could include NRT, offered by prescription with tapering under physician supervision or ad libitum, using gum, lozenge, inhaler, or transdermal patch, or non-NRT drugs that reduce the nicotine cravings such as varenicline or bupropion. Combined therapy could include any combination of the treatments included under counselling and pharmacotherapy.

How the intervention might work

Tobacco cessation treatments provide: motivation and support for change through counselling, treatment for withdrawal symptoms using NRT or non-NRT pharmacotherapy, or a combination of these. Counselling can include a clear request to quit, identification of the risks of tobacco use, identification of strategies that reduce barriers to quitting, and organisation of people in comparable situations to discuss concerns and quit strategies. NRT is an alternative delivery system for nicotine that reduces cravings for nicotine that lead to the desire to smoke. Non-NRT pharmacotherapy reduces cravings for nicotine; varenicline is a nicotinic receptor partial agonist and bupropion is a nicotinic antagonist.

The rates at which the general population achieves tobacco abstinence using counselling combined with pharmacotherapy range from 11% to 30% (Campbell 2003). Counselling combined with pharmacotherapy, and combined use of NRT and non-NRT, is more successful than pharmacotherapy alone (Bornemann 2016), and thus combination therapy is recommended in the general population (Ebbert 2007). In some cases, combined treatments can achieve success rates as high as 65% (Bornemann 2016). For people with more severe tobacco dependence, a group that encompasses most people with drug dependency, some research suggests both combination therapy and the use of multiple pharmacological agents (Bornemann 2016; Hurt 2009).

Why it is important to do this review

It is not known whether adding tobacco cessation therapy to drug dependency treatment programmes yields higher overall abstinence from tobacco, alcohol, and other drugs. We systematically reviewed studies that provided tobacco cessation therapy to people in treatment for or recovery from alcohol and other drug dependence and conducted a meta-analysis of the results. Our analyses considered what type of tobacco cessation therapy is associated with increased tobacco abstinence, whether tobacco cessation therapy should be offered concurrently with treatment for other addictive drugs or delayed, and whether the type of drug dependency affects the association between tobacco cessation therapy and tobacco abstinence.

Two earlier reviews have been conducted in this area (Prochaska 2004; Thurgood 2016). This analysis updates and expands on these previous reviews by considering multiple interventions, assessing abstinence from tobacco and other drugs, conducting meta-analyses of treatment effects, and providing a subgroup analysis of follow-up and analysing type of drug dependency.

OBJECTIVES

To evaluate whether interventions for tobacco cessation are associated with tobacco abstinence for people in concurrent treatment for or in recovery from alcohol and other drug dependence.

METHODS

Criteria for considering studies for this review

Types of studies

Studies were randomised controlled trials (RCTs) and cluster-RCTs, with no exclusions based on language of publication or publication status.

Types of participants

Participants were adults aged 15 years or older undergoing inpatient or outpatient treatment for alcohol or other drug dependence, or in recovery from alcohol and other drug dependence, and participating in a study to encourage tobacco cessation. Interventions could target either groups (e.g. the population of a single clinic) or participants (e.g. people at a single clinic). We distinguished between studies that randomised participants within clinics and studies that randomised by clinic site (cluster randomisation). We included information on the type of dependency for which the person originally sought treatment (e.g. alcohol or other drugs, or both). Participants in the included studies did not need to have been selected based on type of tobacco product, level of smoking (e.g. daily smokers) or their presumed suitability for interventions.

Types of interventions

We included counselling and pharmacotherapy interventions designed to encourage tobacco cessation. We organised interventions by type in the following categories:

- counselling only: brief or extended sessions, and individual or group sessions, delivered in a clinic setting for tobacco cessation purposes during the course of existing addictions treatment, in addition to usual care interventions;
- pharmacotherapy: NRT of all modalities (e.g. gum, patch, lozenge), both prescription and non-prescription, offered to participants for tobacco cessation purposes during the course of existing addictions treatment, or non-NRT pharmacology (e.g. varenicline) offered to participants for tobacco cessation purposes during the course of existing addictions treatment, in addition to usual care interventions;
- counselling plus pharmacotherapy: a combination of any of the above methods.

The controls in these studies were participants in substance abuse treatment who were offered different tobacco cessation therapies,

delayed therapy, lower levels of treatment, or no tobacco-related cessation therapy. We excluded interventions that did not rely on counselling or tobacco cessation-related pharmacotherapy (e.g. higher doses of methadone).

Types of outcome measures

Primary outcomes

- Point prevalence tobacco abstinence, defined by self-reported tobacco use or through biochemical validation (e.g. breath carbon monoxide, urinary cotinine) (or both) at the longest follow-up period reported in each study. Results were measured as the number of participants abstinent in each condition (treatment or control) at final follow-up relative to the number of participants enrolled in the study. Biochemical validation of self-reported abstinence was not required but was recorded and used where available. We relied on point prevalence abstinence rather than continuous abstinence, when both were reported, due to the difficulty of follow-up within this population. No minimum length of follow-up was required; the period of longest follow-up ranged from 6 weeks to 18 months.

We recorded the definition of tobacco use as defined by each study. These included current daily use and current occasional use. We excluded studies reporting reduced smoking rather than abstinence from the analysis. We also excluded studies that measured interventions included in the criteria above, but that did not report tobacco abstinence.

Secondary outcomes

- Point prevalence abstinence from alcohol and other drugs as defined by self-reported drug use or through biochemical validation (or both) at the longest follow-up period reported in the study.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Tobacco Addiction Group Specialised Register, the Cochrane Central Register of Controlled Trials (CENTRAL), and MEDLINE. The Specialised Register includes reports of trials identified from systematic and sensitive searches of resources, including MEDLINE, EMBASE, and PsycINFO, for reports of trials of interventions for smoking cessation and prevention (see the Tobacco Addiction Group Module in the Cochrane Library for full details). The Specialised Register search used topic related keywords and free text terms covering alcohol abuse and drug dependence. The CENTRAL search combined topic-related terms and terms related to smoking cessation. Key search criteria combined study design (e.g. RCT, double blind method), smoking cessation (e.g. tobacco, nicotine), and substance abuse (e.g. alcohol abuse, drug dependence). See Appendix 1 for the full MEDLINE search strategy. We conducted an initial CENTRAL and MEDLINE search on 14 February 2012 with search dates ranging from 1970 to 2011. We completed additional searches on 2 August 2016 with search dates updated to 1 August 2016.

Searching other resources

We searched the grey literature, including conference abstracts from the Society for Research on Nicotine and Tobacco, World Health Organization, and the ProQuest database of digital dissertations, and all registered trials through the National Institutes of Health's ClinicalTrials.gov website.

Data collection and analysis

Selection of studies

Three review authors (DA, RP, and LB) independently reviewed the literature searches from the title, abstract, or descriptors, to identify potentially relevant trials.

Data extraction and management

Two review authors (DA and RP) independently extracted data for the trials using a standardised data extraction form prior to entry into Review Manager 5 (RevMan 2014). Two review authors (DA and RP) corresponded with authors in efforts to obtain missing or raw data. We excluded all studies that clearly did not meet the inclusion criteria in terms of study design, population, or interventions. Two review authors (DA and RP) independently extracted the data, which was checked by a second review author (DA or LB). Two review authors independently extracted data for risk of bias for all included studies.

We extracted the following information, when reported, using a tool developed by one review author (LB) and modified by a second review author (DA).

- Methods, including the setting of the trial, study design, study objectives, study site(s), definition of tobacco use, methods of participant recruitment, types of treatment interventions, proposed outcome measures, and methods of analysis.
- Participant data, including age, gender, ethnicity, socioeconomic status, and numbers of participants recruited and assessed.
- Interventions, including descriptions of interventions, duration of treatment, delivery of intervention, type and duration of behavioural support (if applicable) and components of treatment in the control group.

- Outcomes, including methods of data collection for results, definitions of abstinence, abstinence from tobacco, abstinence from other drugs, validation, follow-up period, other follow-ups in the course of the study, and other data as defined under Types of outcome measures.
- Risks of bias, including methods of sequence generation for randomisation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting, clustering by clinic site, imbalance of outcome measures at baseline, comparability of intervention and control group characteristics at baseline, selective recruitment of participants, and other potential threats to validity.

Assessment of risk of bias in included studies

Two review authors (DA and RP) independently evaluated risk of bias, in line with recommendations made in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). The criteria included allocation sequence, allocation concealment, blinding for participants and personnel, selective outcome reporting, and incomplete outcome data. We noted additional criteria recommended by the Cochrane Effective Practice and Organisation of Care (EPOC) group: assessing threats to validity including: imbalance of outcome measures at baseline and comparability of intervention and control group characteristics at baseline (EPOC 2009). For cluster study designs, when relevant we also assessed the risk of bias associated with selective recruitment of participants through choice of site. We assessed risk of bias in each domain as 'low risk of bias', 'high risk of bias', or 'unclear risk of bias', based on the guidelines from the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), with notes indicating the reasons for each assessment included in the 'Risk of bias' table. We resolved conflicts in the assessments either by consensus or by referring to a third review author (LB).

Measures of treatment effect

We calculated risk ratios (RR) for the primary and secondary outcomes with their 95% confidence intervals (CI). The RR was defined as (number of participants abstinent from tobacco in the intervention group/total number randomised to the intervention group)/(number of participants abstinent from tobacco in the control group/total number randomised to the control group). The RR is greater than 1 if more participants remain abstinent from tobacco in the intervention group than in the control group. We used an intention to treat analysis for all studies that reported the numbers of participants assigned to each study condition, classifying participants lost to follow-up as non-abstinent. Of the 34 included studies, two provided no information on loss to follow-up (Kalman 2001; Karam-Hage 2011), one study had no participants lost to follow-up (Heydari 2013), and one study independently verified abstinence for participants that dropped out (Cooney 2009).

Unit of analysis issues

There were two cluster RCTs, for which the analysis was performed at the individual level (Bobo 1996; Bobo 1998). These studies did not adjust for clustering and the incidence rate ratio (IRR) was unavailable. They were included in the meta-analysis given that a sensitivity analysis found their inclusion did not affect the results.

Dealing with missing data

We evaluated missing information regarding participants on an available case analysis basis as described in Chapter 16 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). If information needed for the meta-analysis was missing (e.g. if numbers abstinent in the treatment and control groups were not reported) or could not be calculated, we sought to contact the authors to gain access to these data. If there was loss of participants before baseline assessment, this review assumed that these missing data had no effect on the final results of the analysis. Two review authors (DA and RP) assessed and discussed attrition after baseline assessments. The main considerations were differential attrition between the intervention and control groups, and differential attrition within groups that were correlated with baseline characteristics.

Whenever possible, we recorded the extent of participants lost to follow-up in each condition. Because loss to follow-up in the case of tobacco cessation treatment is typically associated with continued tobacco use, participants lost to follow-up were coded as non-abstinent.

Assessment of heterogeneity

We classified trials according to the subgroups listed in Types of interventions. We combined studies within these categories of intervention. There can be heterogeneity due to different factors, including level of tobacco use (e.g. number of cigarettes smoked per day), demographics, time to follow-up measures, and measurement tools (e.g. self-report versus clinical assessment). If the confidence intervals of studies have poor overlap, this usually indicates the presence of statistical heterogeneity.

In addition to visually inspecting data, we used I^2 statistic to identify inconsistencies between studies and groups (Higgins 2011). The Chi^2 test has low power when studies have small sample sizes, or when there are few studies. Recognising that some level of statistical heterogeneity is inevitable, the I^2 statistic instead attempts to quantify the potential impact of this heterogeneity on a meta-analysis. It describes the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling. We also considered Chi^2; outcomes were similar. The review used a fixed-effect model throughout the analyses.

Assessment of reporting biases

There are limited statistical methods to detect within-study selective reporting. If non-significant results were mentioned but not reported adequately, we assumed that there was risk of bias. Unfortunately, information sought from authors of studies may be incomplete or unreliable (Chan 2004a; Chan 2004b). Our analysis assessed whether a small number of key outcomes were present in all the included studies, and reported which studies included these outcomes and which did not. We assessed the risk of bias due to selective reporting of outcomes for each study rather than for individual outcomes. Where we suspected selective outcome reporting, we contacted study authors for additional information. We created funnel plots for included studies by outcome. Based on prior research, we assumed that studies that considered pharmacotherapy had a high risk of publication bias.

Data synthesis

We conducted meta-analyses for the primary outcome of point prevalence tobacco abstinence based on the type of intervention, stage of treatment or recovery, and the type of addiction. We analysed data using Review Manager 5 (RevMan 2014). We included multi-arm trials, but extracted only data from the relevant comparisons. We also conducted meta-analysis for the secondary outcome of point prevalence abstinence from alcohol and other drugs. We used the GRADE approach to assess overall quality of evidence. Given that this review included only RCTs, evidence was downgraded from 'high quality' by one level for study limitations including risk of bias, inconsistency, indirectness, imprecision, or risk of publication bias. We generated the 'Summary of findings' table for each type of intervention (counselling, pharmacotherapy, or combined) in GRADEpro and imported into Review Manager 5 (RevMan 2014). The table provides information for each outcome regarding the overall quality of evidence, the magnitude of the effects, and the overall data.

Subgroup analysis and investigation of heterogeneity

In studies that offered extended follow-up of participants, we presented results for several periods of follow-up including short-term (four weeks or less), medium-term (four weeks to six months), and long-term (greater than six months). In studies with more than one follow-up assessment, we reported outcomes at the longest follow-up period. We conducted subgroup analysis for people in treatment relative to people in recovery and by type of addiction. We conducted subgroup analysis for NRT versus non-NRT pharmacotherapy, and for people in treatment versus recovery.

Sensitivity analysis

We conducted sensitivity analysis on studies that were cluster randomised (Bobo 1996; Bobo 1998). The studies included in this review were all RCTs and this restriction limits concern about several methodological issues unique to the cluster RCTs.

RESULTS

Description of studies

Results of the search

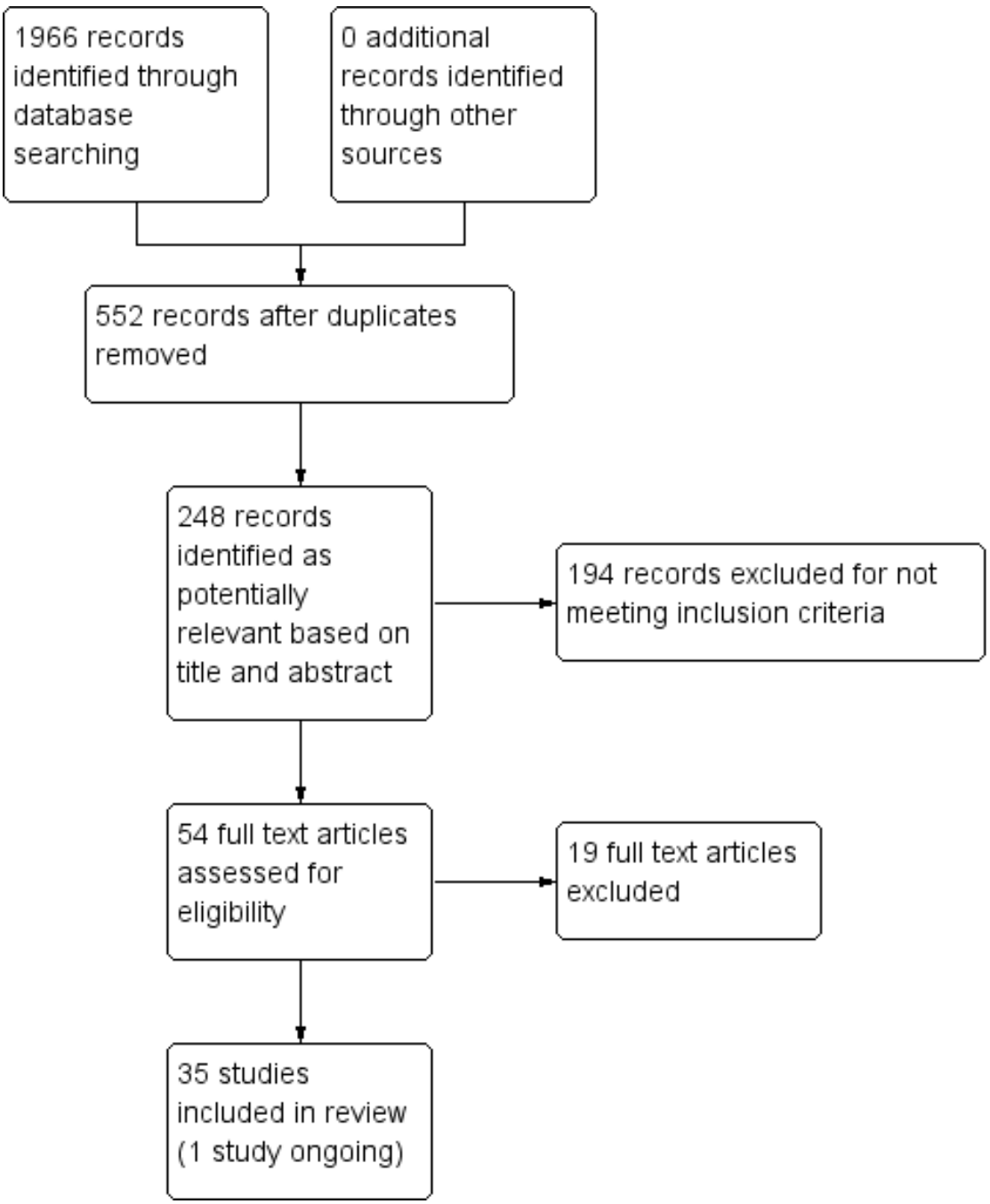
The review included 34 studies involving 5796 participants (Baltieri 2009; Bobo 1996; Bobo 1998; Breland 2014; Burling 1991; Burling 2001; Campbell 1995; Carmody 2012; Cooney 2007; Cooney 2009; Cooney 2015; Gariti 2002; Grant 2003; Grant 2007; Hays 2009; Heydari 2013; Hughes 2003; Joseph 2004; Kalman 2001; Kalman 2011; Karam-Hage 2011; Martin 1997; Mooney 2008; Mueller 2012; Nahvi 2014; Nieva 2011; Patten 1998; Reid 2008; Rohsenow 2014; Rohsenow 2015a; Shoptaw 2002; Stein 2006; Stein 2013; Winhusen 2014). All the included studies addressed cigarette smoking, one study also included hookah use (Heydari 2013). Details are listed in the Characteristics of included studies table.

The electronic searches yielded 1966 citations and no relevant citations were identified from the additional searches. Searching all registered trials through the National Institutes of Health's ClinicalTrials.gov website yielded 11 records, four of which were relevant (Alessi 2006; O'Malley 2012; Rohsenow 2014; Tsoh 2008). Of these four studies, one had associated publications included in the review (Rohsenow 2014), one was ongoing (O'Malley 2012), and two had posted no results and listed no associated publications (Alessi 2006; Tsoh 2008). A search through the grey literature, including conference abstracts from the Society on Nicotine Research and Treatment and the ProQuest database of digital dissertations yielded one additional study, a conference abstract with no results available from the authors (Higley 2014).

After removing duplicates, 552 studies remained. From those, 248 records were potentially relevant based on title and abstract. Of these, we excluded 194 for not meeting study criteria (including not an RCT, post-hoc analysis of a prior study, methodological description of an existing study). We assessed the 54 remaining articles for eligibility and excluded 19 of these studies. The Characteristics of excluded studies table contains the reasons for exclusion (e.g. measured reduction in smoking rather than abstinence, incomplete outcome data, intervention that was not tobacco cessation pharmacotherapy or counselling).

The review included 35 studies (Figure 1). One of these studies was ongoing; it assesses pharmacotherapy (varenicline) and is described in Characteristics of ongoing studies (O'Malley 2012). The results of the ongoing study were not included in the analysis due to incomplete reporting of results (O'Malley 2012).

Figure 1. Study flow diagram.



Included studies

The 34 studies included in the meta-analysis involved results from five countries; 30 of the studies were conducted in the US, one in Brazil (Baltieri 2009), one in Iran (Heydari 2013), one in Switzerland (Mueller 2012), and one in Spain (Nieva 2011). Details of included studies can be found in the Characteristics of included studies table. The characteristics of studies included in each subgroup analysis for the primary outcome of tobacco abstinence are described below.

Tobacco abstinence by intervention type

The inclusion criteria identified relevant interventions as counselling, pharmacotherapy, or a combination of these.

Of the 34 studies included in the analysis, 11 studies involving 1759 participants offered counselling for treatment relative to usual care; usual care could include pharmacotherapy. Of the 11 counselling studies, two offered one-time individual counselling for 10 to 15 minutes (Bobo 1996; Bobo 1998), one offered a 30-minute motivational interviewing intervention (Breland 2014), one offered 15-minute daily counselling (Burling 1991), one offered an individual counselling session and encouragement to attend group sessions (Gariti 2002), one offered five 30-minute CBT sessions specifically targeted to smoking cessation (Mueller 2012), one offered tobacco-specific therapy as part of an existing series of eight × two-hour group counselling sessions (Patten 1998), two offered motivational interviewing intervention sessions with boosters or contingent vouchers (Rohsenow 2014; Rohsenow 2015a), one offered behavioural interventions including 12 × 60-minute group counselling sessions and nicotine patches relative to a control group receiving only nicotine patches (Shoptaw 2002), and one offered four motivational interviewing sessions combined with skills training follow-ups (Stein 2006).

An additional 11 studies involving 1808 participants considered pharmacotherapy for tobacco cessation, relative to usual care, which could include both counselling and other pharmaceutical interventions. Of these, one study offered either naltrexone or topiramate (Baltieri 2009), one offered ab libitum nicotine gum in addition to nicotine patches (Cooney 2009), two offered bupropion in addition to the usual care provision of nicotine patches (Grant 2007; Kalman 2011), two offered bupropion (Hays 2009; Karam-Hage 2011), two offered nicotine patches and gum (Heydari 2013; Hughes 2003), one offered bupropion, buprenorphine, and counselling relative to a control group that received only buprenorphine and counselling (Mooney 2008), one offered varenicline (Nahvi 2014), and one had two intervention arms, one offering varenicline and one offering NRT patches and ad libitum nicotine rescue (Stein 2013).

The remaining 12 studies involving 2229 participants offered tobacco cessation therapy that combined counselling and pharmacotherapy, relative to usual care. Of the 12 studies, 11 offered counselling in combination with NRT (Campbell 1995; Carmody 2012; Cooney 2007; Cooney 2015; Grant 2003; Joseph 2004; Kalman 2001; Martin 1997; Nieva 2011; Reid 2008), and one offered counselling in combination with both NRT and bupropion (Winhusen 2014).

Tobacco abstinence by in treatment or in recovery

The review included studies that enrolled participants both in treatment for and in recovery from addiction to alcohol and other drugs.

Of the 34 studies included in the analysis, 12 studies were conducted with 2134 participants in treatment for alcohol or other drug dependency (or both) (Cooney 2015; Hays 2009; Heydari 2013; Hughes 2003; Kalman 2011; Karam-Hage 2011; Martin 1997; Mueller 2012; Patten 1998; Rohsenow 2014; Rohsenow 2015a; Winhusen 2014). The remaining 22 studies were conducted with 3792 participants in recovery from alcohol or other drug dependency (or both) (Baltieri 2009; Bobo 1996; Bobo 1998; Breland 2014; Burling 1991; Burling 2001; Campbell 1995; Carmody 2012; Cooney 2007; Cooney 2009; Gariti 2002; Grant 2003; Grant 2007; Joseph 2004; Kalman 2001; Mooney 2008; Nahvi 2014; Nieva 2011; Reid 2008; Shoptaw 2002; Stein 2006; Stein 2013).

Tobacco abstinence by type of dependency

Participants in the included studies were diagnosed with alcohol dependence or dependence on other drugs.

Of the 34 studies included in the analysis, 17 studies enrolled 2467 participants in treatment for or in recovery from alcohol dependence (Baltieri 2009; Bobo 1996; Carmody 2012; Cooney 2007; Cooney 2009; Cooney 2015; Grant 2007; Hughes 2003; Joseph 2004; Kalman 2001; Kalman 2011; Karam-Hage 2011; Martin 1997; Mueller 2012; Nieva 2011; Patten 1998; Rohsenow 2014). The remaining 17 students enrolled 3329 participants in treatment for or in recovery from other drug dependence, or combined dependence (Bobo 1998; Breland 2014; Burling 1991; Burling 2001; Campbell 1995; Gariti 2002; Grant 2003; Hays 2009; Heydari 2013; Mooney 2008; Nahvi 2014; Reid 2008; Rohsenow 2015a; Shoptaw 2002; Stein 2006; Stein 2013; Winhusen 2014).

Other study characteristics

Randomisation: in two of the studies, participants were cluster randomised by clinic site (Bobo 1996; Bobo 1998), while in the remaining studies the participants were the unit of randomisation.

Controls: three of the 34 studies used waiting list controls (Campbell 1995; Cooney 2015; Nieva 2011). This means that participants were randomised to receive the intervention immediately or after a defined time.

Follow-up: the 34 included studies had varied lengths of maximum follow-up; 16 studies with approximately six months of longest follow-up, and 11 studies following participants for one year or longer. Participants were followed for a maximum of six weeks (Breland 2014), eight weeks (Karam-Hage 2011), 12 weeks (Baltieri 2009; Mooney 2008), 13 weeks (Cooney 2015), 16 weeks (Campbell 1995), 20 weeks (Kalman 2001), and periods of approximately six months, including 24 weeks (Kalman 2011; Nahvi 2014), 26 weeks (Reid 2008), and six months (Bobo 1996; Burling 1991; Cooney 2007; Gariti 2002; Grant 2007; Hays 2009; Heydari 2013; Hughes 2003; Mueller 2012; Nieva 2011; Stein 2006; Stein 2013; Winhusen 2014). The remaining studies had their longest follow-ups at 12 months (Bobo 1998; Burling 2001; Carmody 2012; Cooney 2009; Grant 2003; Patten 1998; Martin 1997; Rohsenow 2014; Rohsenow 2015a; Shoptaw 2002), and 18 months (Joseph 2004).

Validation: biochemical verification (breath or urinary cotinine level) was used to validate self-reported abstinence in 31 of 34 studies, collateral contacts were used to validate self-reported abstinence in two of 34 studies (Grant 2003; Grant 2007), and one study did not validate self-reported abstinence (Baltieri 2009).

Excluded studies

Of the 56 full text articles assessed for eligibility, we excluded 19. Of these 19 excluded studies, seven measured smoking reduction rather than abstinence (Diehl 2006; Haug 2004; Laaksonen 2013; Leggio 2015; Meszaros 2013; Poling 2010; Wiseman 2005), and an additional five studies assessed contingency management for tobacco cessation rather than counselling or pharmacotherapy (Alessi 2008; Alessi 2014; Dunn 2008; Dunn 2010; Rohsenow 2008). We excluded the remaining seven studies for the following reasons: three reported no findings (Alessi 2006; Higley 2014; Tsoh 2008), one did not provide sufficient outcomes data for analysis (Covey 1993), and three intervened with pharmacotherapy that did not vary across study arms or was not targeted to tobacco cessation (Kalman 2006; Rohsenow 2015b; Story 1991).

Details of excluded studies can be found in the Characteristics of excluded studies table.

Risk of bias in included studies

The rationale for risk of bias judgments can be found in the Characteristics of included studies table. Overall, most studies contained inadequate information to assess risk of bias.

Allocation

The risk of selection bias, judged on the basis of allocation concealment, was low in five studies (Joseph 2004; Nahvi 2014; Reid 2008; Rohsenow 2014; Stein 2006), and high in seven studies, including those that randomised by clinics or used waiting list controls (Bobo 1996; Bobo 1998; Campbell 1995; Cooney 2015; Martin 1997; Nieva 2011; Patten 1998). The remaining 22 studies did not describe methods for concealment of allocation and were at unclear risk of bias.

Selection bias, as assessed through random sequence generation for assignment to treatment and control groups, was low in 13 studies (Bobo 1998; Breland 2014; Carmody 2012; Cooney 2009; Cooney 2015; Joseph 2004; Kalman 2011; Mooney 2008; Nahvi 2014; Reid 2008; Rohsenow 2014; Rohsenow 2015a; Shoptaw 2002), and high in two studies (Martin 1997; Patten 1998). The remaining 19 studies did not describe methods of randomisation and were at unclear risk of bias.

Blinding

The risk of performance bias, as measured by blinding of participants and personnel, was low in 12 studies (Baltieri 2009; Bobo 1996; Bobo 1998; Cooney 2009; Kalman 2001; Kalman 2011; Mooney 2008; Nahvi 2014; Rohsenow 2014; Rohsenow 2015a; Stein 2006; Stein 2013), and high in three studies (Campbell 1995; Cooney 2015; Nieva 2011). The remaining 19 studies did not describe methods for blinding and were at unclear risk of bias.

Incomplete outcome data

The risk of attrition bias was low in 11 studies (Bobo 1996; Cooney 2009; Grant 2007; Heydari 2013; Karam-Hage 2011; Nahvi 2014; Nieva 2011; Reid 2008; Rohsenow 2015a; Stein 2006; Stein 2013), and high in three studies (Baltieri 2009; Carmody 2012; Mooney 2008). The remaining 20 studies did not adequately describe loss to follow-up or the differences between treatment and control groups and were at unclear risk of bias.

Other potential sources of bias

Thirty-one of 34 studies used biochemical verification to validate self-reported abstinence (Bobo 1996; Bobo 1998; Breland 2014; Burling 1991; Burling 2001; Campbell 1995; Carmody 2012; Cooney 2007; Cooney 2009; Cooney 2015; Gariti 2002; Hays 2009; Heydari 2013; Hughes 2003; Joseph 2004; Kalman 2001; Kalman 2011; Karam-Hage 2011; Martin 1997; Mooney 2008; Mueller 2012; Nahvi 2014; Nieva 2011; Patten 1998; Reid 2008; Rohsenow 2014; Rohsenow 2015a; Shoptaw 2002; Stein 2006; Stein 2013; Winhusen 2014). An additional two studies used reports by collateral contacts to validate self-reported abstinence (Grant 2003; Grant 2007), and one study did not verify self-reported abstinence (Baltieri 2009).

We created funnel plots for included studies by outcome; all were symmetrical other than a slight asymmetry towards treatment for

pharmacotherapy interventions, suggesting the possibility of publication bias.

Only 11 of 34 studies reported outcomes for abstinence from alcohol or other drugs. As the reasons for failing to report abstinence from other drugs could relate to the costs of assessment, the demands of working with participants in recovery rather than treatment, independent reporting requirements, baseline imbalance, and selective recruitment due to cluster randomisation. The failure to report outcomes for abstinence from alcohol or other drugs was not assumed to be a potential source of bias.

Effects of interventions

See: **Summary of findings for the main comparison** Tobacco cessation interventions compared to placebo or usual care for people in treatment for or recovery from alcohol or other drug dependency

Tobacco abstinence by type of intervention

Offering a counselling intervention relative to usual care was not significantly associated with an increase in tobacco abstinence (RR 1.33, 95% CI 0.90 to 1.95), based on data from 1759 people in 11 studies (Analysis 1.1). A sensitivity analysis excluded the two included studies that had randomised by clinic site rather than at the participant level (Bobo 1996; Bobo 1998); the effects were not sensitive to the exclusion of the cluster RCTs (RR 1.16, 95% CI 0.74 to 1.84). The outcome was downgraded from high to low quality due to the potential for risk of bias due to limited information regarding allocation, blinding, and incomplete outcome data, as well as cluster randomisation and the use of waiting list controls; and clinical heterogeneity in the nature of the interventions, which ranged from a single counselling session to multiple sessions and which could include individual or group therapy (Summary of findings for the main comparison).

Providing pharmacotherapy for tobacco cessation relative to placebo or usual care was significantly associated with tobacco abstinence (RR 1.88, 95% CI 1.37 to 2.57), based on data from 1808 people in 11 studies (Analysis 1.2). Multiple types of pharmacotherapy were included in the main analysis. When the analysis was limited to those studies assessing only NRT, the treatment effect remained significant (RR 7.74, 95% CI 3.00 to 19.94,) 3 studies, 635 participants). When the analysis was limited to those studies assessing either non-NRT pharmacotherapy or studies that combined NRT and non-NRT pharmacotherapy, there was no significant treatment effect (RR 1.25, 95% CI 0.89 to 1.77, 8 studies, 1173 participants). The outcome was downgraded from high to low quality due to the potential for risk of bias and the well-documented risk of publication bias in drug studies (Summary of findings for the main comparison).

Providing combined counselling and pharmacotherapy relative to placebo or usual care (or both) was significantly associated with tobacco abstinence (RR 1.74, 95% CI 1.39 to 2.18) based on data from 2229 people in 12 studies (Analysis 1.3). The outcome was downgraded from high to low quality due to the potential for risk of bias and clinical heterogeneity in the nature of interventions (Summary of findings for the main comparison).

There were no notable differences in risk of bias between counselling and pharmacotherapy interventions; the studies that addressed combined intervention had slightly higher risks of bias. Most studies had unclear risks of bias for some or all domains. Funnel plots were symmetrical for counselling and combined interventions, and slightly asymmetrical toward treatment for pharmacotherapy, suggesting the possibility of publication bias.

Tobacco abstinence by treatment or recovery group

Offering tobacco cessation therapy relative to usual care or placebo was significantly associated with tobacco abstinence at the length of longest follow-up (Analysis 2.1) both for participants in treatment (RR 1.99, 95% CI 1.59 to 2.50) based on data from 2134 people in 12 studies, and for participants in recovery (RR 1.42, 95% CI 1.11 to 1.82) based on data from 3662 people in 22 studies. The effect size was greater for participants in treatment than it was for participants in recovery. The test for subgroup differences showed Chi^2 = 3.98, degrees of freedom (df) = 1 (P = 0.05), I^2 = 74.9%. The clinical significance of this finding is difficult to assess given that studies of participants in treatment could offer tobacco cessation therapies immediately upon enrolment or after a delay (e.g. seven days after admission, 30 days after admission) without indicating whether the delay was expected to influence the outcome of the intervention. Not all studies assessing participants in treatment indicated the point in treatment at which the tobacco cessation intervention occurred. Two studies explicitly addressed the question of concurrent treatment relative to delayed treatment by imposing a six-month/180-day delay in treatment as the intervention (Joseph 2004; Nieva 2011); the results of these studies were inconsistent with each other with respect to abstinence from tobacco. Overall these studies do not provide sufficient evidence to determine whether the observed difference in effect size is clinically relevant. There were no notable differences in risk of bias between the treatment and recovery groups, but most studies had unclear risks of bias for some or all domains. Funnel plots were symmetrical for both participants in treatment and participants in recovery.

Tobacco abstinence by type of dependency

Offering tobacco cessation therapy relative to usual care or placebo was significantly associated with tobacco abstinence at the length of longest follow-up for both participants with alcohol dependence (RR 1.57, 95% CI 1.27 to 1.95) based on data from 2467 people in 17 studies, and participants with other drug dependence or combined alcohol and other dependence (RR 1.85, 95% CI 1.43

to 2.40) based on data from 3329 people in 17 studies (Analysis 3.1). There were no notable differences in risk of bias between the alcohol or other drug dependency groups, but most studies had unclear risks of bias for some or all domains.

A sensitivity analysis considered the effects of excluding the seven studies with less than six months of follow-up from all analyses (Baltieri 2009; Breland 2014; Campbell 1995; Cooney 2015; Kalman 2001; Karam-Hage 2011; Mooney 2008). The effects were not sensitive to the exclusion of studies with less than six months' follow-up except for participants in recovery from alcohol and other drug dependence; when studies with less than six months of follow-up were excluded, tobacco cessation interventions were no longer associated with increased tobacco abstinence in this population. Funnel plots were symmetrical for both types of dependence.

Secondary outcome - abstinence from alcohol or other drugs

Offering tobacco cessation therapy for participants in treatment or recovery for other drug dependence was not associated with a difference in abstinence rates from alcohol and other drugs (RR 0.97, 95% CI 0.91 to 1.03), based on data from 2231 people in 11 studies (Analysis 4.1). All studies included in this analysis had unclear risk of bias for at least one domain. The funnel plot for this outcome was symmetrical.

DISCUSSION

Summary of main results

Tobacco cessation therapy that includes pharmacotherapy appears to be associated with increased tobacco abstinence for participants diagnosed with alcohol and other drug dependence, although the quality of evidence supporting these findings was low. The results of this review are consistent with those of previous reviews (Prochaska 2004; Thurgood 2016). Abstinence rates in this population are low relative to the general population.

The anticipated absolute effects of treatment on tobacco abstinence for this population were 109 per 1000 participants (95% CI 80 to 150) for pharmacotherapy, relative to 58 per 1000 participants for placebo or usual care, for a period of follow-up ranging from eight weeks to six months. The anticipated absolute effects of treatment were 160 per 1000 participants (95% CI 128 to 201) for combined counselling and pharmacotherapy, relative to 92 per 1000 participants for placebo or usual care, for a period of follow-up ranging from 13 weeks to 18 months.

The anticipated absolute effects of treatment on tobacco abstinence for this population were 62 per 1000 participants (95% CI 42 to 91) for counselling alone, relative to 47 per 1000 participants for placebo or usual care, for a period of follow-up ranging from six weeks to 12 months; these results were not statistically significant.

Participation in tobacco cessation therapy does not appear to influence the success of treatments for alcohol and other drug dependence.

Overall completeness and applicability of evidence

The results reported here are based on a greater body of research relative to earlier systematic reviews of tobacco cessation therapy in people in treatment for or recovery from substance abuse (Prochaska 2004; Thurgood 2016). The findings suggest tobacco cessation interventions based on pharmacotherapy or combined counselling and pharmacotherapy increase rates of tobacco abstinence without influencing rates of abstinence from alcohol or other drugs. These interventions were associated with tobacco abstinence for both participants in treatment as well as participants in recovery, suggesting that intervention during treatment could offer an earlier opportunity to reduce tobacco use in this population. Tobacco cessation was achieved across a wide variety of interventions involving pharmacotherapy alone or pharmacotherapy plus counselling, suggesting that the choice of intervention is less important than ensuring that people in recovery are offered some type of smoking cessation intervention. Despite earlier expectations that interventions to promote tobacco cessation could compromise treatment for other addictions (SAMHSA 2011), tobacco cessation therapy interventions do not appear to affect abstinence rates for alcohol and other drugs. Not all studies assessed these outcomes.

Study limitations include the inability to assess the effects of multiple treatment providers. People in treatment for drug dependency do not receive care from a single source; they may begin with residential care and move to outpatient care over time or complete all treatment as outpatients. As either inpatients or outpatients, people seeking treatment for drug dependency may be counselled on tobacco cessation either by staff dealing with other addictions or by staff dealing specifically with tobacco-related disease. Pharmacotherapy is typically prescribed by a physician that handles medical issues for the client, but not issues relating to addictions. Staff acceptance is a key factor, some staff members smoke themselves, and changing staff attitudes is a first major step towards eventually changing staff behaviour (Hurt 1996). Given existing literature, it was not possible to assess the effects of receiving treatment for drug dependency from multiple care providers or from staff who may themselves smoke.

Quality of the evidence

We found the overall quality of evidence for all outcomes, based on 5796 people in 34 studies, to be low quality, primarily due to the risk of bias arising from incomplete reporting, potentially inconsistent results due to heterogeneity in the nature of interventions, and the risk of publication bias. It was not possible to assess the potential sources of bias for most included studies; there was incomplete reporting for at least 19 of 34 included studies in every category assessed. There was also an absence of reporting of adverse events for the interventions included in this review. Results should be viewed cautiously given unclear methods of treatment allocation, unclear methods of blinding of participants and personnel, and incomplete outcome data regarding loss of participants to attrition. Given the sensitivity of the findings to heterogeneity in the length of follow-up and the nature of pharmacotherapy, further research is warranted to identify whether tobacco cessation interventions would be best targeted to people in treatment or in recovery, and whether NRT or non-NRT pharmacotherapy, or a combination, would lead to greater tobacco abstinence in this population.

Potential biases in the review process

Potential biases in the review process include the risk that the search did not identify all relevant studies. Although the search included both published and unpublished sources of data, it is not possible to conclude that it identified all relevant studies. In addition, multiple studies identified through clinical trials registries and abstract searches could not be included due to the failure to report findings. Given the risk of publication bias, the studies that did not report their findings may have had negative results that indicated that tobacco cessation interventions did not promote tobacco abstinence. In that event, not all relevant data were obtained and review findings would be biased to show a treatment effect. Study selection methods also excluded a potentially relevant intervention (contingency management). A funnel plot suggested the possibility of publication bias in the studies assessing pharmacotherapy interventions.

AUTHORS' CONCLUSIONS

Implications for practice

Tobacco cessation interventions for people in treatment for or recovery from alcohol and other drug dependencies, whether pharmacotherapy or counselling combined with pharmacotherapy, increase the odds of quitting smoking. Therefore, providing tobacco cessation interventions for people in treatment for and recovery from alcohol and other drug dependencies will reduce the health consequences of smoking. Providing tobacco cessation interventions does not appear to affect the rates of abstinence from alcohol or other drugs. These findings are based on studies of overall low quality.

Implications for research

Further research on the effects of tobacco cessation interventions should focus on comparing specific interventions associated with tobacco abstinence. These include specific pharmacotherapies; a sensitivity analysis showed significant effects for non-nicotine replacement therapy and combined nicotine replacement therapy and non-nicotine replacement therapy pharmacotherapy. In addition, further study of counselling as tobacco cessation strategy is warranted, given the clinical heterogeneity of the interventions assessed in this review, which may have contributed to the finding that counselling was not associated with tobacco abstinence. A systematic review of the effects of other tobacco cessation interventions, such as contingency management, could improve understanding of the effects of treatment in this population.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

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

Baltieri 2009

Methods	Country: Brazil Recruitment: alcohol-dependent outpatient smokers enrolled at university treatment clinic Randomised controlled trial
Participants	103 male smokers aged 18 to 60 yr
Interventions	Intervention: two arms combined; daily naltrexone (50 mg), 12 wk, or daily topiramate (dose escalating from 25 mg to 300 mg), 12 wk. (combined n = 65) Control: placebo, usual care (smoking behaviour monitored) (n = 38)
Outcomes	Self-reported abstinence at 12 wk Abstinence verification: none
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blind study, all participants received capsules of identical appearance manufactured in a different university division
Incomplete outcome data (attrition bias) All outcomes	High risk	45% of participants lost to follow-up; authors reported statistically significant differences between dropout rates between placebo and topiramate groups Participants lost to follow-up were assumed to be non-abstinent

Bobo 1996

Methods	Country: USA Recruitment: daily smokers enrolled at 4 residential alcohol treatment centres in central and western Nebraska Cluster randomised trial
Participants	90 smokers aged > 18 yr
Interventions	Intervention: 10-min counselling session based on trans-theoretical model of readiness to change (n = 30) Control: usual care (n = 60)
Outcomes	Self-reported 7-day abstinence at 1 and 6 months Abstinence verification: participants provided saliva COT samples by mail and a list of collateral contact references to verify use of alcohol, tobacco, and other drugs
Notes	ICC not available; sensitivity analysis excluded this study

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Cluster randomised: 4 treatment centres were blocked (2 treatment, 2 control), method not described
Allocation concealment (selection bias)	High risk	Intervention assignment determined by centre of residence
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Intervention and control conditions at different sites
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 3% in intervention and 13% in control group (not statistically significant), authors reported that respondents had completed more formal education than non-respondents (12.4 yr vs 11.2 yr, P = 0.037) Participants lost to follow-up were assumed to be non-abstinent

Bobo 1998

Methods	Country: USA Recruitment: smokers enrolled at 12 residential drug treatment centres in Iowa, Kansas, and Nebraska Cluster randomised trial
Participants	575 smokers aged > 18 yr

Bobo 1998 (*Continued*)

Interventions	Intervention: 4 individualised 10- to 15-min counselling sessions based on trans-theoretical model of readiness to change (n = 288) Control: usual care (n = 287)
Outcomes	Self-reported 7-day tobacco abstinence and 30-day alcohol abstinence at 1, 6, and 12 months Abstinence verification: participants reporting tobacco abstinence provided saliva COT samples by mail, all participants provided a list of collateral contact references to verify use of alcohol, tobacco, and other drugs. 30% of respondents had references contacted for verification
Notes	ICC not available; sensitivity analysis excluded this study

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Cluster randomised: 12 treatment centres were paired based on state licensing authority assessment of comparability, sites within pairs randomised by coin-toss; 2 centres declining to participate were replaced
Allocation concealment (selection bias)	High risk	Cluster randomisation
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Intervention and control conditions at different sites
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 22%, differences between intervention and control groups not reported Participants lost to follow-up were assumed to be non-abstinent

Breland 2014

Methods	Country: USA Recruitment: people aged > 18 yr enrolled in an urban recovery community organisation Randomised controlled trial
Participants	151 current cigarette smokers (> 100 lifetime, > 1 day for the past 7 days and > 10/week, expired carbon monoxide level ≥ 6 ppm) in recovery from addiction to alcohol and other drugs (self-reported)
Interventions	Intervention: 30-min computerised brief motivational intervention (5-A framework) + information/referral sheet, offer of NRT (n = 82) Control: information/referral sheet, offer of NRT (n = 69)

Breland 2014 (*Continued*)

Outcomes	Self-reported 7-day abstinence from tobacco at 4 and 6 wk Abstinence verification: breath carbon monoxide (< 8 ppm) at 4 wk
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated urn randomisation stratified by gender and cigarettes smoked/day
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 34% in treatment group and 38% in control group Participants lost to follow-up were separately analysed as non-abstinent and excluded

Burling 1991

Methods	Country: USA Recruitment: male veterans enrolled in inpatient substance abuse treatment at a California medical centre Randomised controlled trial
Participants	39 smokers in residence for at least 1 month
Interventions	Intervention: computer-guided nicotine fading, daily 15-min counselling, and self-administered contingency contract (n = 19) Control: waiting list with usual care (n = 20)
Outcomes	Tobacco abstinence: self-report and carbon monoxide levels ≤ 8 ppm; other drugs: self-reported 30-day abstinence, follow-up at 3 and 6 months Abstinence verification: carbon monoxide assessment of air samples (tobacco); other drugs: breath and urine sample for onsite follow-ups
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Burling 1991 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up reporting incomplete Participants lost to follow-up were assumed to be non-abstinent

Burling 2001

Methods	Country: USA Recruitment: drug and alcohol-dependent smokers in residential rehabilitation programme for homeless veterans at a California medical centre Randomised controlled trial
Participants	200 daily smokers in residence for at least 1 month
Interventions	Intervention 1: computer-guided nicotine fading, daily 30- to 45-min counselling, self-administered contingency contract (smoking oriented) (n = 50) Intervention 2: computer-guided nicotine fading, daily 30- to 45-min counselling, self-administered contingency contract (generalised from smoking to other drugs) (n = 50) Control 1: usual care (n = 50) Control 2: treatment refusers (n = 50, not included in meta-analysis)
Outcomes	Self-reported 7-day tobacco abstinence, self-reported 30-day abstinence from other drugs at 1, 3, 6, and 12 months after discharge Abstinence verification: breath and urine samples (cut-off measures not reported)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described

Burling 2001 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up reporting incomplete (authors reported 80% to 90% follow-up rate) Participants lost to follow-up were excluded

Campbell 1995

Methods	Country: USA Recruitment: smokers enrolled in residential and outpatient programmes at a non-profit substance abuse treatment agency in Oregon Randomised controlled trial
Participants	112 smokers
Interventions	Intervention: 4 daily group counselling sessions followed by 15 weekly group counselling sessions, free transdermal nicotine patches, payment for participation and continued abstinence, individual counselling on request (n = 90) Control: waiting list with usual care (n = 21)
Outcomes	Self-reported abstinence at 1 day, 4 and 16 wk Abstinence verification: expired air carbon monoxide sample analysis < 10 ppm (tobacco)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	High risk	Wait list control
Blinding of participants and personnel (performance bias) All outcomes	High risk	Wait list control
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up reporting incomplete (authors reported 17% follow-up rate for treatment group) Participants lost to follow-up were excluded

Carmody 2012

Methods	Country: USA Recruitment: alcohol-dependent daily-smoker veterans enrolled in drug and alcohol treatment programmes at 2 California medical centres Randomised controlled trial
Participants	162 smokers (≥ 5 cigarettes/day) abstinent from alcohol for ≥ 7 days, aged > 18 yr
Interventions	Intervention: 16 sessions of individual CBT and combination NRT over 26 wk (n = 82) Control: usual care (referral to a free-standing smoking cessation programme) (n = 80)
Outcomes	Self-reported 7-day abstinence from tobacco and 30-day abstinence alcohol at 12, 26, and 52 wk Abstinence verification: exhaled carbon monoxide sample analysis < 10 ppm (tobacco)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated random assignment list, stratified by number of cigarettes smoked/day, depression, and abuse of other drugs
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	High risk	Loss to follow-up was 24% in intervention group, 29% in control group, authors reported that missing data may not have been random Participants lost to follow-up were excluded

Cooney 2007

Methods	Country: USA Recruitment: alcohol-dependent daily smokers enrolled in substance abuse treatment outpatient programmes for veterans Randomised controlled trial
Participants	118 daily smokers (≥ 10 cigarettes/day) aged ≥ 18 yr who met DSM-IV criteria for alcohol dependence in the prior 3 months

Cooney 2007 (*Continued*)

Interventions	Intervention: 3 × 60-min behavioural smoking cessation counselling sessions, 8 wk of transdermal nicotine patches (n = 44) Control: 15-min advice intervention, 5-min follow-up (n = 47)
Outcomes	Self-reported 7-day abstinence from tobacco and 30-day abstinence from alcohol at 14 days, and 3 and 6 months Abstinence verification: breath carbon monoxide levels < 10 ppm (tobacco)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 20% overall, with attrition rates higher in the control group; early quit rates were comparable across both groups Participants lost to follow-up were excluded

Cooney 2009

Methods	Country: USA Recruitment: people with current alcohol abuse or dependence recruited through university health clinics and radio/newspaper advertisements Randomised controlled trial
Participants	96 alcohol-dependent daily smokers (≥ 15 cigarettes/day) aged ≥ 18 yr willing to attend outpatient treatment for substance abuse
Interventions	Intervention: nicotine patch and nicotine gum plus usual care behavioural counselling for alcohol and smoking (16 sessions) (n = 45) Control: nicotine patch and placebo gum plus usual care behaviour counselling for alcohol and tobacco dependence (16 sessions) (n = 51)
Outcomes	Self-reported 7-day abstinence from tobacco and 90-day abstinence from alcohol at 2 wk, and 3, 6, and 12 months Abstinence verification: breath carbon monoxide levels < 10 ppm (tobacco), alcohol breathalyser reading = 0

Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Urn-randomised computer program that balanced groups by history of previous substance abuse, treatment, age, sex, baseline drinks/drinking day and baseline cigarettes/day
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blinded research design All participants were asked whether they believed they were in the treatment or control conditions; 80% reported "don't know", remaining 20% identified the gum's content with 50% accuracy
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 28% overall, with no between-treatment differences in participants retained (P > 0.05) Participants lost to follow-up had abstinence status independently verified

Cooney 2015

Methods	Country: USA Recruitment: people enrolled in an intensive 3-wk outpatient alcohol treatment programme Randomised controlled trial
Participants	151 alcohol-dependent smokers (alcohol use in past 30 days, 1+ cigarettes smoked/day, 3-yr smoking history)
Interventions	Intervention: 12 × 15-min individual counselling treatment twice daily before and after substance abuse treatment days using centralised therapist supervision and progressive contingency management rewards, and 8 to 20 wk of combination NRT (patch + gum/lozenge) Control: smoking cessation treatment delayed until 3 months after enrolment in alcohol dependence treatment and 8 to 20 wk of combination NRT (patch + gum/lozenge)
Outcomes	Self-reported 7-day abstinence from tobacco at treatments and 2 and 13 wk Abstinence verification: breath carbon monoxide (< 5 ppm)

Cooney 2015 (*Continued*)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computerised urn-randomisation stratified by cigarette craving, alcohol self-efficacy, alcohol dependence, nicotine dependence, and gender at 2:1 treatment:control ratio
Allocation concealment (selection bias)	High risk	Waiting list control
Blinding of participants and personnel (performance bias) All outcomes	High risk	Waiting list control
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 19% and comparable across treatment and control groups Participants lost to follow-up were significantly younger than those retained; analysis assumed non-abstinence

Gariti 2002

Methods	Country: USA Recruitment: people enrolled in inpatient substance abuse treatment at a veterans medical centre Randomised controlled trial
Participants	64 substance-dependent daily smokers (≥ 10 cigarettes/day)
Interventions	Intervention: 1 individual counselling session and encouragement to attend daily group session screening films addressing quitting, nicotine patch, referral to outside clinic on request (n = 34) Control: usual care (nicotine patch, referral to outside clinic on request) (n = 30)
Outcomes	Self-reported 7-day abstinence from tobacco and 30-day abstinence from tobacco and other drugs at 6 months Abstinence verification: breath carbon monoxide (< 9 ppm) and BAC (0.000 ppm) samples, urine samples (COT < 50 ng/mL), qualitative assessment by technician
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Gariti 2002 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Stratified by primary substance type, method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 12% overall (excluding 2 deaths), differences between groups not reported Participants lost to follow-up were assumed to be non-abstinent

Grant 2003

Methods	Country: USA Recruitment: veterans enrolled in an outpatient substance abuse treatment programme Randomised controlled trial
Participants	40 alcohol-dependent daily smokers (≥ 10 cigarettes/day)
Interventions	Intervention: 5 × 30-min weekly education and group therapy sessions addressing nicotine dependence followed by 60-min group therapy session, carbon monoxide assessments, 8 weeks of NRT offered (gum or patch) (n = 20) Control: usual care (access to 1 educational session and NRT) (n = 20)
Outcomes	Self-reported abstinence from alcohol, tobacco, and other drugs at 1, 6, and 12 months Abstinence verification: 2 collateral informants contacted at 6-month follow-up for confirmation
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described

Grant 2003 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 43% overall (55% in treatment group, 30% in control group) Participants lost to follow-up were excluded

Grant 2007

Methods	Country: USA Recruitment: people enrolled in outpatient alcohol treatment in community and veterans centre programmes Randomised controlled trial
Participants	58 alcohol-dependent daily smokers
Interventions	Intervention: nicotine patch and bupropion, smoking cessation lecture and group therapy session (n = 192) Control: nicotine patch, smoking cessation lecture and group therapy session (n = 191)
Outcomes	Self-reported abstinence from alcohol, tobacco, and other drugs at 4 and 9 wk, and 6 months Abstinence verification: 2 collateral informants contacted at 6-month follow-up for confirmation
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up 31% overall (40% in treatment group, 21% in control group) Participants lost to follow-up were excluded

Hays 2009

Methods	Country: USA Recruitment: people in community alcohol and drug treatment programmes recruited by news releases, advertisements, and notices Randomised controlled trial
Participants	110 daily smokers (≥ 20 cigarettes/day) aged ≥ 18 yr and abstinent from alcohol and other drugs at least 1 yr
Interventions	Intervention: bupropion SF 150 mg/day for 3 days followed by 150 mg twice daily, < 10 min behavioural counselling per visit (n = 35) Control: placebo, < 10 min behavioural counselling per visit (n = 32)
Outcomes	Self-reported abstinence from alcohol, tobacco and other drugs at 1 wk, 3 and 6 months Abstinence verification: urine screening
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Double-blind reported, method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 34% in treatment group, 37% in control group, with no significant differences between groups Participants lost to follow-up were excluded

Heydari 2013

Methods	Country: Iran Recruitment: men with opiate dependence referred to 1 of 4 urban drug abuse treatment centres to undergo methadone maintenance treatment Randomised controlled trial
Participants	424 men aged 15 to 88 yr with a history of drug abuse (opiates, hashish, other recreational drugs) for 1 yr and 1 yr habitual tobacco consumption (cigarettes or hookah)
Interventions	Intervention: 6 wk step-down NRT patches (30 mg, 20 mg, 10 mg) + supply of NRT gum/pills, behavioural therapy to aid in smoking cessation (5-As) (n = 212) Control: behavioural therapy to aid in smoking cessation (5-As) (n = 212)

Outcomes	Self-reported abstinence from tobacco and other drugs at 1 and 6 months Abstinence verification: breath carbon monoxide, rapid opiate test, thin-layer chromatography
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up in study

Hughes 2003

Methods	Country: USA Recruitment: smokers with a history of alcohol dependence recruited by advertisements, notices at outpatient clinics, and Alcoholics Anonymous meetings Randomised controlled trial
Participants	115 daily smokers (≥ 20 cigarettes/day) and abstinent from alcohol and other drugs for ≥ 30 days
Interventions	Intervention: nicotine patch 21 mg (for 6 wk), reduced to 14 mg (for 2 wk), 7 mg (for 2 wk), placebo (for 2 wk), stop smoking booklet, 7 × 60-min group therapy sessions, 3 × 15-min individual sessions (n = 61) Control: placebo patch 12 weeks, stop smoking booklet, 7 × 60-min group therapy sessions, 3 × 15-min individual sessions (n = 54)
Outcomes	Self-reported abstinence at 16 wk, 6 months Abstinence verification: breath carbon monoxide reading < 10 ppm
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Hughes 2003 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up 73% overall, differences between groups not reported Participants lost to follow-up were assumed to be non-abstinent

Joseph 2004

Methods	Country: USA Recruitment: smokers in treatment for alcohol dependence or abuse in 3 centres (2 private, 1 VAMC) in Minneapolis-St Paul area Randomised controlled trial
Participants	499 alcohol-dependent daily smokers (≥ 5 cigarettes/day) aged 21 to 75 yr expressing interest in quitting (score > 2 on Contemplation Ladder)
Interventions	Intervention: 60-min individual counselling session, 3 follow-up session, nicotine patches (21 mg/6 wk, 14 mg/2 wk, 7 mg/2 wk), reminders of treatment available on request every 3 months for following 12 months (n = 251) Control: usual care, 6-month delayed enrolment to intervention (n = 248)
Outcomes	Self-reported 7-day abstinence from tobacco, 30-day abstinence from alcohol at 6, 12, and 18 months Abstinence verification: biochemical testing (expired carbon monoxide, BAC), collateral interviews, or both
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation. stratified by substance use disorder treatment site and blocked within site in groups of 10
Allocation concealment (selection bias)	Low risk	Computer-generated random sequence was concealed from study personnel; research assistants ready to enrol an eligible person consulted the study co-ordina-

Joseph 2004 (*Continued*)

		tor, who obtained the treatment assignment from an independent office holding the master list
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up 22% in treatment group, 17% in control group Participants lost to follow-up were assumed to be non-abstinent

Kalman 2001

Methods	Country: USA Recruitment: smokers in inpatient treatment at a VAMC for alcohol dependence Randomised controlled trial
Participants	36 alcohol-dependent male daily smokers (≥ 10 cigarettes/day) who expressed readiness to quit
Interventions	Intervention: 3 × 45-min individual smoking cessation counselling session, nicotine patches (n = 16) Control: 1 counselling session, nicotine patch delayed to 1 wk post-discharge (n = 13)
Outcomes	Self-reported alcohol and tobacco abstinence at 12, 16, and 20 wk Abstinence verification: participants reporting abstinence returned to clinic for biochemical verification (carbon monoxide testing, COT analysis)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Outcomes assessed by a research assistant blinded to study condition
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Authors reported loss to follow-up was not significantly different between groups, no further discussion

Kalman 2011

Methods	Country: USA Recruitment: alcohol-dependent smokers enrolled in residential and community substance abuse treatment programmes Randomised controlled trial
Participants	148 daily smokers (≥ 10 cigarettes/day) with a history of alcohol dependence/abuse abstinent from alcohol for 2 to 12 months
Interventions	Intervention: bupropion 150 mg twice daily 7 wk, nicotine patch 7 wk (21 mg/4 wk, 14 mg/2 wk, 7 mg/1 wk), 8 weekly counselling sessions (n = 73) Control: placebo twice daily 7 wk, nicotine patch 7 wk (21 mg/4 wk, 14 mg/2 wk, 7 mg/1 wk), 8 weekly counselling sessions (n = 70)
Outcomes	Self-reported 7-day tobacco abstinence 7, 11, and 24 wk Abstinence verification: biochemical testing (salivary COT < 15 mg/mL)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Urn randomisation stratified by gender, severity of nicotine dependence, depressive symptoms, substance use history
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Active and placebo tablets were identical in appearance
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up 40% in treatment group, 36% in control group Participants lost to follow-up were classified as non-abstinent

Karam-Hage 2011

Methods	Country: USA Recruitment: smokers in treatment for alcohol-dependence at a university outpatient addictions treatment programme Randomised controlled trial
Participants	11 alcohol-dependent daily smokers (≥ 10 cigarettes/day) abstinent from alcohol between 6 wk and 6 months

Karam-Hage 2011 (*Continued*)

Interventions	Intervention: bupropion 150 mg daily 1 wk, twice daily 7 wk, smoking cessation booklet, 10-min counselling session (n = 6) Control: placebo daily 1 wk, twice daily 7 wk, smoking cessation booklet, 10-min counselling session (n = 5)
Outcomes	Self-reported tobacco abstinence at 4 and 8 wk Abstinence verification: expired carbon monoxide, BAC testing, urine drug screen, collateral informants contacted at follow-up for confirmation
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up reported

Martin 1997

Methods	Country: USA Recruitment: smokers recruited through advertising directed to Alcoholics Anonymous programmes Randomised controlled trial
Participants	205 daily smokers (≥ 10 cigarettes/day) aged ≥ 18 yr with a history of alcohol dependence, ≥ 3 months' alcohol and other drug abstinence
Interventions	Intervention 1: 8 wk 60- to 75-min group behavioural counselling sessions, aerobic exercise prescription increasing from 15 min to 45 min (n = 73) Intervention 2: 8 wk behavioural counselling, nicotine gum 2 mg with advice to chew 1 to 6 pieces/day up to 6 months (n = 62) Control: 8 wk 60- to 75-min group behavioural counselling sessions, American Lung Association 20-day quit programme (n = 70)
Outcomes	Self-reported 7-day abstinence from tobacco at 6 months and 1 yr Abstinence verification: expired carbon monoxide < 10 ppm, 1 collateral informant contacted at follow-up if carbon monoxide data unavailable

Martin 1997 (*Continued*)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomisation into cohorts dependent on time of enrolment (6 consecutive cohorts in groups of 36)
Allocation concealment (selection bias)	High risk	No concealment
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up rates not reported Participants lost to follow-up were classified as non-abstinent

Mooney 2008

Methods	Country: USA Recruitment: opioid and nicotine-dependent smokers enrolled in a veterans' outpatient substance abuse treatment programme Randomised controlled trial
Participants	40 opiate and nicotine-dependent daily smokers (≥ 10 cigarettes/day) aged 18 to 65 yr Men and women opioid-dependent smokers stabilised on buprenorphine 24 mg/day; 20 assigned to treatment and 20 assigned to control
Interventions	Intervention: buprenorphine (increasing to 24 mg/day) and bupropion (150 mg daily for 3 days, 150 mg twice daily thereafter, last week taper) 12 wk, weekly 60-min counselling sessions (n = 19) Control: buprenorphine (increasing to 24 mg/day) and placebo 12 wk, weekly 60-min counselling sessions (n = 20) (Test of Bupropion (300 mg/day) versus placebo)
Outcomes	Tobacco abstinence assessed 3 times weekly by expired carbon monoxide (< 10 ppm), other drug abstinence by urine assay for opiates < 200 ng/mL, benzoylecgonine < 300 ng/mL at weekly intervals over 12 wk
Notes	
Risk of bias	
Bias	**Authors' judgement**	**Support for judgement**

Mooney 2008 (*Continued*)

Random sequence generation (selection bias)	Low risk	An urn randomisation procedure was used to ensure balance distribution across race and sex
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Bupropion pills were over-encapsulated to match placebo pills
Incomplete outcome data (attrition bias) All outcomes	High risk	Overall loss to follow-up was 42%, treatment group retention was significantly lower than control group retention P = 0.0241) Participants lost to follow-up were classified as non-abstinent

Mueller 2012

Methods	Country: Switzerland Recruitment: people enrolled in a 21-day inpatient alcohol detoxification treatment programme Randomised controlled trial
Participants	103 alcohol-dependent smokers aged 18 to 65 yr with stay long enough to complete 10-day treatment programme; excluded if using pharmacotherapy for smoking cessation
Interventions	Intervention: 5 × 30-min group CBT sessions focused on smoking cessation (CBT) (n = 53) Control: autogenic training (n = 50)
Outcomes	Self-reported 7-day abstinence from alcohol and tobacco at end of intervention, 6 months Abstinence verification: breath carbon monoxide, urine sample
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described

Mueller 2012 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 53% in intervention group, 34% in control group Participants lost to follow-up were classified as non-abstinent

Nahvi 2014

Methods	Country: USA Recruitment: smokers interested in quitting enrolled in 1 of 3 urban methadone maintenance programs in New York City Randomised controlled trial
Participants	112 smokers (≥ 5 cigarettes/day) maintained on methadone for at least 3 months without psychiatric disorders, suicidal ideation, or recent suicide attempts English-speaking with no psychiatric disorders
Interventions	Intervention: 12 wk varenicline (1 mg) twice daily, with inpatient or telephone counselling (n = 57) Control: matched placebo, with inpatient or telephone counselling (n = 55)
Outcomes	Self-reported 7-day abstinence from tobacco at 2, 4, 8, 12, and 24 wk Abstinence verification: breath carbon monoxide (< 8 ppm)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated and stratified by 3 clinic sites in blocks of 6 by stratum
Allocation concealment (selection bias)	Low risk	Allocation concealed by central data manager using a password-protected file; medication orders faxed to pharmacist
Blinding of participants and personnel (performance bias) All outcomes	Low risk	All study participants and staff blinded to treatment condition; pharmacist compounded identical varenicline and placebo tablets
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 10% Participants lost to follow-up were assumed to be non-abstinent; sensitivity tests for differences conducted using Fisher's exact

Nieva 2011

Methods	Country: Spain Recruitment: smokers enrolled in a university outpatient alcohol dependence treatment clinic Randomised controlled trial
Participants	92 alcohol-dependent daily smokers (≥ 5 cigarettes/day) aged 18 to 65 yr
Interventions	Intervention: 10 × 30-to 45-min individual counselling sessions based on CBT, nicotine patch/gum/lozenge for 3 months (n = 51) Control: treatment delayed 6 months with usual care (n = 41)
Outcomes	Self-reported 7-day abstinence from tobacco at 1, 2, 3, and 6 months Abstinence verification: expired carbon monoxide < 9 ppm
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	High risk	Waiting list control
Blinding of participants and personnel (performance bias) All outcomes	High risk	Waiting list control
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 72.5% in treatment group, 61% in control group, difference between groups was not significant; authors reported treatment adherence unrelated to sociodemographic or baseline clinical data Participants lost to follow-up were classified as non-abstinent

Patten 1998

Methods	Country: USA Recruitment: smokers recruited from the community through advertising directed to Alcoholics Anonymous programmes Randomised controlled trial
Participants	29 daily smokers (≥ 10 cigarettes/day) aged ≥ 18 yr with a history of alcohol dependence and major depression

Patten 1998 (*Continued*)

Interventions	Intervention: behavioural counselling + cognitive-behavioural mood management, 8 weekly 120-min group sessions (n = 13) Control: behavioural counselling, 8 weekly 120-min group sessions (n = 16)
Outcomes	Self-reported abstinence from tobacco at 1, 3, and 12 months Abstinence verification: expired carbon monoxide, 2 collateral informants contacted at follow-up for confirmation (3 and 12 months)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomisation into cohorts dependent on time of enrolment (consecutive cohorts in groups of 8)
Allocation concealment (selection bias)	High risk	No concealment
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 55% in treatment group, 70% in control group Participants lost to follow-up were classified as non-abstinent

Reid 2008

Methods	Country: USA Recruitment: smokers recruited from 7 methadone-maintenance/drug and alcohol treatment programmes using person to person communication, flyers, clinical referrals Randomised controlled trial
Participants	225 daily smokers (≥ 10 cigarettes/day) with a history of drug/alcohol dependence enrolled in substance abuse treatment ≥ 30 days
Interventions	Intervention: usual substance abuse treatment, smoking cessation treatment consisting of 8 weeks of group counselling and transdermal nicotine patches (21 mg/day in wk 1 to 6, 14 mg/day in wk 7 and 8) (n = 140) Control: usual substance abuse treatment (n = 68)
Outcomes	Self-reported 7-day abstinence from tobacco, alcohol, and other drug use at 13 and 26 wk Abstinence verification: expired carbon monoxide < 10 ppm, urine drug screen, alcohol breathalyser test

Reid 2008 (*Continued*)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomisation was computer-generated using permuted blocks of 6, stratified by site and sex
Allocation concealment (selection bias)	Low risk	A study statistician who had no other contact with site study staff, performed the randomisation and staff were blind as to stratification and block size strategies
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	Overall loss to follow-up was 7%, no significant difference in time to dropout between groups or between methadone and non-methadone study sites Participants lost to follow-up were excluded

Rohsenow 2014

Methods	Country: USA Recruitment: smokers recruited from a state-funded inner-city residential substance abuse treatment programme Randomised controlled trial
Participants	165 alcohol-dependent daily smokers (≥ 10 cigarettes/day for 6 months) recently admitted to a 45-day residential alcohol dependence treatment centre
Interventions	Intervention: motivational interviewing based therapy (with and without boosters) and free access to NRT, smoking cessation information (n = 80) Control: brief advice (with and without boosters) and free access to NRT, smoking cessation information (n = 85)
Outcomes	Self-reported alcohol, tobacco, and other drug use, carbon monoxide levels at 1, 3, 6, and 12 months Abstinence verification: breath carbon monoxide (< 10 ppm), collateral contacts, urine drug screens
Notes	
Risk of bias	

Rohsenow 2014 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Assigned using random numbers table
Allocation concealment (selection bias)	Low risk	Assignment placed in a sealed envelope opened immediately before 1st treatment session
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Treatment content described as informational to participants and took place during unscheduled time so no reduction in other programme activities; personnel conducting assessments blinded to assignment
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 34% in treatment group, 29% in control group Participants lost to follow-up were classified as non-abstinent

Rohsenow 2015a

Methods	Country: USA Recruitment: smokers recruited from a state-funded inner-city residential substance abuse treatment programme Randomised controlled trial
Participants	184 smokers (≥ 10 cigarettes/day for 6 months) in substance abuse treatment, excluding those with psychiatric disorders
Interventions	Intervention: motivational interviewing based therapy (7 sessions), crossed with contingent vouchers (outcomes not included), and free access to NRT, smoking cessation information (n = 97) Control: brief advice (7 sessions), crossed with contingent vouchers (outcomes not included) and free access to NRT, smoking cessation information (n = 86)
Outcomes	Self-reported 7-day abstinence from tobacco at 1, 3, 6, and 12 months Abstinence verification: breath carbon monoxide (< 4 ppm) or salivary COT (≤ 15 ng/mL)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Rohsenow 2015a (*Continued*)

Random sequence generation (selection bias)	Low risk	Urn randomisation stratifying for gender, nicotine dependence severity, motivation to change
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants in all groups informed they would receive "informational sessions about smoking;" personnel conducting assessments blinded to assignment
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 22% in treatment group, 27% in control group Multiple imputation methods used to assess sensitivity for missing values; 1 participant who died before first follow-up excluded from the analysis

Shoptaw 2002

Methods	Country: USA Recruitment: smokers recruited from 3 narcotic treatment centres in Los Angeles using on-site flyers and staff referrals Randomised controlled trial
Participants	175 daily smokers (≥ 10 cigarettes/day) aged 18 to 65 yr in good standing in a methadone maintenance programme
Interventions	Intervention 1: 12 wk of NRT patch (21 mg/day 8 wk, 14 mg/day 2 wk, 7 mg/day 2 wk) and weekly 60-min relapse prevention group counselling (n = 42) Intervention 2: 12 wk of NRT patch (dose as above) and contingency management vouchers worth USD2 for providing initial verification samples, increasing by USD0.5 consecutively with a USD5 for each third consecutive sample; relapse restarted voucher payments at USD2, total of USD447.50 available for 100% abstinent breath samples (n = 43) Intervention 3: 12 wk of NRT patch (dose as above) and relapse prevention counselling/ contingency management vouchers (n = 47) Control: 12 wk of NRT patch only (dose as above) (n = 43)
Outcomes	Self-reported 7-day abstinence from tobacco and other drugs at 6 and 12 months Abstinence verification: expired carbon monoxide < 9 ppm, urine samples analysed for COT (< 30 ng/mL) and metabolites of opiates (< 300 ng/mL) and cocaine (< 300 ng/ mL)
Notes	Only counselling and control arms included in analysis
Risk of bias	

Shoptaw 2002 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants were assigned to 1 of 4 smoking cessation interventions using urn randomisation
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Overall loss to follow-up was 27%, multiple imputation applied to intermittent missing data; dropouts determined to be non-random and not covariate-dependent random Participants lost to follow-up were classified as non-abstinent

Stein 2006

Methods	Country: USA Recruitment: smokers enrolled at 5 methadone maintenance treatment programme clinics in Rhode Island Randomised controlled trial
Participants	383 English-speaking daily smokers (≥ 10 cigarettes/day) aged ≥ 18 yr in methadone maintenance for ≥ 6 months
Interventions	Intervention: 8 to 12 wk nicotine patch (< 2 pack/day smokers: 21 mg/day 4 wk, 14 mg/day 2 wk, 7 mg/day 2 wk; 2 pack/day smokers: 42 mg/day 4 wk, 35 mg/day 2 wk, 28 mg/day 2 wk, 14 mg/day 1 wk, 7 mg/day 1 wk), 3 counselling sessions based on motivational interviewing, quit date counselling, follow-up session reinforcing skills training (n = 192) Control: brief advice using the National Cancer Institute 4As model (n = 191)
Outcomes	Self-reported 7-day abstinence from tobacco at 1, 3, and 6 months Abstinence verification: expired carbon monoxide < 8 ppm
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described

Stein 2006 (*Continued*)

Allocation concealment (selection bias)	Low risk	Assignments made by a separate study interventionist
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Follow-up research assessments performed by staff blinded to participant group assignment
Incomplete outcome data (attrition bias) All outcomes	Low risk	Overall loss to follow-up was 18.5%, authors reported follow-up rates were similar in both groups and no association between attrition and covariates Participants lost to follow-up were classified as non-abstinent

Stein 2013

Methods	Country: USA Recruitment: methadone-maintained participants from 9 treatment centres in New England Randomised controlled trial
Participants	315 daily smokers (≥ 10 cigarettes/day) in methadone maintenance for ≥ 4 wk, not pregnant or nursing or unwilling to set quit date
Interventions	Intervention 1: 6 months varenicline 1 mg treatment, brief advice (n = 137) Intervention 2: 6 months NRT prescription patch + ad libitum nicotine rescue, brief advice (n = 133) Control: placebo, brief advice (5-As) (n = 45)
Outcomes	Self-reported 7-day tobacco abstinence at 6 months Abstinence verification: breath carbon monoxide (< 8 ppm), urinary COT
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Follow-up research assessments performed by staff blinded to participant group assignment; placebo group given capsules identical to varenicline capsules; NRT arm unblinded

Stein 2013 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was 18% in intervention arms, 22% in control arm Participants lost to follow-up were classified as non-abstinent; sensitivity analysis conducted on missing data

Winhusen 2014

Methods	Country: USA Recruitment: adults recruited from 1 of 12 substance use disorder treatment programmes at treatment start Randomised controlled trial
Participants	538 cocaine or methamphetamine (or both)-dependent smokers (≥ 7 cigarettes/day for 3 months, carbon monoxide ≥ 8 ppm) interested in quitting, excluded for conditions that could make participation unsafe (e.g. pregnancy), use of non-cigarette tobacco products
Interventions	Intervention: weekly individual smoking cessation counselling and extended release bupropion 300 mg/day for 10 wk, nicotine inhaler and contingency management during post-quit treatment, substance abuse treatment (n = 267) Control: substance abuse treatment (n = 271)
Outcomes	Self-reported 7-day tobacco and other drug abstinence at 3 and 6 months Abstinence verification: breath carbon monoxide (< 8 ppm), urinary drug screen
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method not described
Allocation concealment (selection bias)	Unclear risk	Method not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Method not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss to follow-up was 10% in intervention group, 9% in control group Participants lost to follow-up were classified as non-abstinent

BAC: blood alcohol concentration; CBT: cognitive behavioural therapy; COT: cotinine; DSM-IV: Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition; ICC: intraclass correlation coefficient; min: minute; n: number of participants; NRT: nicotine replacement therapy; ppm: parts per million; VAMC: Veterans Affairs Medical Center; wk: week; yr: year.

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

Study	Reason for exclusion
Alessi 2006	Intervention of contingency management
Alessi 2008	Intervention of contingency management
Alessi 2014	Intervention of contingency management
Covey 1993	Not a trial in relevant population; comparison of outcomes for people with and without substance use disorders
Diehl 2006	Measured reduction in smoking rather than abstinence
Dunn 2008	Intervention of contingency management
Dunn 2010	Intervention of contingency management
Haug 2004	Measured reduction in smoking rather than abstinence
Higley 2014	Completed clinical trial; outcomes not described, no published results
Kalman 2006	Control group did not receive placebo
Laaksonen 2013	Measured reduction in smoking rather than abstinence
Leggio 2015	Measured reduction in smoking rather than abstinence
Meszaros 2013	Measured reduction in smoking rather than abstinence
Poling 2010	Measured reduction in smoking rather than abstinence
Rohsenow 2008	Intervention of contingency management
Rohsenow 2015b	Control group did not receive placebo
Story 1991	Intervention of increased methadone
Tsoh 2008	Completed clinical trial with a planned enrolment of 75 participants; outcomes not described, no published results
Wiseman 2005	Measured reduction in smoking rather than abstinence

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

O'Malley 2012

Trial name or title	1/2-Multi-Site Study: Varenicline Treatment of Alcohol Dependence in Smokers
Methods	Randomised controlled trial
Participants	Inclusion criteria: aged 18 to 70 years, alcohol dependent and seeking treatment, report smoking 100 lifetime cigarettes and smoke twice weekly in the past 90 days with urinary cotinine of > 30 ng/mL, report heavy drinking at least 2/days week in the past 90 days Exclusion criteria: current clinically significant physical disease or abnormality, history of cancer, history of sensitivity to varenicline, psychiatric illness, suicidal ideation, psychotropic drug use, drug dependence other than nicotine or alcohol, at risk for alcohol withdrawal, used another investigational drug within 30 days, intention to donate blood or blood products, body mass index < 15 or > 39.99 or weigh < 45 kg, women of childbearing potential who is pregnant, nursing, or not practicing effective contraception
Interventions	Intervention: varenicline 0.5 mg once per day for days 1 to 3, 0.5 mg twice daily for days 4 to 7, 2 × 0.5 mg tablets twice daily following Control: placebo comparator on same schedule
Outcomes	Primary outcome: percentage of heavy drinking days in last 8 weeks of treatment for weeks 11 to 17 Secondary: 30-day self-reported smoking abstinence at weeks 13 to 17
Starting date	September 2012
Contact information	Stephanie O'Malley, Connecticut Mental Health Center Substance Abuse Treatment Unit, New Haven, CT, USA 06511
Notes	

DATA AND ANALYSES

Comparison 1. Abstinence, by intervention category

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Counselling	11	1759	Risk Ratio (M-H, Fixed, 95% CI)	1.33 [0.90, 1.95]
2 Pharmacotherapy	11	1808	Risk Ratio (M-H, Fixed, 95% CI)	1.88 [1.37, 2.57]
2.1 Nicotine replacement therapy (NRT)	3	635	Risk Ratio (M-H, Fixed, 95% CI)	7.74 [3.00, 19.94]
2.2 Other pharmacotherapy or combined NRT and other pharmacotherapy	8	1173	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [0.89, 1.77]
3 Combined counselling and pharmacotherapy	12	2229	Risk Ratio (M-H, Fixed, 95% CI)	1.74 [1.39, 2.18]

Comparison 2. Abstinence by treatment or recovery subgroup

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Abstinence	34	5796	Risk Ratio (M-H, Fixed, 95% CI)	1.69 [1.43, 1.99]
1.1 Participants in treatment	12	2134	Risk Ratio (M-H, Fixed, 95% CI)	1.99 [1.59, 2.50]
1.2 Participants in recovery	22	3662	Risk Ratio (M-H, Fixed, 95% CI)	1.42 [1.11, 1.82]

Comparison 3. Abstinence by type of dependency

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Abstinence	34	5796	Risk Ratio (M-H, Fixed, 95% CI)	1.69 [1.43, 1.99]
1.1 Alcohol dependence	17	2467	Risk Ratio (M-H, Fixed, 95% CI)	1.57 [1.27, 1.95]
1.2 Other drug (or combined) dependence	17	3329	Risk Ratio (M-H, Fixed, 95% CI)	1.85 [1.43, 2.40]

Comparison 4. Alcohol or other drug abstinence

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Abstinence at longest follow-up	11	2231	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.91, 1.03]

Analysis 1.1. Comparison 1 Abstinence, by intervention category, Outcome 1 Counselling.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 1 Abstinence, by intervention category

Outcome: 1 Counselling

Study or subgroup	Intervention n/N	No intervention n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Burling 1991	0/19	0/20			Not estimable
Gariti 2002	2/34	0/30		1.3 %	4.43 [0.22, 88.74]
Rohsenow 2015a	6/97	2/86		5.1 %	2.66 [0.55, 12.83]
Breland 2014	5/82	2/69		5.3 %	2.10 [0.42, 10.51]
Bobo 1996	1/30	4/60		6.5 %	0.50 [0.06, 4.28]
Rohsenow 2014	0/80	3/85		8.2 %	0.15 [0.01, 2.89]
Mueller 2012	0/53	3/50		8.7 %	0.13 [0.01, 2.55]
Shoptaw 2002	1/47	4/42		10.2 %	0.22 [0.03, 1.92]
Patten 1998	9/13	5/16		10.9 %	2.22 [0.98, 4.99]
Bobo 1998	19/232	9/231		21.9 %	2.10 [0.97, 4.55]
Stein 2006	10/192	9/191		21.9 %	1.11 [0.46, 2.66]
Total (95% CI)	**879**	**880**		**100.0 %**	**1.33 [0.90, 1.95]**

Total events: 53 (Intervention), 41 (No intervention)

Heterogeneity: Chi^2 = 12.58, df = 9 (P = 0.18); I^2 =28%

Test for overall effect: Z = 1.44 (P = 0.15)

Test for subgroup differences: Not applicable

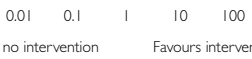
Analysis 1.2. Comparison 1 Abstinence, by intervention category, Outcome 2 Pharmacotherapy.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 1 Abstinence, by intervention category

Outcome: 2 Pharmacotherapy

Study or subgroup	Intervention n/N	No intervention n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Nicotine replacement therapy (NRT)					
Cooney 2009	6/45	0/51		1.0 %	14.70 [0.85, 253.79]
Heydari 2013	15/212	1/212		2.1 %	15.00 [2.00, 112.54]
Hughes 2003	15/61	3/54		6.6 %	4.43 [1.35, 14.47]
Subtotal (95% CI)	**318**	**317**		**9.6 %**	**7.74 [3.00, 19.94]**
Total events: 36 (Intervention), 4 (No intervention)					
Heterogeneity: Chi^2 = 1.46, df = 2 (P = 0.48); I^2 =0.0%					
Test for overall effect: Z = 4.23 (P = 0.000023)					
2 Other pharmacotherapy or combined NRT and other pharmacotherapy					
Nahvi 2014	3/57	0/55		1.1 %	6.76 [0.36, 127.89]
Karam-Hage 2011	4/6	1/5		2.3 %	3.33 [0.53, 21.03]
Baltieri 2009	8/65	1/38		2.6 %	4.68 [0.61, 35.97]
Stein 2013	16/270	1/45		3.6 %	2.67 [0.36, 19.62]
Mooney 2008	3/19	2/20		4.0 %	1.58 [0.30, 8.43]
Kalman 2011	5/73	7/70		14.8 %	0.68 [0.23, 2.06]
Grant 2007	10/192	9/191		18.7 %	1.11 [0.46, 2.66]
Hays 2009	20/35	20/32		43.3 %	0.91 [0.62, 1.35]
Subtotal (95% CI)	**717**	**456**		**90.4 %**	**1.25 [0.89, 1.77]**
Total events: 69 (Intervention), 41 (No intervention)					
Heterogeneity: Chi^2 = 8.28, df = 7 (P = 0.31); I^2 =15%					
Test for overall effect: Z = 1.28 (P = 0.20)					
Total (95% CI)	**1035**	**773**		**100.0 %**	**1.88 [1.37, 2.57]**
Total events: 105 (Intervention), 45 (No intervention)					
Heterogeneity: Chi^2 = 27.65, df = 10 (P = 0.002); I^2 =64%					
Test for overall effect: Z = 3.93 (P = 0.000084)					
Test for subgroup differences: Chi^2 = 12.55, df = 1 (P = 0.00), I^2 =92%					



Analysis 1.3. Comparison 1 Abstinence, by intervention category, Outcome 3 Combined counselling and pharmacotherapy.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 1 Abstinence, by intervention category

Outcome: 3 Combined counselling and pharmacotherapy

Study or subgroup	Intervention n/N	No intervention n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Cooney 2015	20/105	0/46		0.7 %	18.18 [1.12, 294.29]
Campbell 1995	7/68	0/19		0.8 %	4.35 [0.26, 72.88]
Grant 2003	1/9	1/14		0.8 %	1.56 [0.11, 21.85]
Cooney 2007	4/44	1/47		1.0 %	4.27 [0.50, 36.77]
Kalman 2001	3/16	1/13		1.1 %	2.44 [0.29, 20.75]
Nieva 2011	7/51	1/41		1.1 %	5.63 [0.72, 43.91]
Reid 2008	8/140	4/68		5.3 %	0.97 [0.30, 3.11]
Burling 2001	14/96	5/48		6.6 %	1.40 [0.54, 3.66]
Carmody 2012	11/82	9/80		9.0 %	1.19 [0.52, 2.72]
Winhusen 2014	35/267	10/271		9.8 %	3.55 [1.80, 7.03]
Martin 1997	79/135	23/70		30.0 %	1.78 [1.24, 2.56]
Joseph 2004	31/251	34/248		33.9 %	0.90 [0.57, 1.42]
Total (95% CI)	**1264**	**965**		**100.0 %**	**1.74 [1.39, 2.18]**

Total events: 220 (Intervention), 89 (No intervention)

Heterogeneity: Chi^2 = 19.42, df = 11 (P = 0.05); I^2 =43%

Test for overall effect: Z = 4.78 (P < 0.00001)

Test for subgroup differences: Not applicable

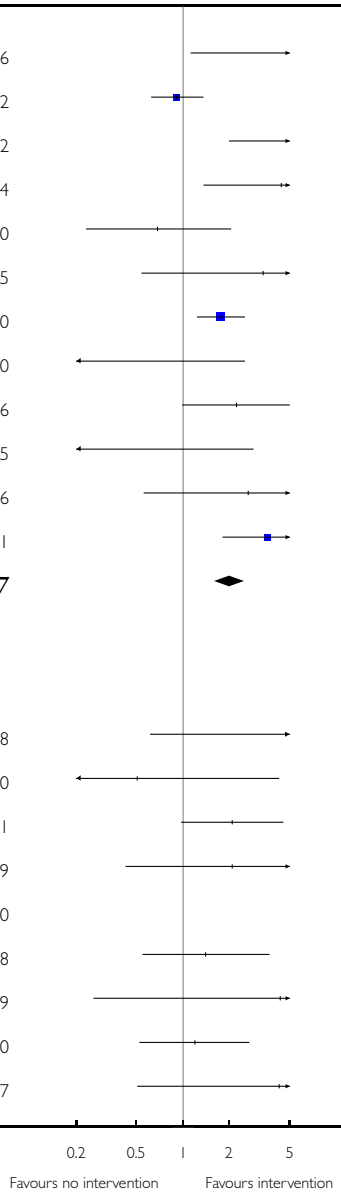
Analysis 2.1. Comparison 2 Abstinence by treatment or recovery subgroup, Outcome 1 Abstinence.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 2 Abstinence by treatment or recovery subgroup

Outcome: 1 Abstinence

Study or subgroup	Intervention n/N	No intervention n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Participants in treatment					
Cooney 2015	20/105	0/46		0.4 %	18.18 [1.12, 294.29]
Hays 2009	20/35	20/32		11.0 %	0.91 [0.62, 1.35]
Heydari 2013	15/212	1/212		0.5 %	15.00 [2.00, 112.54]
Hughes 2003	15/61	3/54		1.7 %	4.43 [1.35, 14.47]
Kalman 2011	5/73	7/70		3.8 %	0.68 [0.23, 2.06]
Karam-Hage 2011	4/6	1/5		0.6 %	3.33 [0.53, 21.03]
Martin 1997	79/135	23/70		15.9 %	1.78 [1.24, 2.56]
Mueller 2012	0/53	3/50		1.9 %	0.13 [0.01, 2.55]
Patten 1998	9/13	5/16		2.4 %	2.22 [0.98, 4.99]
Rohsenow 2014	0/80	3/85		1.8 %	0.15 [0.01, 2.89]
Rohsenow 2015a	6/97	2/86		1.1 %	2.66 [0.55, 12.83]
Winhusen 2014	35/267	10/271		5.2 %	3.55 [1.80, 7.03]
Subtotal (95% CI)	**1137**	**997**		**46.1 %**	**1.99 [1.59, 2.50]**
Total events: 208 (Intervention), 78 (No intervention)					
Heterogeneity: Chi^2 = 36.55, df = 11 (P = 0.00014); I^2 =70%					
Test for overall effect: Z = 6.02 (P < 0.00001)					
2 Participants in recovery					
Baltieri 2009	8/65	1/38		0.7 %	4.68 [0.61, 35.97]
Bobo 1996	1/30	4/60		1.4 %	0.50 [0.06, 4.28]
Bobo 1998	19/232	9/231		4.7 %	2.10 [0.97, 4.55]
Breland 2014	5/82	2/69		1.1 %	2.10 [0.42, 10.51]
Burling 1991	0/19	0/20			Not estimable
Burling 2001	14/96	5/48		3.5 %	1.40 [0.54, 3.66]
Campbell 1995	7/68	0/19		0.4 %	4.35 [0.26, 72.88]
Carmody 2012	11/82	9/80		4.8 %	1.19 [0.52, 2.72]
Cooney 2007	4/44	1/47		0.5 %	4.27 [0.50, 36.77]



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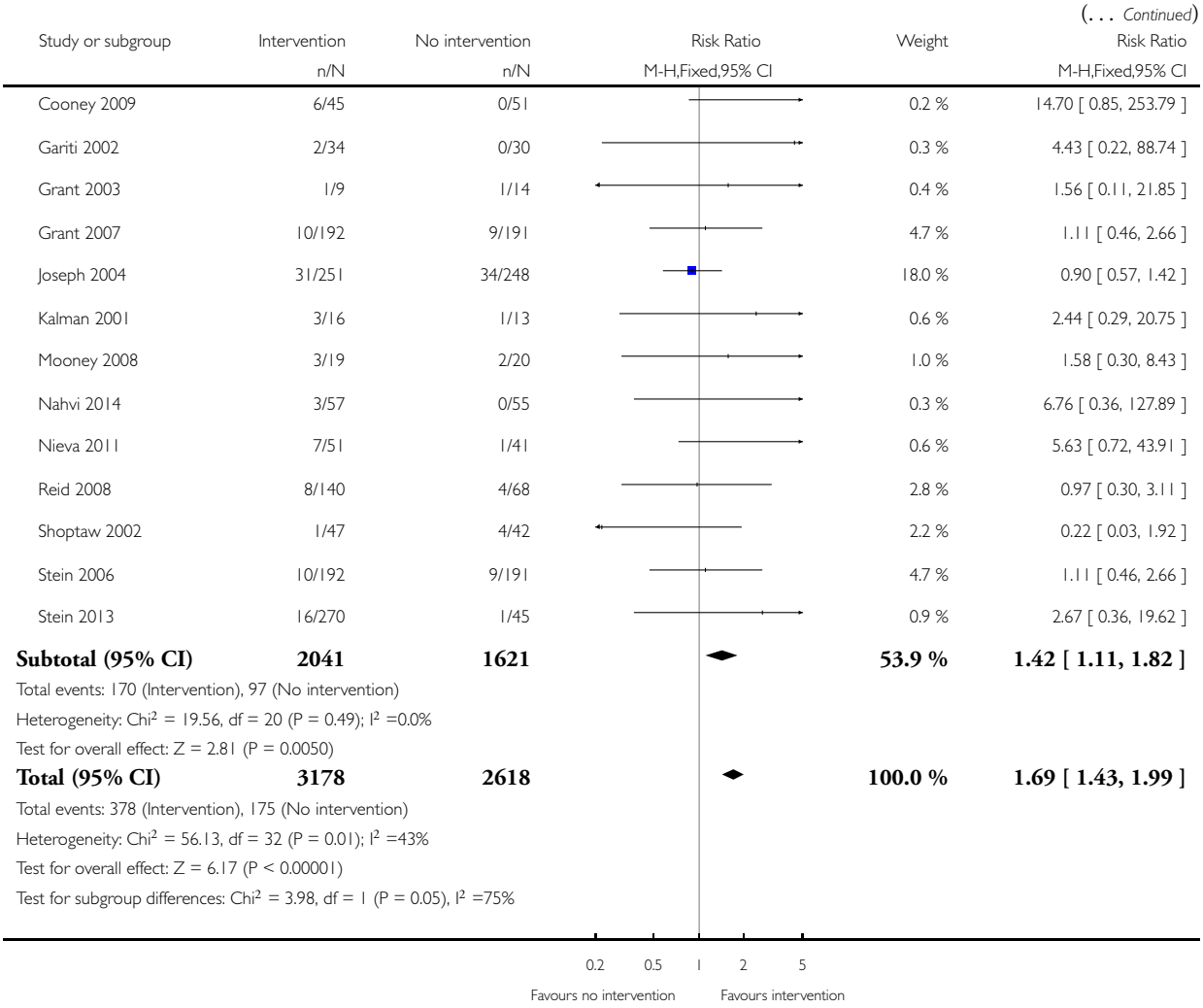
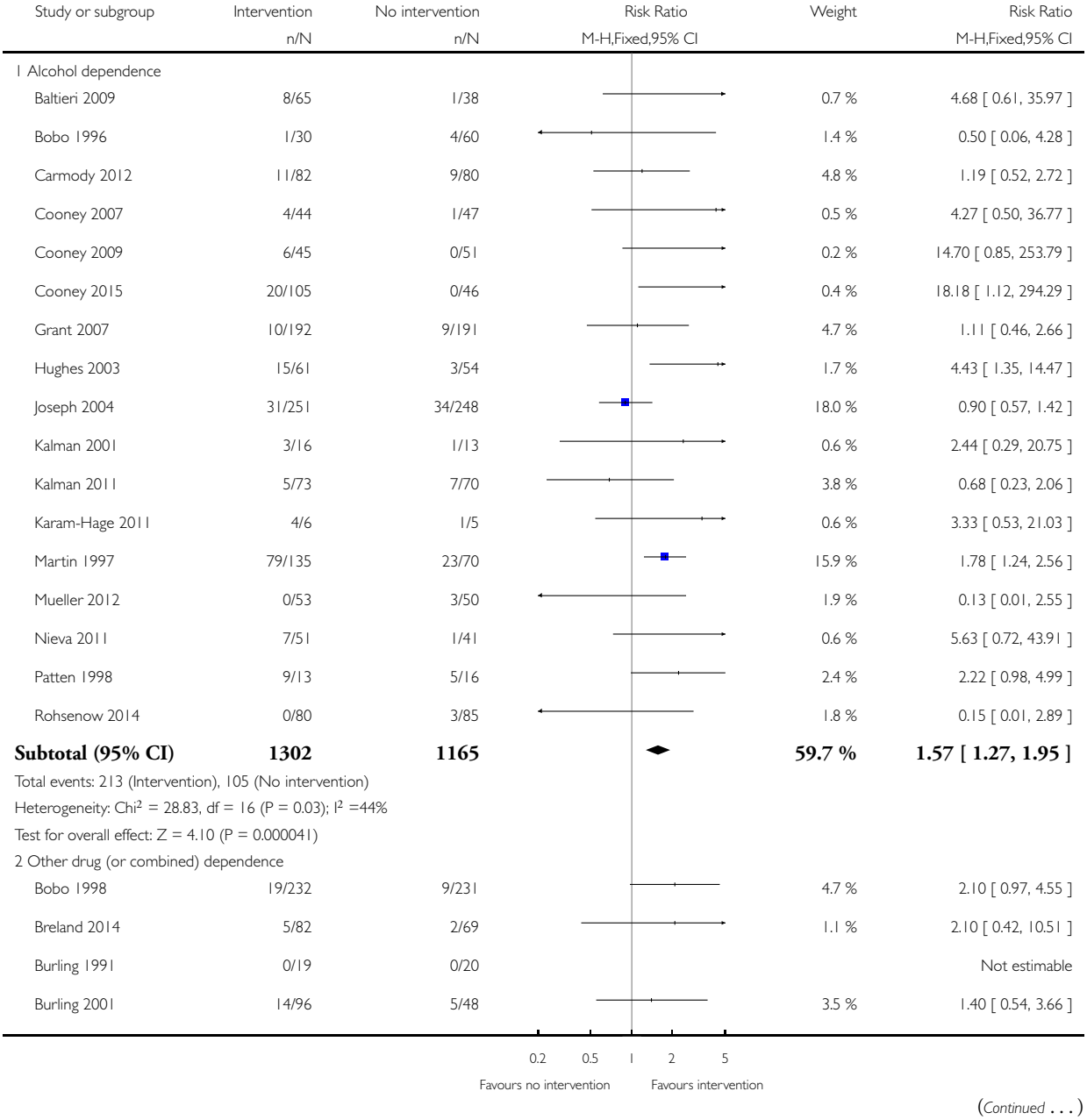


Analysis 3.1. Comparison 3 Abstinence by type of dependency, Outcome 1 Abstinence.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 3 Abstinence by type of dependency

Outcome: 1 Abstinence



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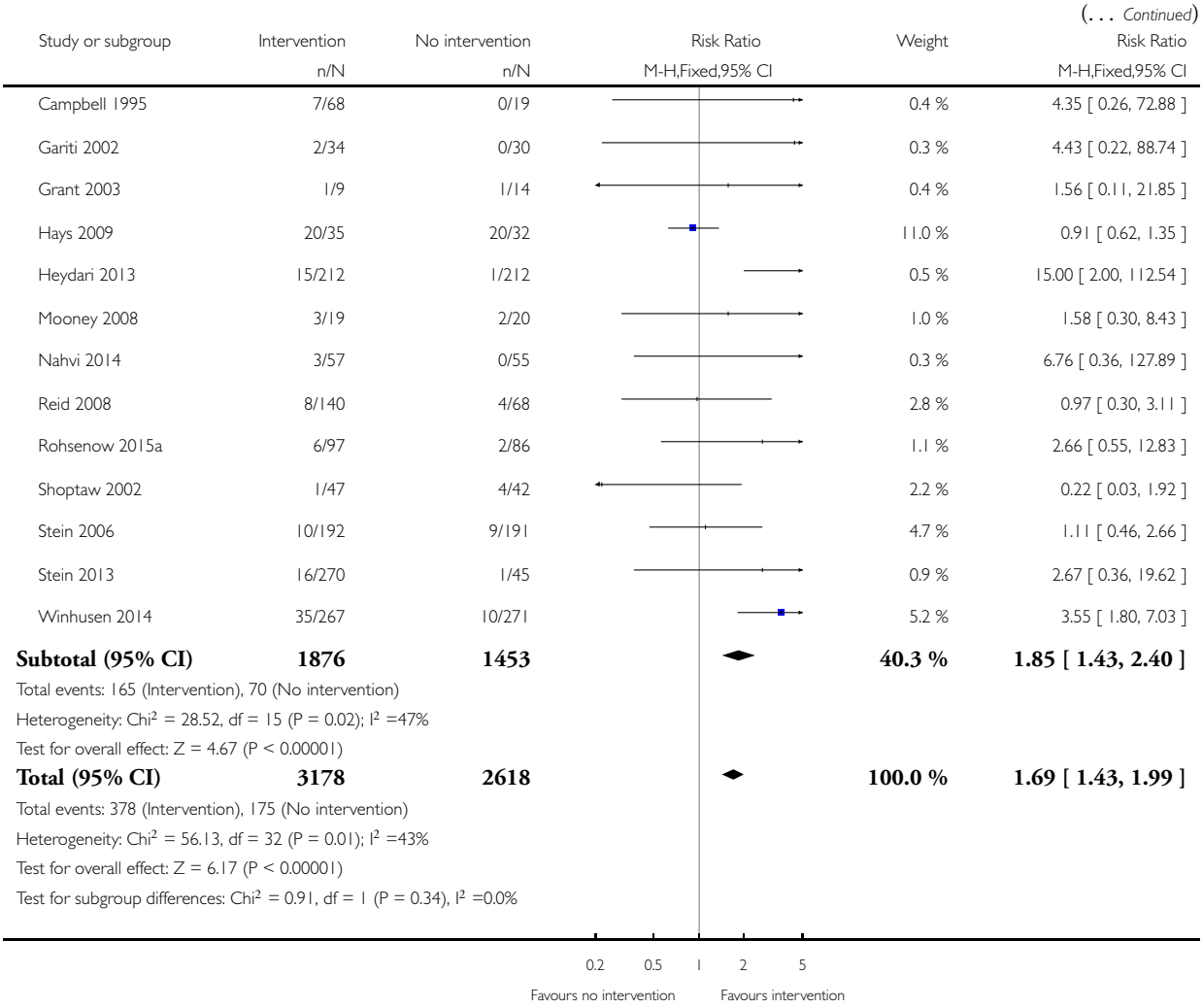


Analysis 4.1. Comparison 4 Alcohol or other drug abstinence, Outcome 1 Abstinence at longest follow-up.

Review: Interventions for tobacco use cessation in people in treatment for or recovery from substance use disorders

Comparison: 4 Alcohol or other drug abstinence

Outcome: 1 Abstinence at longest follow-up

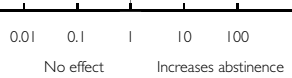
Study or subgroup	Intervention n/N	No intervention n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Bobo 1996 (1)	27/30	45/60		4.8 %	1.20 [0.99, 1.45]
Bobo 1998 (2)	79/232	81/231		13.0 %	0.97 [0.76, 1.25]
Burling 1991 (3)	9/19	7/20		1.1 %	1.35 [0.63, 2.90]
Carmody 2012 (4)	33/82	39/80		6.3 %	0.83 [0.58, 1.17]
Hays 2009 (5)	37/37	34/34		5.7 %	1.00 [0.95, 1.06]
Heydari 2013 (6)	209/212	199/212		31.8 %	1.05 [1.01, 1.09]
Joseph 2004 (7)	103/251	119/248		19.1 %	0.86 [0.70, 1.04]
Mooney 2008 (8)	31/38	34/40		5.3 %	0.96 [0.79, 1.17]
Mueller 2012 (9)	10/53	9/50		1.5 %	1.05 [0.46, 2.36]
Nieva 2011 (10)	13/51	14/41		2.5 %	0.75 [0.40, 1.41]
Reid 2008 (11)	74/142	41/68		8.9 %	0.86 [0.67, 1.11]
Total (95% CI)	**1147**	**1084**		**100.0 %**	**0.97 [0.91, 1.03]**

Total events: 625 (Intervention), 622 (No intervention)

Heterogeneity: Chi^2 = 29.04, df = 10 (P = 0.001); I^2 =66%

Test for overall effect: Z = 1.03 (P = 0.30)

Test for subgroup differences: Not applicable



(1) In recovery, alcohol dependence

(2) In recovery, other drug dependence

(3) In recovery, alcohol and other drug dependence

(4) In recovery, alcohol dependence

(5) In treatment, alcohol and other drug dependence

(6) In treatment, other drug dependence

(7) In recovery, alcohol dependence

(8) In recovery, other drug dependence

(9) In treatment, alcohol dependence

(10) In recovery, alcohol dependence

(11) In recovery, alcohol and other drug dependence

APPENDICES

Appendix 1. MEDLINE search strategy

((alcohol drinking/dt[mh:noexp] OR alcohol drinking/pc[mh:noexp] OR alcohol drinking/px[mh:noexp] OR alcohol drinking/th[mh:noexp]) OR (alcoholism/dt[mh:noexp] OR alcoholism/pc[mh:noexp] OR alcoholism/px[mh:noexp] OR alcoholism/rh[mh:noexp] OR alcoholism/th[mh:noexp]) OR (heavy[tiab] AND drink[tiab]) OR (substance withdrawal syndrome/dt[mh:noexp] OR substance withdrawal syndrome/pc[mh:noexp] OR substance withdrawal syndrome/px[mh:noexp] OR substance withdrawal syndrome/rh[mh:noexp] OR substance withdrawal syndrome/th[mh:noexp]) OR (substance-related disorders/dt[mh:noexp] OR substance-related disorders/pc[mh:noexp] OR substance-related disorders/px[mh:noexp] OR substance-related disorders/rh[mh:noexp] OR substance-related disorders/th[mh:noexp]) OR (alcohol-related disorders/dt[mh:noexp] OR alcohol-related disorders/pc[mh:noexp] OR alcohol-related disorders/px[mh:noexp] OR alcohol-related disorders/rh[mh:noexp] OR alcohol-related disorders/th[mh:noexp]) OR (amphetamine-related disorders/dt[mh:noexp] OR amphetamine-related disorders/pc[mh:noexp] OR amphetamine-related disorders/px[mh:noexp] OR amphetamine-related disorders/rh[mh:noexp] OR amphetamine-related disorders/th[mh:noexp]) OR (cocaine-related disorders/dt[mh:noexp] OR cocaine-related disorders/pc[mh:noexp] OR cocaine-related disorders/px[mh:noexp] OR cocaine-related disorders/rh[mh:noexp] OR cocaine-related disorders/th[mh:noexp]) OR (inhalant abuse/dt[mh:noexp] OR inhalant abuse/pc[mh:noexp] OR inhalant abuse/px[mh:noexp] OR inhalant abuse/rh[mh:noexp] OR inhalant abuse/th[mh:noexp]) OR (marijuana abuse/dt[mh:noexp] OR marijuana abuse/pc[mh:noexp] OR marijuana abuse/px[mh:noexp] OR marijuana abuse/rh[mh:noexp] OR marijuana abuse/th[mh:noexp]) OR (opioid-related disorders/dt[mh] OR opioid-related disorders/pc[mh] OR opioid-related disorders/px[mh] OR opioid-related disorders/rh[mh] OR opioid-related disorders/th[mh]) OR (phencyclidine abuse/dt[mh:noexp] OR phencyclidine abuse/pc[mh:noexp] OR phencyclidine abuse/px[mh:noexp] OR phencyclidine abuse/rh[mh:noexp] OR phencyclidine abuse/th[mh:noexp]) OR (substance abuse, intravenous/dt[mh:noexp] OR substance abuse, intravenous/pc[mh:noexp] OR substance abuse, intravenous/px[mh:noexp] OR substance abuse, intravenous/rh[mh:noexp] OR substance abuse, intravenous/th[mh:noexp])) AND ((("smoking cessation" OR smoking cessation[mh]) OR (tobacco use cessation[mh:noexp]) OR (tobacco use disorder[mh:noexp]) OR (tobacco, smokeless[mh:noexp]) OR (tobacco smoke pollution[mh]) OR (tobacco[mh]) OR (nicotine[mh]) OR ((quit*[tiab] OR stop*[tiab] OR ceas*[tiab] OR giv*[tiab]) AND smoking[tiab]) OR (smoking/pc[mh] OR smoking/th[mh])) AND ((randomised controlled trial[pt]) OR (controlled clinical trial[pt]) OR (clinical trial[pt])) NOT (animals[mh] NOT humans[mh]))*

WHAT'S NEW

Date	Event	Description
19 January 2017	Amended	Correction to Cooney 2009 data and consequent small changes to effect estimates

CONTRIBUTIONS OF AUTHORS

The manuscript was conceived and prepared by Dorie E Apollonio, with contributions to coding and analysis by Rose Philipps, and contributions to coding, analysis, and review by Lisa A Bero.

DECLARATIONS OF INTEREST

No conflicts of interest to report.

SOURCES OF SUPPORT

Internal sources

- No sources of support supplied

External sources

- National Cancer Institute CA140236, USA.

Grant

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The objective to assess costs of treatment was removed. The subgroups based on intensity and follow-up were not undertaken. Hypotheses were added. The age range of participants was lowered from a minimum of 18 years to a minimum of 15 years. The review conducted a sensitivity analysis to assess the effects of cluster randomisation.

INDEX TERMS

Medical Subject Headings (MeSH)

*Tobacco Use Cessation Products; Combined Modality Therapy; Counseling [*methods]; Randomized Controlled Trials as Topic; Smoking [*therapy]; Smoking Cessation [methods]; Substance-Related Disorders [*rehabilitation]; Tobacco Use Cessation [*methods]

MeSH check words

Humans