Cochrane Library

Cochrane Database of Systematic Reviews

Motivational interviewing for smoking cessation (Review)

Lindson-Hawley N, Thompson TP, Begh R

Lindson-Hawley N, Thompson TP, Begh R.
Motivational interviewing for smoking cessation.
Cochrane Database of Systematic Reviews 2015, Issue 3. Art. No.: CD006936.
DOI: 10.1002/14651858.CD006936.pub3.

www.cochranelibrary.com

WILEY

TABLE OF CONTENTS

[Intervention Review]

Motivational interviewing for smoking cessation

Nicola Lindson-Hawley[1], Tom P Thompson[2], Rachna Begh[1]

[1]Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK. [2]Plymouth University Peninsula Schools of Medicine and Dentistry, Plymouth, UK

Contact address: Nicola Lindson-Hawley, Nuffield Department of Primary Care Health Sciences, University of Oxford, Radcliffe Observatory Quarter, Woodstock Road, Oxford, Oxfordshire, OX2 6GG, UK. nicola.lindson-hawley@phc.ox.ac.uk.

Editorial group: Cochrane Tobacco Addiction Group.
Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 3, 2015.
Review content assessed as up-to-date: 14 November 2014.

Citation: Lindson-Hawley N, Thompson TP, Begh R. Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews* 2015, Issue 3. Art. No.: CD006936. DOI: 10.1002/14651858.CD006936.pub3.

ABSTRACT

Background

Motivational Interviewing (MI) is a directive patient-centred style of counselling, designed to help people to explore and resolve ambivalence about behaviour change. It was developed as a treatment for alcohol abuse, but may help people to a make a successful attempt to quit smoking.

Objectives

To determine whether or not motivational interviewing (MI) promotes smoking cessation.

Search methods

We searched the Cochrane Tobacco Addiction Group Specialized Register for studies using the term motivat* NEAR2 (interview* OR enhanc* OR session* OR counsel* OR practi* OR behav*) in the title or abstract, or motivation* as a keyword. Date of the most recent search: August 2014.

Selection criteria

Randomized controlled trials in which motivational interviewing or its variants were offered to tobacco users to assist cessation.

Data collection and analysis

We extracted data in duplicate. The main outcome measure was abstinence from smoking after at least six months follow-up. We used the most rigorous definition of abstinence in each trial, and biochemically validated rates where available. We counted participants lost to follow-up as continuing smoking or relapsed. We performed meta-analysis using a fixed-effect Mantel-Haenszel model.

Main results

We identified 28 studies published between 1997 and 2014, involving over 16,000 participants. MI was conducted in one to six sessions, with the duration of each session ranging from 10 to 60 minutes. Interventions were delivered by primary care physicians, hospital clinicians, nurses or counsellors. Our meta-analysis of MI versus brief advice or usual care yielded a modest but significant increase in quitting (risk ratio (RR) 1.26; 95% confidence interval (CI) 1.16 to 1.36; 28 studies; N = 16,803). Subgroup analyses found that MI delivered by primary care physicians resulted in an RR of 3.49 (95% CI 1.53 to 7.94; 2 trials; N = 736). When delivered by counsellors the RR was smaller (1.25; 95% CI 1.15 to 1.63; 22 trials; N = 13,593) but MI still resulted in higher quit rates than brief advice or usual care. When we compared MI interventions conducted through shorter sessions (less than 20 minutes per session) to controls,

this resulted in an RR of 1.69 (95% CI 1.34 to 2.12; 9 trials; N = 3651). Single-session treatments might increase the likelihood of quitting over multiple sessions, but both regimens produced positive outcomes. Evidence is unclear at present on the optimal number of follow-up calls.

There was variation across the trials in treatment fidelity. All trials used some variant of motivational interviewing. Critical details in how it was modified for the particular study population, the training of therapists and the content of the counselling were sometimes lacking from trial reports.

Authors' conclusions

Motivational interviewing may assist people to quit smoking. However, the results should be interpreted with caution, due to variations in study quality, treatment fidelity, between-study heterogeneity and the possibility of publication or selective reporting bias.

PLAIN LANGUAGE SUMMARY

Does motivational Interviewing help people who smoke to quit?

Background: Motivational interviewing is widely used to help people to stop smoking. It is a counselling style which helps people to explore and resolve their uncertainties about changing their behaviour. It tries to avoid an aggressive or confrontational approach and instead steer people towards choosing to change their behaviour, and encouraging their self belief. The aim of this review is to discover whether motivational interviewing helps more people to quit than brief advice or usual care, when used to help people to stop smoking.

Study characteristics: We searched for new studies to add to this review in August 2014 and found 14 new studies. Twenty-eight randomized or cluster-randomized controlled trials are now included in this review. Studies were included if participants were tobacco users; provided participants were not pregnant women or adolescents; if the intervention being tested was based on motivational interviewing principles; if the study included some kind of monitoring of the motivational interviewing intervention, such as staff training or a measure of the quality of counselling delivered, or both; if the control/comparison condition was brief advice or usual care; and if the study reported smoking abstinence at least six months after the start of the programme. Between them these studies recruited 16,803 tobacco users. Two of the studies recruited smokeless tobacco users, and the rest recruited cigarette smokers. The majority of studies provided motivational interviewing support face-to-face; however seven studies delivered the support by telephone only.

Key findings: Our review found that motivational interviewing appears to help more people to quit smoking than brief advice or usual care when provided by general practitioners and by trained counsellors. Motivational interviewing carried out by general practitioners appeared to be more successful than when carried out by nurses or counsellors. Shorter motivational interviewing sessions (less than 20 minutes per session) were more effective than longer ones. A single session of treatment appeared to be marginally more successful than multiple sessions, but both delivered successful outcomes. The evidence for the value of follow-up telephone support was unclear, and face-to-face counselling did not help more people to quit than telephone counselling. Both approaches were more successful than brief advice or usual care.

Quality of evidence: We have assessed the evidence presented in this review as of moderate quality. Our results should be interpreted with caution, due to variations in study characteristics and how the treatment was delivered. In a number of cases it was difficult to assess the quality of included studies due to a lack of reporting of study details. Finally there is some evidence that studies which did not find an effect of motivational interviewing were less likely to be published and therefore this may impact upon our results.

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

Motivational Interviewing compared to brief advice/usual care for smoking cessation

Patient or population: adult smokers
Settings:
Intervention: Motivational Interviewing
Comparison: brief advice/usual care

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	brief advice/usual care	Motivational Interviewing				
Longest duration and strictest definition of tobacco abstinence	Study population		RR 1.26 (1.16 to 1.36)	16,803 (28 RCTs)	⊕⊕⊕◯ MODERATE [1,2,3]	
	104 per 1000	131 per 1000 (121 to 142)				

*The **assumed risk** (e.g. the median control group risk across studies) is calculated based on the quit rates in control groups across all studies. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval;

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

[1]Most studies at unclear risk of bias due to a lack of reporting. Very few at high risk of bias. No evidence of sensitivity of the effect due to high risk of bias, so decision made not to downgrade on risk of bias.
[2]Significant amount of heterogeneity ($I^2 = 49\%$), which is not fully explained by any test for subgroup differences; however confidence intervals largely overlap, so decision made not to downgrade on basis of heterogeneity.
[3]Downgraded one level due to indication of possible publication bias: funnel plot indicates that less precise studies were more likely to show positive effects.

BACKGROUND

Description of the condition

Cigarette smoking remains one of the leading causes of preventable disease worldwide (USDHHS 2000). Various pharmacological and non-pharmacological methods to assist smoking cessation are available, and there is good quality evidence for the effectiveness of several of them. For instance, Stead 2013 has shown that brief advice from physicians can significantly increase the odds of quitting, as can nicotine replacement therapy (Stead 2012), bupropion (Hughes 2014) and varenicline (Cahill 2012). There is also evidence that combining pharmacological and behavioural interventions helps people to stop smoking. Both pharmacological and behavioural methods are considered as equal contributors to overall success rates (Coleman 2004).

Description of the intervention

The concept of motivational interviewing (MI) evolved from experiences in treating alcohol abuse, and was first described by Miller in 1983. It is defined as "a directive, client-centred counselling style for eliciting behavior change by helping clients to explore and resolve ambivalence" (Miller 1983). The four guiding principles: (a) expressing empathy, (b) developing discrepancy, (c) rolling with resistance, (d) supporting self efficacy, have been detailed elsewhere (Miller 2002).

The motivational interviewing process is a brief psychotherapeutic intervention intended to increase the likelihood that a person will make an attempt to change their harmful behaviour. Adaptations of MI have ranged from brief 20-minute office interventions (Motivational Consulting) to Motivation Enhancement Therapy (MET), a multi-session course of treatment, including a lengthy assessment, personalized feedback and follow-up interviews (Rollnick 1992, Lawendowski 1998). MI has also been provided by telephone consultations and in a group format. MI and its various forms have been applied both as a stand-alone intervention or with other treatments, and in a range of settings. These include health settings such as general hospital wards, emergency departments, and general medical practice (Britt 2002).

How the intervention might work

In motivational interviewing, Miller conceptualises that motivation may fluctuate over time or from one situation to another, and can be influenced to change in a particular direction (Miller 1994). Thus, lack of motivation (or resistance to change) is seen as something that is open to change. The main focus of MI is facilitating behaviour change by helping people to explore and resolve their ambivalence about behaviour change (Rollnick 1995). Miller and Rollnick also suggested that adopting an aggressive or confrontational style or both (as in traditional approaches) is likely to produce negative responses from people (such as arguing), which then may be interpreted by the practitioner as denial or resistance. MI also differs from patient-centred approaches in that it is directive, that is, with MI there is a clear goal of exploring the person's ambivalence in such a way that they are more likely to choose to change the behaviour in question in the desired direction.

Why it is important to do this review

MI has been used primarily for the behavioural management of disorders. It has been used to treat alcohol abuse, drug addiction, weight loss, compliance with treatment for asthma and diabetes as well as for smoking cessation. Systematic reviews (Burke 2003; Knight 2006; Rubak 2005;Martins 2009; Armstrong 2011; Song 2014; Teeter 2014) have shown MI to be an effective intervention for drug and alcohol use, weight control, diet and exercise, diabetes management, medication adherence and oral health. Two systematic reviews of motivational interviewing to aid smoking cessation have been carried out since this review was first published in 2010 (Heckman 2010; Hettema 2010). Both reviews found very modest positive effects of MI at long-term follow. Heckman 2010 includes 31 trials and reports an odds ratio (OR) of 1.44 (95% confidence interval (CI) 1.11 to 1.88) at 22 to 26 week follow-up, and 1.25 (95% CI 0.91 to 1.71) at 52 week follow-up. The main meta-analysis by Hettema 2010 includes 23 studies and results in an OR of 1.35 (95% CI 1.02 to 1.78).

Both previous reviews had slightly broader inclusion criteria than those used in this review, and Heckman 2010 included studies which had active control studies, which may have underestimated the effect of MI. Allsop 2007 has summarised the difficulties of assessing a given intervention's fidelity to the principles of MI: firstly, its limited theoretical basis compromises our understanding of its essential ingredients and processes; secondly, there are relatively few reliable and practical instruments with which to assess the training, quality and fidelity of implementation of MI's principles; and thirdly, research reports often give inadequate detail of the methods used in what purports to be an MI intervention. Our review attempts to address these pitfalls through the selection, assessment and analysis of the included trials.

OBJECTIVES

The primary objective is to determine whether or not motivational interviewing (MI) promotes smoking cessation.

Our hypotheses are:

- More participants quit smoking when provided with MI treatment than with no advice or simple advice (usual care).

- MI effects are relatively long-lasting compared with other therapies.

- Intensive MI (more sessions, longer duration of each session) is more likely to help people to quit smoking than single or shorter sessions.

- MI counsellors' attributes, e.g. occupation (doctor, nurse, counsellors), experience or level of training in MI, are potential moderators of the effect size.

- MI quitters have a similar relapse rate to those who quit with other therapies.

- MI has incremental effects when combined with other therapies.

- MI does not have any significant harmful effect.

METHODS

Criteria for considering studies for this review

Types of studies

- Randomized controlled trials (RCTs).

- Cluster-randomized controlled trials (c-RCTs), with the unit of allocation an institution or organization (e.g., school, hospital, workplace) where one or more professionals are implementing the interventions.

Types of participants

Participants could be tobacco users of either gender recruited in any setting. The only exceptions are trials which only recruited pregnant women or adolescents who smoked, as their particular needs and circumstances warrant them being treated as separate populations.

Types of interventions

The intervention must be based primarily upon the motivational interviewing (MI) principles laid down by Miller and Rollnick (Miller 2002). The trial must, in the opinion of the authors, comply with MI principles and practice, beyond simply referring to the concept.

- The study should make explicit reference to at least some of these MI principles; exploring ambivalence, decision balance, assessment of motivation and confidence to quit, eliciting 'change talk' and supporting self efficacy.

- To ensure fidelity of intervention, some form of monitoring of MI should also be reported. This could include the details concerning the training of the counsellor and measures to ensure the quality of MI sessions, e.g. by videotaping the sessions or by using an assessment scale and supervision.

- The intervention could be delivered on an individual basis or as group sessions.

- Even the briefest of interventions may be acceptable, provided that it met our other inclusion criteria. It is unclear how brief an adaptation of MI may be while still conforming to MI principles and techniques.

- Face-to-face and telephone-based interviews are both eligible.

- The therapists could be any healthcare professional or counsellor.

- Trials with a pharmacological co-intervention (e.g. nicotine replacement therapy) are eligible, provided that the pharmacotherapy was given to all participants and was not the intervention being tested.

- The comparison (control) intervention could be brief advice (i.e. verbal instruction with a 'stop smoking' message, with or without information on the harmful effects of smoking), a low-intensity intervention, or routine care.

Motivational interviewing is frequently linked with the transtheoretical ('stages of change') model of behaviour change. However, it is conceptually and practically distinct from it, and we have not included trials primarily testing that approach. Stage-based interventions are covered in a separate review (Cahill 2010).

Types of outcome measures

The primary outcome used in the review is smoking cessation. We exclude trials not including data on smoking cessation rates. We have preferred sustained abstinence over point prevalence, where both were available. We report abstinence at the longest follow-up, and have required a minimum follow-up of six months from the start of treatment. Where biochemical validation was used, we regard only those participants meeting the biochemical criteria for cessation as abstainers. We assumed participants lost to follow-up to have continued smoking or relapsed, and we include all participants randomized in the denominator (an intention-to-treat analysis).

Search methods for identification of studies

Electronic searches

We identified trials from the Tobacco Addiction Review Group's specialized register, using the term (motivat*) NEAR2 (interview* OR enhanc* OR session* OR counsel* OR practi* OR behav*) in title or abstract, or as keywords, or motivation* as a keyword. The full search strategy can be found in Appendix 1. The specialized register has been developed from electronic searching of

MEDLINE, EMBASE, PsycINFO and Web of Science, together with handsearching of specialist journals, conference proceedings and reference lists of previous trials and overviews. At the time of the search the Register included the results of searches of the Cochrane Central Register of Controlled trials (CENTRAL), issue 6, 2014; MEDLINE (via OVID) to update 20140627; EMBASE (via OVID) to week 201427; PsycINFO (via OVID) to update 20140630. See the Tobacco Addiction Group module in the Cochrane Library for full search strategies and a list of other resources searched.

Searching other resources

For the first version of this review, we cross-checked our results with the MINT database of past and current research into motivational interviewing (MINT 2015). This resource has not been updated since November 2009. We also searched local journals in Chinese (including Mainland and Taiwan). We did not identify any additional studies from either of these sources, and have not repeated these searches for the current (2015) update.

Data collection and analysis

Selection of studies

We checked the abstracts of studies generated by the search strategy for relevance, and then acquired full-text reports of any trials that might be suitable for the review. Two authors independently assessed and selected candidate trials for inclusion, and each independently extracted the data from them. We have noted reasons for the non-inclusion of studies (Characteristics of excluded studies).

Data extraction and management

We extracted the following information about each trial, where available. Study characteristics are presented in the table ' Characteristics of included studies:

- Details of study design, including method of allocation, blinding, study structure
- Location and setting of the trial, e.g. hospital-based, clinic-based, community-based
- Method of recruitment to the study
- Sample size calculations
- Status of the participants, e.g. only motivated volunteers or all motivated and unmotivated volunteers
- Eligibility and exclusion criteria, and demographic descriptors
- Type and quality of MI training provided to the therapists
- Any procedures followed to ensure MI fidelity
- Description of the intervention, including the nature, frequency and duration of MI, and any co-interventions used
- Outcome measures: definition of smoking abstinence used for primary outcome, timing of longest follow-up, any biochemical validation
- Reporting of drop-outs and losses to follow-up.

In trials where details of the methodology were unclear or where results were not expressed in a form that allowed extraction of the necessary key data, we wrote to the investigators to request the information.

Assessment of risk of bias in included studies

We evaluated studies on the basis of the quality of the randomization procedure, allocation concealment (Schulz 2002a; Schulz 2002b), blinding, and any other bias, using the 'Risk of bias' table, as outlined in the Cochrane Handbook 2011;). As with the study characteristics above we extracted information regarding each domain and then two authors independently rated the domian as being at high, low or unclear risk of bias. We resolved any disagreement between authors through discussion with the third author. We used the GRADE system to assess the quality of the evidence for the primary outcome across the included studies and produced a 'Summary of findings' table to illustrate this (Cochrane Handbook 2011).

Measures of treatment effect

Where possible we have extracted smoking outcomes as continuous abstinence, but we have accepted less strict definitions (e.g. point prevalence abstinence) where continuous abstinence was not available.

Dealing with missing data

We conducted an intention-to-treat analysis, i.e. using as the denominator all participants randomized to their original groups where the data were available, and we assumed that those participants lost to follow-up were continuing to smoke.

Assessment of heterogeneity

To investigate statistical heterogeneity, we have used the I^2 statistic, given by the formula [(Q - df)/Q] x 100%, where Q is the chi squared statistic and df is its degrees of freedom (Higgins 2003). This describes the percentage of the variability in effect estimates that is due to heterogeneity rather than to sampling error (chance). A value greater than 50% may be considered to represent substantial heterogeneity. If heterogeneity were present, we would have perform a random-effects meta-analysis if we could not explain the heterogeneity by study characteristics.

Data synthesis

We estimate pooled treatment effects as risk ratios, using the Mantel-Haenszel fixed-effect model. Smoking cessation outcome data are reported as the number of quitters in each group divided by the number of participants receiving the treatment, i.e. the risk ratio with 95% confidence intervals. A ratio greater than 1 indicates that more people quit in the treatment group than in the control group. Measures of effective interventions appear to the right of the axis on the meta-analysis graphs. We pooled the data provided that no significant heterogeneity between the trials was demonstrated.

We have included cluster-randomized trials (with the therapist or site as the unit of allocation) in the meta-analyses using patient-level data.

Subgroup analysis and investigation of heterogeneity

Subgroups

In view of possible heterogeneity between studies, we analyzed the trials in the following subgroups:

- Stratified by the type of counsellor delivering the intervention e.g. doctor, nurse, counsellor
- Stratified by the intensity of the counselling, e.g. duration of each session and number of sessions
- Stratified by the intensity of follow-up support, usually by phone calls
- Stratified by the type of control intervention
- Stratified by the participants' motivation to quit, i.e. whether those recruited had mixed motivation to quit or whether they were already motivated to quit at baseline

RESULTS

Description of studies

See Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Results of the search

The original literature search (April 2009) returned 691 references, with full-text reports of 42 studies potentially relevant to the review screened. We updated the search in August 2014, and retrieved 310 references. We screened 31 full-text reports. We excluded 12 studies for the reasons specified in the Characteristics of excluded studies table, and found that five of the studies are ongoing and will be assessed for eligibility as part of subsequent updates, following their completion.

Included studies

This review includes 28 studies, 14 of which were added in the most recent update (carried out in 2014) (Ellerbeck 2009; Lloyd-Richardson 2009; Severson 2009; Tevyaw 2009; Wu 2009; De Azevedo 2010; Harris 2010; Davis 2011; Bastian 2013; Lindqvist 2013; Okuyemi 2013; Bock 2014; Louwagie 2014; Rohsenow 2014), including 16,803 tobacco users.

Recruitment and settings

All the trials, excluding five (Butler 1999 in the UK; Soria 2006 in Spain; De Azevedo 2010 in Brazil; Lindqvist 2013 in Sweden; Louwagie 2014 in South Africa) were conducted in the United States. Four were set in primary care clinics (Butler 1999; Soria 2006; Ellerbeck 2009; Bock 2014), one in participants' homes (Borrelli 2005), and three were delivered through telephone quitline services (Hollis 2007; Bastian 2013; Lindqvist 2013). Three programmes were provided through screening clinics (McClure 2005; Wu 2009; Okuyemi 2013), six in specialist outpatient clinics (Glasgow 2000; Curry 2003; Hokanson 2006; Stein 2006; Lloyd-Richardson 2009; Louwagie 2014), six in hospitals/inpatient settings (Rigotti 1997; Dornelas 2000; Hennrikus 2005; Bock 2008; De Azevedo 2010; Rohsenow 2014); three in university or laboratory settings (Tevyaw 2009; Harris 2010; Davis 2011) and two in military settings (Cigrang 2002; Severson 2009). The two studies carried out in military settings (Cigrang 2002; Severson 2009) recruited mainly men using smokeless tobacco. Cigrang 2002 recruited only men on a Texan air force base and Severson 2009 recruited only one woman and 784 men. Three studies recruited only women: Glasgow 2000 recruited women who smoked, attending Planned Parenthood clinics. McClure 2005 recruited women who smoked and had an abnormal pap smear or colposcopy. Curry 2003 recruited women attending paediatric clinics. Six trials (Cigrang 2002; Hollis 2007; Wu 2009; Bastian 2013; Lindqvist 2013; Okuyemi 2013) recruited participants motivated to quit; however all other trials recruited participants without specific reference to their motivation to quit smoking.

Intervention

The most commonly-used approach to motivational interviewing (MI) has been one in which the smoker is given feedback intended to develop discrepancy between smoking and personal goals in a non-threatening manner (Butler 1999; McClure 2005; Hokanson 2006; Soria 2006). However, most studies merely specified that the intervention was carried out according to established MI techniques, as developed by Miller 2002. MI was delivered in face-to-face sessions in all the studies except for Cigrang 2002; McClure 2005; Hollis 2007; Ellerbeck 2009; Severson 2009; Bastian 2013 and Lindqvist 2013, in which the counselling was telephone-based. None of the included studies used MI in groups. Sixteen

studies delivered the MI intervention in a single session; four studies (Borrelli 2005; Soria 2006; Stein 2006; Tevyaw 2009) each provided three sessions, seven (McClure 2005; Ellerbeck 2009; Lloyd-Richardson 2009; Wu 2009; Harris 2010; Bastian 2013; Okuyemi 2013) provided four or more sessions, and Lindqvist 2013 did not specify how many sessions were provided. The duration of sessions ranged from 10 to 60 minutes across studies.

Seventeen studies reported follow-up telephone calls, ranging from one (Borrelli 2005; Ellerbeck 2009; Lloyd-Richardson 2009; Davis 2011), to two, three or four (Rigotti 1997; Cigrang 2002; Glasgow 2000; Curry 2003; Hollis 2007; Bock 2008; Bock 2008; Severson 2009; Bock 2014; Rohsenow 2014), up to six (Hennrikus 2005; Hokanson 2006) or seven calls (Dornelas 2000; De Azevedo 2010). Where reported, the duration of the calls was typically around 10 minutes each.

Thirteen trials (Hennrikus 2005; Hokanson 2006; Soria 2006; Hollis 2007; Bock 2008; Ellerbeck 2009; Lloyd-Richardson 2009; Wu 2009; Harris 2010; Bastian 2013; Okuyemi 2013; Bock 2014; Rohsenow 2014) either offered smoking cessation pharmacotherapies (NRT or bupropion) or encouraged their use. Apart from Hollis 2007, who included NRT patches as an intervention component in their factorial study design, the use and type of pharmacotherapy was not the intervention being tested.

MI interventions were compared in most studies to 'usual care' or brief advice (ranging from two to 15 minutes) for smoking cessation, often with self-help manuals, booklets or videos; only five trials (Butler 1999; Soria 2006; Curry 2003;Tevyaw 2009; Harris 2010) did not offer smoking cessation support to any of the participants. Several trials also offered or referred control participants to standard smoking cessation services (Dornelas 2000; Cigrang 2002; Hennrikus 2005; Hokanson 2006; Hollis 2007; Lloyd-Richardson 2009; Severson 2009) or to a phone counselling service (McClure 2005; Lindqvist 2013; Bock 2014).

Provider

MI was delivered by general practitioners (Butler 1999; Soria 2006), hospital physicians (Rigotti 1997; Curry 2003), nurses (Curry 2003; Borrelli 2005; Hennrikus 2005; Hokanson 2006; Davis 2011), or counsellors/psychologists (Glasgow 2000; Dornelas 2000; Curry 2003 ; McClure 2005; Hokanson 2006; Hollis 2007; Bock 2008; Cigrang 2002; Stein 2006; Ellerbeck 2009; Lloyd-Richardson 2009; Severson 2009; Tevyaw 2009; Wu 2009; De Azevedo 2010; Harris 2010; Bastian 2013; Lindqvist 2013; Okuyemi 2013; Bock 2014; Louwagie 2014; Rohsenow 2014). Although hospital clinicians contributed to the counselling in at least two of the studies (Glasgow 2000; Curry 2003), they were never the main or only counsellor in any of the included trials.

Training of the provider

Details of therapist training in MI were provided in 25 studies (Butler 1999; Glasgow 2000; Curry 2003; Borrelli 2005; Hennrikus 2005; McClure 2005; Hokanson 2006; Soria 2006; Stein 2006; Hollis 2007; Bock 2008; Ellerbeck 2009; Lloyd-Richardson 2009; Severson 2009; Tevyaw 2009; Wu 2009; De Azevedo 2010; Harris 2010; Davis 2011; Bastian 2013; Lindqvist 2013; Okuyemi 2013; Bock 2014; Louwagie 2014; Rohsenow 2014). The length of training in MI (where specified) ranged from two hours (Butler 1999) to 40 hours (Ellerbeck 2009; Tevyaw 2009; Wu 2009; Bastian 2013), and was usually in the form of workshops.

Description of the content of counselling delivered

All the studies included in this review made explicit reference to using MI principles laid down by Miller and Rollnick (Miller 2002). Details of counselling were reported in 21 studies. These included a full explanation of the main components and principles of MI, including the four guiding principles (Butler 1999; Glasgow 2000; Cigrang 2002; Curry 2003; Hennrikus 2005; McClure 2005; Hokanson 2006; Hollis 2007; Bock 2008; Lloyd-Richardson 2009; Severson 2009; Tevyaw 2009; Wu 2009; De Azevedo 2010; Harris 2010; Davis 2011; Bastian 2013; Okuyemi 2013; Bock 2014; Louwagie 2014; Rohsenow 2014).

Outcomes

All but one of the trials (Severson 2009) reported point prevalence abstinence as a main outcome. The outcome data used for Davis 2011 in the meta-analysis is point prevalence abstinence reported at both one month and six months (i.e. a cross between point prevalence and prolonged abstinence). We used this outcome, as for all other reported abstinence outcomes the manner of reporting made it impossible to tell to which time point the data referred (i.e. abstinence at one or six months). Five trials reported sustained abstinence at six months (Dornelas 2000; Cigrang 2002; Borrelli 2005; Bock 2008; Severson 2009), and five trials at 12 months (Dornelas 2000; Curry 2003; Borrelli 2005; McClure 2005; Lindqvist 2013). Sixteen trials reported biochemically-validated abstinence rates, which were used in meta-analyses (Rigotti 1997; Glasgow 2000; Curry 2003; Borrelli 2005; Hennrikus 2005; McClure 2005 [12 months only]; Hokanson 2006; Soria 2006; Stein 2006; Ellerbeck 2009; Lloyd-Richardson 2009; Tevyaw 2009; Harris 2010; Okuyemi 2013; Bock 2014; Rohsenow 2014). Dornelas 2000 used the testimony of informants to confirm self-reported abstinence, and Borrelli 2005 and Ellerbeck 2009 used a mixture of biochemical and testimony-based validation. McClure 2005 used a modified 'bogus pipeline' for six-month assessments, i.e. warning participants that they could be asked to provide a confirmatory sample for self-reported abstinence, but not collecting it. Louwagie 2014 used a similar approach by only validating abstinence in a small sample, so that participants were aware that they could be tested. As the validated

and self-report outcomes produced the same results and validation only occurred in minimal participants, we have used self-reported outcomes in this case. Bock 2008 and Wu 2009 reported collecting saliva cotinine samples and exhaled CO readings respectively for validation, but did not report validated data in a way which we could use for this meta-analysis, and so we have used self-reported outcomes.

Cost effectiveness

Two of the included studies offered an assessment of cost effectiveness. Hollis 2007 reported on an MI counselling quitline service based in Oregon, with and without nicotine replacement therapy. The cost of intensive telephone counselling per participant was USD 132 (2004 USD), with an incremental cost per quitter of USD 2640 (2004 USD), compared with brief advice. Butler 1999, comparing brief advice with an MI consultation delivered by UK general practitioners, calculated that the cost of training each physician in MI techniques was GBP 69.50, and the additional consultation time for each patient was GBP 13.59. However, the sustained quit rates achieved in this programme did not reach statistically significant levels.

We did not find sufficient evidence from the trials in our review to test our remaining hypotheses (MI effects are relatively long-lasting; MI quitters have similar relapse rates; MI does not have any significant harmful effects).

Excluded studies

Some of the excluded trials had a short follow-up, typically three months. Some did not use true motivational interviewing techniques, others delivered complex interventions from which the MI component could not be isolated, and some used motivational interviewing techniques in both trial arms. Several concentrated on adolescents who smoked, which we exclude from this review, and a number addressed multiple health behaviours, where the smoking outcomes could not be isolated for analysis. Excluded trials are listed in the table Characteristics of excluded studies, with reasons for their exclusion.

Risk of bias in included studies

Full details of 'Risk of bias' assessments are given for each trial within the Characteristics of included studies table. Overall summary results of all the 'Risk of bias' assessments are displayed in Figure 1.

Allocation

Fourteen studies did not describe their methods of sequence generation or allocation concealment, and are rated as 'unclear' for one or both of these domains. Six studies used sealed opaque envelopes(Butler 1999; Soria 2006; Ellerbeck 2009; De Azevedo 2010; Louwagie 2014; Rohsenow 2014). Three studies used methods of allocation rated in this review as inadequate, i.e. drawing random numbers from an envelope (Dornelas 2000), drawing coloured ping-pong balls from a bag (Curry 2003) or counsellors were randomised to give an intervention via coin toss and participants received whichever treatment the first counsellor they spoke to provided (Lindqvist 2013). The remaining studies used block randomization procedures, with computerized lists or tables. Borrelli 2005 and Lindqvist 2013 randomized therapists rather than participants.

Blinding

Given the nature of the behavioural intervention, blinding of participants and intervention delivery was generally not feasible, which increased the potential risk of bias. However, 13 of the 28 studies reported some measure of blinded assessment of outcome measurement.

Other potential sources of bias

Validity of the intervention was maintained by audiotaping the counselling (Borrelli 2005; Hollis 2007; Bock 2008; Severson 2009; Davis 2011; Bastian 2013; Okuyemi 2013; Rohsenow 2014), by supervision throughout the study period (Glasgow 2000; Curry 2003; McClure 2005; Hokanson 2006; Tevyaw 2009; Wu 2009; Harris 2010; Bock 2014), by booster sessions throughout the study to maintain counselling skills (Borrelli 2005; Ellerbeck 2009; De Azevedo 2010; Louwagie 2014), or by regular meetings among therapists (Hennrikus 2005; De Azevedo 2010). Four studies (Rigotti 1997; Dornelas 2000; Cigrang 2002; Davis 2011) gave no details of training or measures to ensure treatment fidelity, although Davis 2011 did specify that this took place. Only one study (Stein 2006) reported using a validated instrument, i.e. the Motivational Interviewing Skill Code (MISC) to measure adherence to MI principles.

We have prepared a funnel plot of the included studies (Figure 2), which suggests that there may be some publication and/or reporting bias in favour of positive findings.

Figure 1

Figure 1. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.

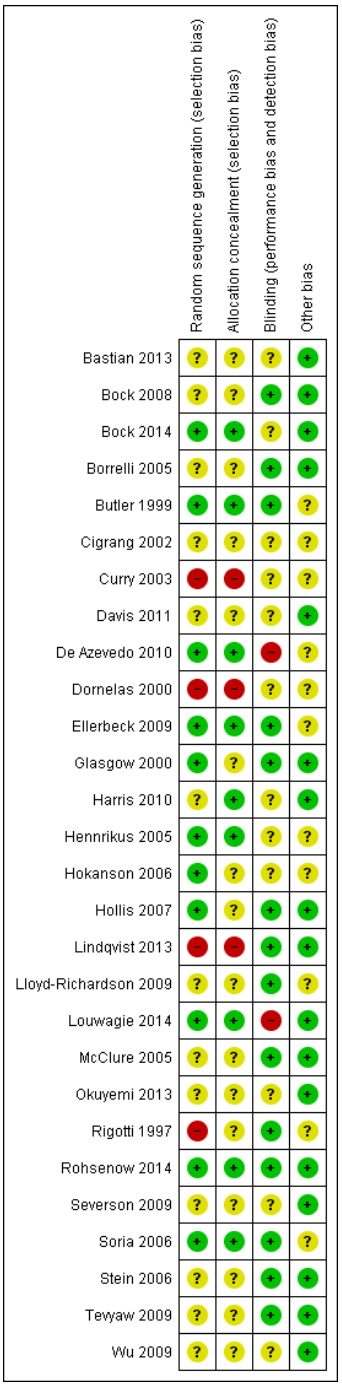
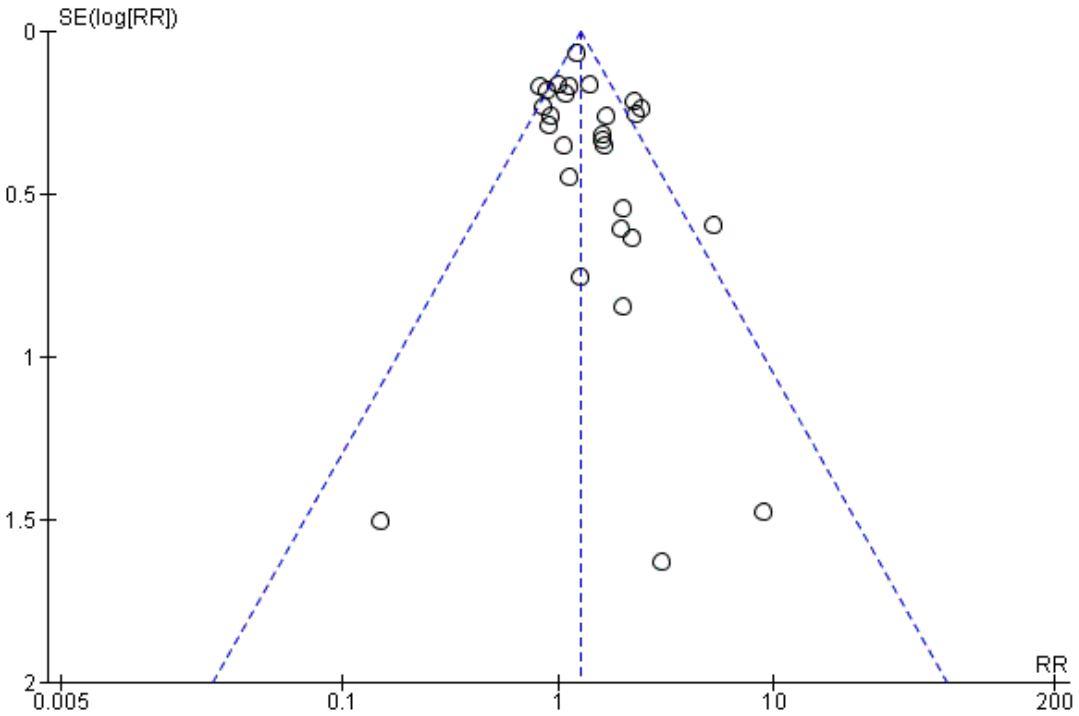


Figure 2

Figure 2. Funnel plot of comparison: 1 MI vs brief advice/usual care: all trials, outcome: 1.1 Smoking Cessation: longest duration and strictest definition of abstinence.



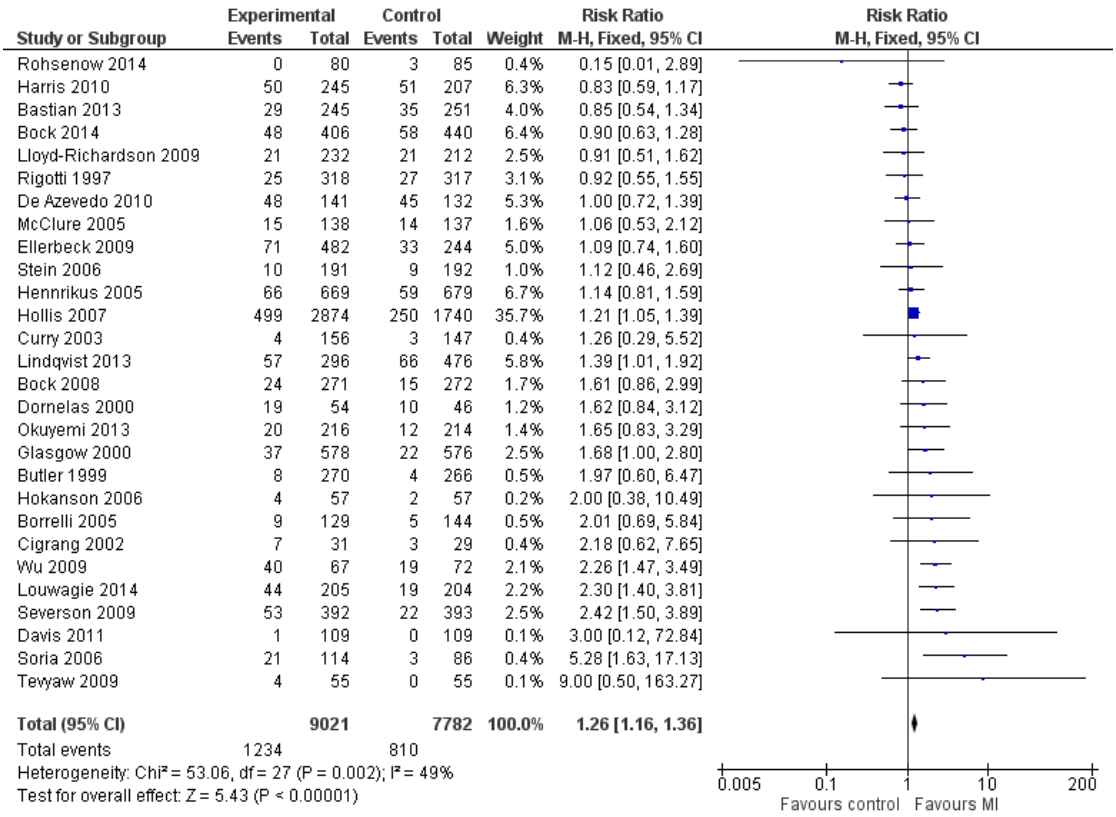
Effects of interventions

See: **Summary of findings for the main comparison** Motivational Interviewing compared to brief advice/usual care for smoking cessation

Motivational interviewing vs brief advice or usual care

The overall effect across all 28 included trials (N = 16,803), using the strictest definition of abstinence and longest follow-up, gives a modestly significant effect (risk ratio (RR) 1.26; 95% confidence interval (CI) 1.16 to 1.36; Analysis 1.1). There was also moderate evidence of heterogeneity (I^2 = 49%). See Figure 3. Quit rates across the intervention groups ranged from 0% to 59.7%, with a weighted average of 16.9%. Control group quit rates ranged from 0% to 34.1%, with a weighted average of 14.2%.

Figure 3. Forest plot of comparison: 1 Motivational Interviewing vs brief advice/usual care, outcome: 1.1 All studies: longest duration and strictest definition of abstinence.



When pooling the 20 trials which reported point prevalence abstinence only, at a minimum of six months follow-up, the effect was slightly lower than the main effect (RR 1.20; 95% CI 1.09 to 1.31; N = 13,692; I^2 = 54%), although still significant. There was a slightly higher effect when the eight studies that measured sustained abstinence at six months or longer were pooled (RR 1.62; 95% CI 1.32 to 2.00; N = 3111; I^2 = 0%) (analyses not shown). The 16 trials which biochemically validated their outcomes delivered a lower risk ratio (1.12; 95% CI 0.98 to 1.29; N = 7858; I^2 = 29%), which did not reach significance (analyses not shown).

Comparison between therapists

In a subgroup analysis by type of therapist, MI delivered by general practitioners had a larger effect (RR 3.49; 95% CI 1.53 to 7.94: 2 trials, N = 736; I^2 = 27%; Analysis 1.2.1) when compared with nurses (RR 1.24; 95% CI 0.91 to 1.68; 5 trials, N = 2256; I^2 = 0%; Analysis 1.2.2) or counsellors (RR 1.25; 95% CI 1.15 to 1.36; 22 trials, N = 13,593; I^2 = 52%; Analysis 1.2.3). Curry 2003 used nurses and counsellors to deliver the intervention, and so appears in both analyses (not pooled).

Duration of session

Pooling studies in which the MI sessions lasted less than 20 minutes produced a significant, larger effect (RR 1.69; 95% CI 1.34 to 2.12; 9 trials, N = 3651; I^2 = 27%; Analysis 1.3.1). Studies with MI sessions lasting longer than 20 minutes produced a smaller effect (RR 1.20; 95% CI 1.08 to 1.32; 16 trials, N = 10,306; I^2 = 56%; Analysis 1.3.2).

Number of sessions

Interventions delivered in a single session (RR 1.26; 95% CI 1.15 to 1.40; 16 trials, N = 12,103; I^2 = 43%; Analysis 1.4.1) had a similar effect size to multiple session interventions (RR 1.20; 95% CI 1.02 to 1.42; 11 trials, N = 3928; I^2 = 56%; Analysis 1.4.2).

Number of follow-up sessions

Subgroup analysis of studies by the number of follow-up calls suggested an inverse relationship between the success of MI and

amount of telephone follow-up. The lowest risk ratio, and therefore the lowest MI quit rates, was associated with the higher number of follow-up calls, indicating no incremental benefit of multiple calls. Studies with no follow-up calls yielded a RR of 1.41 (95% CI 1.20 to 1.65; 10 trials, N = 3927; Analysis 1.5.1); however, this analysis demonstrated substantial heterogeneity, with an I^2 of 69% (P = 0.11), so should be viewed with caution. Studies offering one or two follow-up calls had a RR of 1.28 (95% CI 1.05 to 1.55; 8 trials, N = 3895; I^2 = 53%; Analysis 1.5.2), while those offering three or more calls had a RR of 1.20 (95% CI 1.07 to 1.34; 8 trials, N = 8541; I^2 = 0%; Analysis 1.5.3).

Only Hollis 2007 tested for differences between offering follow-up calls and no follow-up support within a single trial. For our meta-analyses we have combined the moderate and intensive intervention arms in that trial, to compare them with a brief advice intervention. We have also separately compared the moderate intervention (no follow-up support) with the intensive intervention (up to four follow-up calls), to quantify the value of the additional support calls. The RR was 1.05 (95% CI 0.89 to 1.23; N = 2874, analysis not shown), suggesting no added benefit for additional telephone support in this trial.

Face-to-face versus telephone

Seven of the trials (Cigrang 2002; McClure 2005; Hollis 2007; Ellerbeck 2009; Severson 2009; Bastian 2013; Lindqvist 2013) delivered their counselling by telephone only (N=7728), without any face-to-face contact. Subgroup analysis suggested that the risk ratio (1.27, 95% CI 1.12 to 1.43; N = 9075; I^2 = 51%) for face-to-face counselling trials only was almost the same as the main pooled effect (analyses not shown).

Comparison between control interventions

Control interventions were generally one of four types: 1) self-help smoking cessation materials; 2) in-person/telephone-based smoking cessation support; 3) in-person smoking health warning; 4) no smoking cessation intervention. When compared to self-help materials or no smoking cessation intervention the effect of MI was non-significant. The pooled self-help control studies had a RR of 1.11 (0.91 to 1.35; 6 trials, N = 3502; I^2 = 0%; Analysis 1.6.1), and the pooled no-smoking cessation control RR was 0.85 (0.61 to 1.19; 2 trials, N = 755; I^2 = 0%; Analysis 1.6.4). However, when compared to a control of in-person/telephone smoking cessation support or an in-person smoking health warning, MI for smoking cessation did show a significant benefit (RR 1.31; 95% CI 1.19 to 1.45; 17 trials, N = 10,966; I^2 = 54%; Analysis 1.6.2; and RR 2.25; 95% CI 1.41 to 3.57; 2 trials, N = 945; I^2 = 0%; Analysis 1.6.3 respectively).

Participants motivated to quit versus those with mixed motivation

Pooling trials which only recruited participants already motivated to make a quit attempt (Cigrang 2002; Hollis 2007; Wu 2009; Bastian 2013; Lindqvist 2013; Okuyemi 2013) yielded a similar effect size (RR 1.27; 95% CI 1.13 to 1.42; 6 trials, N = 6511; I^2 = 58%; Analysis 1.7.1) to the main pooled effect.

Type of tobacco user

This review includes studies of participants using smokeless tobacco or smoking cigarettes. Two of the 28 studies recruited only smokeless tobacco users. In this limited number of studies, MI produced a larger relative risk (RR 2.39; 95% CI 1.53 to 3.73; N = 845; I^2 = 0%; Analysis 1.8.1) than the pooled studies of cigarette smoking participants (RR 1.22; 95% CI 1.12 to 1.33; N = 15,958; I^2 = 44%; Analysis 1.8.2).

Incremental effects

Cigrang 2002 tested for an incremental effect of adding a self-help manual and a supportive video to the initial counselling call. At six month follow-up, 5/29 (17%) in the usual care (control) group had quit, compared with 3/11 (27%) for the MI counselling-only group and 6/20 (30%) for the counselling plus additional materials group. Differences were not statistically significant. We have used the combined intervention group for the analyses throughout this review. Ellerbeck 2009 compared MI with two counselling calls every six months to MI with up to six counselling calls every six months. The odds ratio for this comparison at 24 month follow-up was 1.33 (95% CI 0.88 to 2.02), indicating no effect of more intensive counselling. Rohsenow 2014 also compared more- with less-intensive MI by comparing groups with and without two counselling booster sessions. They reported that "logistic regressions were nonsignificant for treatment or booster effects". For both of these studies the higher and lower intensity groups were combined into one MI intervention group for our analyses. Finally Tevyaw 2009 tested for an incremental effect of adding contingency reinforcement to MI, in the form of cash payments for reductions in smoking behaviour (participants earned on average USD 297.50). Although there was an incremental effect of this reinforcement during the intervention, no effect was found at follow-ups. Again we combined the two MI groups for the purpose of our analyses.

DISCUSSION

Summary of main results

The overall effect of MI compared with brief advice or usual care appears to be modest . This update, carried out in 2014/2015 resulted in the addition of 14 studies and altered the result very

little, although confidence intervals narrowed slightly. This provides further confidence in the validity and precision of the main result. Certain components of interventions appear to enhance the efficacy of MI. There is some limited evidence in this review that MI interventions delivered by general practitioners confer greater benefit than those delivered by nurses or counsellors. Primary care doctors, counselling people with whom they are already familiar and have an established rapport, may be better suited to this approach. However, this finding is based on two relatively small studies, and should not be overstated. When delivered by nurses, the effect of MI was non-significant, which may lend support to the findings of Rice 2013, who found that evidence for an effect of smoking cessation interventions delivered by nurses is weaker when their main role is not health promotion or smoking cessation. The question of the amount and intensity of therapist contact also presented an interesting result. The effect size associated with MI sessions of shorter duration (less than 20 minutes) appears to be higher than that associated with longer sessions, and delivering no follow-up calls appear to be associated with a greater effect size than providing them. This is further supported by studies that compared more intensive with less intensive MI as part of their study design (Ellerbeck 2009; Rohsenow 2014), and found that less intensive support was associated with higher abstinence rates. One explanation for this could be that a single, short session of MI is enough to increase a person's motivation to quit smoking, and that by prolonging this and the time to the quit date participants may lose focus on their goal rather than further increasing their motivation.

Face-to-face counselling (with or without telephone follow-up calls) was not associated with a greater effect than counselling delivered entirely by telephone, and either mode of delivery resulted in a superior effect to brief advice or usual care.

Training methods and duration of delivery of the MI counselling ranged from none to 40 hours, and monitoring of delivery and treatment fidelity was highly variable. Only one trial (Stein 2006) reported using a validated training tool (the Motivational Interviewing Skill Code). The included trials demonstrated a wide range of components and techniques for the delivery of MI, making direct comparisons across the trials problematic. This may explain the moderate amount of heterogeneity that was observed across the trials in the primary analysis, which could not be fully explained by the subgroup and sensitivity analyses conducted. It is unclear from these trials whether specific MI components or just the 'spirit' of MI is important, and whether short-term achievements translate conclusively into long-term abstinence. The question also remains whether the success rates in the intervention groups were attributable to MI techniques, or simply to a higher intensity intervention than that received by the control group. However, this does not appear to be the case, as when the studies were split according to the control intervention MI was not significantly superior to no or very minimal smoking cessation interventions, but was significantly more successful in comparison to more intensive, in-person interventions. It is unclear why this may be the case.

The studies generally did not define what would have counted as a quit attempt, and did not report the proportion of participants who tried to quit, with or without success. The rate of quit attempts can be interpreted as a mediator of treatment effect, and the lack of such data limits the findings of this review.

Despite the positive findings of our meta-analyses, absolute quit rates were relatively low. Most of the trials included participants unmotivated to quit smoking, although studies produced modest quit rates across the board, with some exceptions (Dornelas 2000; Hollis 2007; Wu 2009; De Azevedo 2010; Harris 2010; Lindqvist 2013; Louwagie 2014).

Although the evidence in this review suggests that MI techniques can deliver higher rates of smoking cessation than control, the effect size is somewhat lower than that demonstrated for individual counselling (RR 1.39; 95% CI 1.24 to 1.57, across 22 trials when compared to minimal control; Lancaster 2005), and significantly lower than for group behaviour therapy (RR 1.98; 95% CI 1.60 to 2.46, across 13 trials when compared to self-help therapy; Stead 2005). Whether this discrepancy may be attributable to an unidentified cause of the observed heterogeneity between studies or to lower efficacy of MI techniques for smoking cessation, remains an open question. Based on a subgroup analysis, splitting participants according to their motivation to quit, it does not seem likely that low motivation to quit explains the moderate effect, as the risk ratio for motivated participants was very similar to the risk ratio for participants who were not recruited on the basis of their wanting to quit tobacco, with mixed motivation to quit. Another subgroup analysis did find that the effect of MI was significantly greater when used to help people to stop using smokeless tobacco in comparison to smoking tobacco. However, as the existing evidence is limited (only two studies of smokeless tobacco cessation which both took place in a military setting) this result should be treated with caution.

Quality of the evidence

The included studies in this review generally reported adequately on their design, methods and conduct. Only four trials reported inadequate methods of sequence generation or allocation concealment or both, which are held to be key determinants of selection bias (Schulz 2002a; Schulz 2002b). Fourteen of the 28 trials did not confirm blinding of outcome assessment. However, sensitivity analyses testing exclusion for these factors did not alter the review's findings in either case.

Confining the analyses to biochemically validated outcomes and to prolonged abstinence measures in sensitivity analyses reduced the effect size and increased it respectively. In the former case this could be because MI participants had developed a better rapport with their counsellor and so felt more pressure to report that they had remained abstinent, which then went on to be disproved by

validation. In the latter case an explanation for a greater effect of MI in the studies measuring prolonged abstinence could be that participants may have gone on to make further quit attempts after relapsing in the control groups, so that point prevalence rates were higher than prolonged rates. Whereas participants using MI were more likely to be quit in the long-term as a result of the original intervention.

Our funnel plot of the included studies (Figure 2) suggests a measure of publication bias or selective reporting or both, in favour of positive findings, which may compromise the strength of the evidence and the review's conclusions.

In conclusion, the Summary of findings for the main comparison indicates that the quality of the evidence generated by this review has been assessed to be of moderate quality.

Agreements and disagreements with other studies or reviews

Two previous reviews of MI for smoking cessation (Heckman 2010; Hettema 2010) provide evidence of a very modest effect of MI at long-term follow-up (6 months or more). Our own effect estimates were also modest but slightly higher than these, providing evidence of a larger benefit of using MI for smoking cessation than the previous reviews. This may be because our inclusion criteria resulted in our including studies more likely to reflect true MI (it was necessary for studies to include some form of MI monitoring, such as training for providers or a measure of treatment fidelity, or both), and which had a minimal intervention or usual care as a control rather than another active intervention.

Hettema 2010 also found evidence of a dose-response relationship, with some evidence to suggest that shorter administrations of MI were more likely to result in quitting than longer administrations, and both Heckman 2010 and Hettema 2010 also report evidence of a small amount of publication bias. Unlike this review, Hettema 2010 found that the baseline motivation of participants moderated the effect of MI. The studies included in their meta-analyis which recruited participants with low motivation produced quit rates two to three times higher than those which recruited highly-motivated participants.

AUTHORS' CONCLUSIONS

Implications for practice

- Motivational interviewing appears to be modestly successful in promoting smoking cessation, compared with usual care or brief advice.

- Motivational interviewing delivered by general practitioners or in a general practice setting may deliver higher success rates.

- The effect size associated with shorter sessions (less than 20 minutes) of motivational counselling appear to be higher than that for longer sessions.

- The evidence is unclear for the optimal number of sessions or the number of follow-up calls.

- The effect size associated with motivational interviewing with an aim to help people to stop using smokeless tobacco appears to be higher than that for motivational interviewing aimed at getting people to stop smoking tobacco; however, due to limited evidence, this could be due to other study characteristics.

Implications for research

- Publication bias or selective reporting or both may have compromised the quality of the evidence in this review. Dissemination of small-scale or 'negative' findings would strengthen the evidence base.

- Greater clarity and consistency of methods, components and counselling techniques would improve comparability between trials.

- Future research should attempt to identify which core components of the motivational interviewing approach successfully help people to quit smoking, and whether modifying them enhances or reduces the likelihood of quitting.

- Future research should compare interventions of equal intensity but different techniques, to test the specific effects of the MI approach.

- There were frequent discrepancies between self-reported and biochemically-validated measures of abstinence, and several trials did not use any form of biochemical confirmation of abstinence. Biochemical validation tools should be used where possible in future research.

ACKNOWLEDGEMENTS

We thank Douglas Lai, Kate Cahill, Ying Qin and Jin-Ling Tang for their authorship of the first version of this review published in 2011. We thank Dr Lindsay Stead for editorial support and Dr Tim Lancaster for editorial comment.

REFERENCES

References to studies included in this review

Bastian 2013 *{published data only}*

Bastian LA, Fish LJ, Peterson BL, Biddle AK, Garst J, Lyna P, et al. Assessment of the impact of adjunctive proactive telephone counseling to promote smoking cessation among lung cancer patients' social networks. *American Journal of Health Promotion* 2013;**27**(3):181–90.

Bock 2008 *{published data only}*

Bock BC, Becker BM, Niaura RS, Partridge R, Fava JL, Trask P. Smoking cessation among patients in an emergency chest pain observation unit: outcomes of the Chest Pain Smoking Study (CPSS). *Nicotine & Tobacco Research* 2008; **10**(10):1523–31.

Bock 2014 *{published and unpublished data}*

Bock BC, Papandonatos GD, De Dios MA, Abrams DB, Azam MM, Fagan M, et al. Tobacco cessation among low-income smokers: Motivational enhancement and nicotine patch treatment. *Nicotine & Tobacco Research* 2014;**16**(4): 413–22. [CENTRAL: 986341; CRS: 9400050000000050; EMBASE: 2014185069; PUBMED: 24174612]

Borrelli 2005 *{published data only}*

Borrelli B, Novak S, Hecht J, Emmons K, Papandonatos G, Abrams D. Home health care nurses as a new channel for smoking cessation treatment: outcomes from project CARES (Community-nurse Assisted Research and Education on Smoking). *Preventive Medicine* 2005;**41**(5-6): 815–21.

Butler 1999 *{published data only}*

Butler CC, Rollnick S, Cohen D, Bachmann M, Russell I, Stott N. Motivational consulting versus brief advice for smokers in general practice: a randomized trial. *British Journal of General Practice* 1999;**49**(445):611-6.

Cigrang 2002 *{published data only}*

Cigrang JA, Severson HH, Peterson AL. Pilot evaluation of a population-based health intervention for reducing use of smokeless tobacco. *Nicotine & Tobacco Research* 2002;**4**(1): 127–31.

Curry 2003 *{published data only}*

Curry SJ, Ludman EJ, Graham E, Stout J, Grothaus L, Lozano P. Pediatric-based smoking cessation intervention for low-income women. *Archives of Pediatrics and Adolescent Medicine* 2003;**157**(3):295–302.

Davis 2011 *{published data only}*

Davis MF, Shapiro D, Windsor R, Whalen P, Rhode R, Miller HS, et al. Motivational interviewing versus prescriptive advice for smokers who are not ready to quit. *Patient Education and Counseling* 2011;**83**(1):129–33.

De Azevedo 2010 *{published data only}*

De Azevedo RC, Mauro ML, Lima DD, Gaspar KC, Da Silva VF, Botega NJ. General hospital admission as an opportunity for smoking-cessation strategies: a clinical trial in Brazil. *General Hospital Psychiatry* 2010;**32**(6):599–606.

Dornelas 2000 *{published data only}*

Dornelas EA, Sampson RA, Gray JF, Waters D, Thompson PD. A randomized controlled trial of smoking cessation counseling after myocardial infarction. *Preventive Medicine* 2000;**30**(4):261–8.

Ellerbeck 2009 *{published data only}*

Cupertino AP, Berg C, Gajewski B, Hui SA, Richter K, Catley D, et al. Change in self-efficacy, autonomous and controlled motivation predicting smoking cessation. *Journal of Health Psychology* 2012;**17**(5):640–52.

* Ellerbeck EF, Mahnken JD, Cupertino AP, Cox LS, Greiner KA, Mussulman LM, et al. Effect of varying levels of disease management on smoking cessation. *Annals of Internal Medicine* 2009;**150**(7):437–46.

Glasgow 2000 *{published data only}*

Glasgow RE, Whitlock EP, Eakin EG, Lichtenstein E. A brief smoking cessation intervention for women in low-income planned parenthood clinics. *American Journal of Public Health* 2000;**90**(5):786–9.

Harris 2010 *{published data only}*

Harris KJ, Catley D, Good GE, Cronk NJ, Harrar S, Williams KB. Motivational interviewing for smoking cessation in college students: A group randomized controlled trial. *Preventive Medicine* 2010;**51**(5):387-93.

Hennrikus 2005 *{published data only}*

Hennrikus DJ, Lando HA, McCarty MC, Klevan D, Holtan N, Huebsch JA, et al. The TEAM project: the effectiveness of smoking cessation intervention with hospital patients. *Preventive Medicine* 2005;**40**(3):249–58.

Hokanson 2006 *{published data only}*

Hokanson JM, Anderson RL, Hennrikus DJ, Lando HA, Kendall DM. Integrated tobacco cessation counseling in a diabetes self-management training program: a randomized trial of diabetes and reduction of tobacco. *The Diabetes Educator* 2006;**32**(4):562–70.

Hollis 2007 *{published data only}*

Hollis JF, McAfee TA, Fellows JL, Zbikowski SM, Stark M, Riedlinger K. The effectiveness and cost effectiveness of telephone counselling and the nicotine patch in a state tobacco quitline. *Tobacco Control* 2007;**16**(Suppl 1):i53–9.

Lindqvist 2013 *{published data only}*

Lindqvist H, Forsberg LG, Forsberg L, Rosendahl I, Enebrink P, Helgason AR. Motivational Interviewing in an ordinary clinical setting: A controlled clinical trial at the Swedish National Tobacco Quitline. *Addictive Behaviors* 2013;**38**(7):2321–24.

Lloyd-Richardson 2009 *{published data only (unpublished sought but not used)}*

Lloyd-Richardson EE, Stanton CA, GD Papandonatos, Shadel WG, Stein M, Tashima K, et al. Motivation and patch treatment for HIV+ smokers: a randomized controlled trial. *Addiction* 2009;**104**(11):1891–900.

Louwagie 2014 *{published data only}*
Louwagie GM, Okuyemi KS, Olalekan AA. Efficacy of brief motivational interviewing on smoking cessation at tuberculosis clinics in Tshwane, South Africa: a randomized controlled trial. *Addiction* 2014;**109**(11):1942–52.

McClure 2005 *{published data only}*
McClure JB, Westbrook E, Curry SJ, Wetter DW. Proactive, motivationally enhanced smoking cessation counseling among women with elevated cervical cancer risk. *Nicotine & Tobacco Research* 2005;**7**(6):881–9.

Okuyemi 2013 *{published data only}*
Goldade K, Whembolua G, Thomas J, Eischen S, Guo H, Connett J, et al. Designing a smoking cessation intervention for the unique needs of homeless persons: a community-based randomized clinical trial. *Clinical Trials* 2011;**8**(6): 744–54.
Okuyemi KS, Goldade K, Whembolua G, Thomas JL, Eischen S, Guo H, et al. Smoking characteristics and comorbidities in the power to quit randomized clinical trial for homeless smokers. *Nicotine & Tobacco Research* 2013;**15** (1):22–8.
* Okuyemi KS, Goldade K, Whembolua G, Thomas JL, Eischen S, Sewali B, et al. Motivational interviewing to enhance nicotine patch treatment for smoking cessation among homeless smokers: a randomized controlled trial. *Addiction* 2013;**108**(6):1136–44.

Rigotti 1997 *{published data only}*
Rigotti NA, Arnsten JH, McKool KM, Wood-Reid KM, Pasternak RC, Singer DE. Efficacy of a smoking cessation program for hospital patients. *Archives of Internal Medicine* 1997;**157**(22):2653–60.

Rohsenow 2014 *{published data only}*
Rohsenow DJ, Martin RA, Monti PM, Colby SM, Day AM, Abrams DB, et al. Motivational interviewing versus brief advice for cigarette smokers in residential alcohol treatment. *Journal of Substance Abuse Treatment* 2014;**46**(3):346–55.

Severson 2009 *{published data only}*
Severson HH, Peterson AL, Andrews JA, Gordon JS, Cigrang JA, Danaher BG, et al. Smokeless tobacco cessation in military personnel: A randomized controlled trial. *Nicotine & Tobacco Research* 2009;**11**(6):730–8.

Soria 2006 *{published data only}*
Soria R, Legido A, Escolano C, Lopez Yeste A, Montoya J. A randomised controlled trial of motivational interviewing for smoking cessation. *British Journal of General Practice* 2006; **56**(531):768–74.

Stein 2006 *{published data only}*
Stein MD, Weinstock MC, Herman DS, Anderson BJ, Anthony JL, Niaura R. A smoking cessation intervention for the methadone-maintained. *Addiction* 2006;**101**(4): 599–607.

Tevyaw 2009 *{published data only}*
Tevyaw TO, Colby SM, Tidey JW, Kahler CW, Rohsenow DJ, Barnett NP, et al. Contingency management and motivational enhancement: a randomized clinical trial for college student smokers. *Nicotine & Tobacco Research* 2009; **11**(6):739–49.

Wu 2009 *{published data only}*
Wu D, Ma GX, Zhou K, Zhou D, Liu A, Poon AN. The effect of a culturally tailored smoking cessation for Chinese American smokers. *Nicotine & Tobacco Research* 2009;**11** (12):1448–57.

References to studies excluded from this review

Abdullah 2005 *{published data only}*
Abdullah AS, Mak YW, Loke AY, Lam TH. Smoking cessation intervention in parents of young children: a randomised controlled trial. *Addiction* 2005;**100**(11): 1731–40.

Ahluwalia 2006 *{published data only}*
Ahluwalia JS, Okuyemi K, Nollen N, Choi WS, Kaur H, Pulvers K, et al. The effects of nicotine gum and counseling among African American light smokers: a 2 x 2 factorial design. *Addiction* 2006;**101**(6):883–91.

Baker 2006 *{published data only}*
Baker A, Richmond R, Haile M, Lewin TJ, Carr VJ, Taylor RL, et al. A randomized controlled trial of a smoking cessation intervention among people with a psychotic disorder. *American Journal of Psychiatry* 2006;**163**(11): 1934–42.

Breland 2014 *{published data only}*
Breland AB, Almond L, Kienzle J, Ondersma SJ, Hart Jr A. Weaver M, et al. Targeting tobacco in a community-based addiction recovery cohort: results from a computerized, brief, randomized intervention trial. *Contemporary Clinical Trials* 2014;**38**(1):113–20.

Butler 2013 *{published data only}*
* Butler CC, Simpson SA, Hood K, Cohen D, Pickles T, Spanou C, et al. Training practitioners to deliver opportunistic multiple behaviour change counselling in primary care: a cluster randomised trial. *BMJ* 2013;**346**: f1191.
Spanou C, Simpson SA, Hood K, Edwards A, Cohen D, Rollnick S, et al. Preventing disease through opportunistic, rapid engagement by primary care teams using behaviour change counselling (PRE-EMPT): protocol for a general practice-based cluster randomised trial. *BMC Family Practice* 2010;**11**:69.

Calabro 2012 *{published data only}*
Calabro KS, Marani S, Yost T, Segura J, Mullin Jones M, Nelson S, et al. Project SUCCESS: results from a randomized controlled trial. International Scholarly Research Notices: Public Health: www.hindawi.com/journals/isrn/2012/913713/ref/ 2012 (accessed 5th February 2015). [Article ID 913713]

Carpenter 2004 *{published data only}*
Carpenter MJ, Hughes JR, Solomon LJ, Callas PW. Both smoking reduction with nicotine replacement therapy and motivational advice increase future cessation among smokers unmotivated to quit. *Journal of Consulting and Clinical Psychology* 2004;**72**(3):371–81.

Chan 2005 *{published data only}*
Chan SS, Lam TH, Salili F, Leung GM, Wong DC, Botelho RJ, et al. A randomized controlled trial of an individualized motivational intervention on smoking cessation for parents of sick children: a pilot study. *Applied Nursing Research* 2005;**18**(3):178–81.

Colby 2005 *{published data only}*
Colby SM, Monti PM, O'Leary Tevyaw T, Barnett NP, Spirito A, Rohsenow DJ, et al. Brief motivational intervention for adolescent smokers in medical settings. *Addictive Behaviors* 2005;**30**(5):865–74.

Cornuz 2002 *{published data only}*
Cornuz J, Humair JP, Seematter L, Stoianov R, Van Melle G, Stalder H, et al. Efficacy of resident training in smoking cessation: a randomized, controlled trial of a program based on application of behavioral theory and practice with standardized patients. *Annals of Internal Medicine* 2002;**136**(6):429–37.

Cossette 2012 *{published data only}*
Cossette S, Frasure-Smith N, Robert M, Chouinard M, Juneau M, Guertin M, et al. A pilot randomized trial of a smoking cessation nursing intervention in cardiac patients after hospital discharge. *Canadian Journal of Cardiovascular Nursing* 2012;**22**(4):16–26.

Dixon 2009 *{published data only}*
NCT00960375. Smoking cessation for veterans with severe and persistent mental illness. clinicaltrials.gov/ct2/show/record/NCT00960375 (accessed 5 January 2015). [NCT00960375]

Emmons 2001 *{published data only}*
Emmons KM, Hammond SK, Fava JL, Velicer WF, Evans JL, Monroe AD. A randomized trial to reduce passive smoke exposure in low-income households with young children. *Pediatrics* 2001;**108**(1):18–24.

Emmons 2005 *{published data only}*
Emmons KM, Puleo E, Park E, Gritz ER, Butterfield RM, Weeks JC, et al. Peer-delivered smoking counseling for childhood cancer survivors increases rate of cessation: the Partnership for Health Study. *Journal of Clinical Oncology* 2005;**23**(27):6516–23.

Erol 2008 *{published data only}*
Erol S, Erdogan S. Application of a stage based motivational interviewing approach to adolescent smoking cessation: The Transtheoretical Model-based study. *Patient Education and Counseling* 2008;**72**(1):42–8.

George 2000 *{published data only}*
George TP, Ziedonis DM, Feingold A, Pepper WT, Satterburg CA, Winkel J, et al. Nicotine transdermal patch and atypical antipsychotic medications for smoking cessation in schizophrenia. *American Journal of Psychiatry* 2000;**157**(11):1835–42..

Gilbert 2006 *{published data only}*
Gilbert H, Sutton S. Evaluating the effectiveness of proactive telephone counselling for smoking cessation in a randomized controlled trial. *Addiction* 2006;**101**(4):590–8.

Gray 2005 *{published data only}*
Gray E, McCambridge J, Strang J. The effectiveness of motivational interviewing delivered by youth workers in reducing drinking, cigarette and cannabis smoking among young people: quasi-experimental pilot study. *Alcohol & Alcoholism* 2005;**40**(6):535–9.

Groeneveld 2011 *{published data only}*
* Groeneveld IF, Proper KI, Van der Beek AJ, Hildebrandt VH, Van Mechelen W. Short and long term effects of a lifestyle intervention for construction workers at risk for cardiovascular disease: a randomized controlled trial. *BMC Public Health* 2011;**11**:836.
Groeneveld IF, Proper KI, Van der Beek AJ, Van Duivenbooden C, Van Mechelen W. Design of a RCT evaluating the (cost-) effectiveness of a lifestyle intervention for male construction workers at risk for cardiovascular disease: The Health under Construction study. *BMC Public Health* 2008;**8**:1.
Groeneveld IF, Proper KI, Van der Beek AJ, Van Mechelen W. Sustained body weight reduction by an individual-based lifestyle intervention for workers in the construction industry at risk for cardiovascular disease: results of a randomized controlled trial. *Preventive Medicine* 2010;**51**(3-4):240–6.

Helstrom 2007 *{published data only}*
Helstrom A, Hutchison K, Bryan A. Motivational enhancement therapy for high-risk adolescent smokers. *Addictive Behaviors* 2007;**32**(10):2404–10.

Herman 2003 *{published data only}*
Herman KC, Fahnlander B. A motivational intervention to reduce cigarette smoking among college students: overview and exploratory investigation. *Journal of College Counselling* 2003;**6**(1):46.

Hollis 2005 *{published data only}*
Hollis JF, Polen MR, Whitlock EP, Lichtenstein E, Mullooly JP, Velicer WF, et al. Teen reach: outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics* 2005;**115**(4):981–9.

Horn 2007 *{published data only}*
Horn K, Dino G, Hamilton C, Noerachmanto N. Efficacy of an emergency department-based motivational teenage smoking intervention. *Preventing Chronic Disease* 2007;**4**(1):A08.

Ingersoll 2009 *{published data only}*
Ingersoll KS, Cropsey KL, Heckman CJ. A test of motivational plus nicotine replacement interventions for HIV positive smokers. AIDS and Behavior 2009; Vol. 13, issue 3:545–54.

Jansink 2009 *{published data only}*
* Jansink R, Braspenning J, Keizer E, Van der Weijden T, Elwyn G, Grol R. No identifiable Hb1Ac or lifestyle change after a comprehensive diabetes programme including motivational interviewing: a cluster randomised trial.

Scandinavian Journal of Primary Health Care 2013;**31**(2): 119–27.

Jansink R, Braspenning J, Van der Weijden T, Niessen L, Elwyn G, Grol R. Nurse-led motivational interviewing to change the lifestyle of patients with type 2 diabetes (MILD-project): protocol for a cluster randomized controlled trial on implementing lifestyle recommendations. *BMC Health Services Research* 2009;**9**:19.

Kelly 2006 ***{published data only}***

Kelly AB, Lapworth K. The HYP program-Targeted motivational interviewing for adolescent violations of school tobacco policy. *Preventive Medicine* 2006;**43**(6):466–71.

Koelewijn-van Loon 2009 ***{published data only}***

Koelewijn-van Loon MS, Van der Weijden T, Van Steenkiste B, Ronda G, Winkens B, Severens JL, et al. Involving patients in cardiovascular risk management with nurse-led clinics: a cluster randomized controlled trial. *Canadian Medical Association Journal* 2009;**181**(12):E267–74.

Lakerveld 2013 ***{published data only}***

Lakerveld J, Bot SD, Chinapaw MJ, Van Tulder MW, Kostense PJ, Dekker JM, et al. Motivational interviewing and problem solving treatment to reduce type 2 diabetes and cardiovascular disease risk in real life: a randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity* 2013;**10**:47.

Manfredi 2004 ***{published data only}***

Manfredi C, Crittenden KS, Cho YI, Gao S. Long-term effects (up to 18 months) of a smoking cessation program among women smokers in public health clinics. *Preventive Medicine* 2004;**38**(1):10–19.

McHugh 2001 ***{published data only}***

McHugh F, Lindsay GM, Hanlon P, Hutton I, Brown MR, Morrison C, et al. Nurse led shared care for patients on the waiting list for coronary artery bypass surgery: a randomised controlled trial. *Heart* 2001;**86**(3):317–23.

Nohlert 2014 ***{published data only}***

Nohlert E, Öhrvik J, Helgason ÁR. Effectiveness of proactive and reactive services at the Swedish National Tobacco Quitline in a randomized trial. *Tobacco Induced Diseases* 2014;**12**(1):9.

Okuyemi 2007 ***{published data only}***

Okuyemi KS, James AS, Mayo MS, Nollen N, Catley D, Choi WS, et al. Pathways to Health: a cluster randomized trial of nicotine gum and motivational interviewing for smoking cessation in low-income housing. *Health Education and Behavior* 2007;**34**(1):43–54.

Persson 2006 ***{published data only}***

Persson LG, Hjalmarson A. Smoking cessation in patients with diabetes mellitus: results from a controlled study of an intervention programme in primary healthcare in Sweden. *Scandinavian Journal of Primary Health Care* 2006;**24**(2): 75–80.

Pisinger 2005a ***{published data only}***

Pisinger C, Vestbo J, Borch-Johnsen K, Jorgensen T. Smoking reduction intervention in a large population-based study. The Inter99 study. *Preventive Medicine* 2005;**40**(1): 112–8.

Pisinger 2005b ***{published data only}***

Pisinger C, Vestbo J, Borch-Johnsen K, Jorgensen T. Smoking cessation intervention in a large randomised population-based study. The Inter99 study. *Preventive Medicine* 2005;**40**(3):285–92.

Smith 2001 ***{published data only}***

Smith SS, Jorenby DE, Fiore MC, Anderson JE, Mielke MM, Beach KE, et al. Strike while the iron is hot: can stepped-care treatments resurrect relapsing smokers?. *Journal of Consulting and Clinical Psychology* 2001;**69**(3): 429–39.

Steinberg 2004 ***{published data only}***

Steinberg ML, Ziedonis DM, Krejci JA, Brandon TH. Motivational interviewing with personalized feedback: a brief intervention for motivating smokers with schizophrenia to seek treatment for tobacco dependence. *Journal of Consulting and Clinical Psychology* 2004;**72**(4): 723–8.

Stockings 2011 ***{published data only}***

Stockings EA, Bowman JA, Wiggers J, Baker AL, Terry M, Clancy R, et al. A randomised controlled trial linking mental health inpatients to community smoking cessation supports: A study protocol. *BMC Public Health* 2011;**11**: 570.

Thomsen 2010 ***{published data only}***

Thomsen T, Tønnesen H, Okholm M, Kroman N, Maibom A, Sauerberg M, et al. Brief smoking cessation intervention in relation to breast cancer surgery: a randomized controlled trial. *Nicotine & Tobacco Research* 2010;**12**(11):1118–24.

Tonnesen 1996 ***{published data only}***

Tonnesen P, Mikkelsen K, Markholst C, Ibsen A, Bendixen M, Pedersen L, et al. Nurse-conducted smoking cessation with minimal intervention in a lung clinic: a randomized controlled study. *European Respiratory Journal* 1996;**9**(11): 2351–5.

Wakefield 2004 ***{published data only}***

Wakefield M, Olver I, Whitford H, Rosenfeld E. Motivational interviewing as a smoking cessation intervention for patients with cancer: randomized controlled trial. *Nursing Research* 2004;**53**(6):396–405.

References to ongoing studies

Catley 2012 ***{published data only}***

Catley D, Harris KJ, Goggin K, Richter K, Williams K, Patten C, et al. Motivational Interviewing for encouraging quit attempts among unmotivated smokers: study protocol of a randomized, controlled, efficacy trial. *BMC Public Health* 2012;**12**:456.

Grossman 2012 ***{published data only}***

Grossman E, Shelley D, Braithwaite RS, Lobach I, Goffin A, Rogers E, et al. Effectiveness of smoking-cessation interventions for urban hospital patients: study protocol for a randomized controlled trial. *Trials* 2012;**13**:126.

Marshall 2013 ***{published data only (unpublished sought but not used)}***
Marshall HM, Yang IA, Passmore L, McCaul EM, Bowman R, Fong KM. A randomized controlled trial of brief counselling intervention and audio materials for smoking cessation in a low-dose CT screening study. *Journal of thoracic oncology* 2013;**8 (Supplement 2)**:S703.

Martin-Lujan 2011 ***{published data only}***
Martin-Lujan F, Piñol-Moreso JL, Martin-Vergara N, Basora-Gallisa J, Pascual-Palacios I, Sagarra-Alamo R, et al. Effectiveness of a structured motivational intervention including smoking cessation advice and spirometry information in the primary care setting: the ESPITAP study. *BMC Public Health* 2011;**11**:859.

Schuck 2011 ***{published data only}***
Schuck K, Otten R, Kleinjan M, Bricker JB, Engels RC. Effectiveness of proactive telephone counselling for smoking cessation in parents: Study protocol of a randomized controlled trial. *BMC Public Health* 2011;**11**:732.

Additional references

Allsop 2007
Allsop S. What is this thing called motivational interviewing? [editorial]. *Addiction* 2007;**102**(3):343–5.

Armstrong 2011
Armstrong M J, Mottershead T A, Ronksley P E, Sigal R J, Campbell T S, Hemmelgarn B R. Motivational interviewing to improve weight loss in overweight and/or obese patients: a systematic review and meta-analysis of randomized controlled trials. *Obesity Reviews* 2011, 2011; **12**(9):709–23.

Britt 2002
Britt E, Hudson SM, Blampied NM. Motivational Interviewing in health settings: a review. *Patient Education and Counselling* 2004;**53**(2):147–55.

Burke 2003
Burke BL, Arkowitz H, Menchola M. The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *Journal of Consulting and Clinical Psychology* 2003;**71**(5):843–61.

Cahill 2010
Cahill K, Lancaster T, Green N. Stage-based interventions for smoking cessation. *Cochrane Database of Systematic Reviews* 2010, Issue 11. [DOI: 10.1002/14651858.CD004492.pub4]

Cahill 2012
Cahill K, Stead LF, Lancaster T. Nicotine receptor partial agonists for smoking cessation. *Cochrane Database of Systematic Reviews* 2012, Issue 4. [DOI: 10.1002/14651858.CD006103.pub5]

Chamberlain 2013
Chamberlain C, O'Mara-Eves A, Oliver S, Caird JR, Perlen SM, Eades SJ, et al. Psychosocial interventions for supporting women to stop smoking in pregnancy. *Cochrane Database of Systematic Reviews* 2013, Issue 10. [DOI: 10.1002/14651858.CD001055.pub4]

Cochrane Handbook 2011
Higgins JP, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Coleman 2004
Coleman T. ABC of smoking cessation: Use of simple advice and behavioural support. *BMJ* 2004;**328**(7436): 397–9.

Grimshaw 2013
Grimshaw G, Stanton A. Tobacco cessation interventions for young people. *Cochrane Database of Systematic Reviews* 2013, Issue 8. [DOI: 10.1002/14651858.CD003289.pub5]

Heckman 2010
Heckman Carolyn J, Egleston Brian L, Hofmann Makary T. Efficacy of motivational interviewing for smoking cessation: a systematic review and meta-analysis. *Tobacco Control* 2010;**19**(5):410–6. [DOI: 10.1136/tc.2009.033175]

Hettema 2010
Hettema JE, Hendricks PS. Motivational interviewing for smoking cessation: a meta-analytic review. *Journal of consulting and clinical psychology* 2010;**78**(6):868–84. [PUBMED: 21114344]

Higgins 2003
Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ* 2003; **7414**:557–60.

Hughes 2014
Hughes JR, Stead LF, Hartmann-Boyce J, Cahill K, Lancaster T. Antidepressants for smoking cessation. *Cochrane Database of Systematic Reviews* 2014, Issue 1. [DOI: 10.1002/14651858.CD000031.pub4]

Knight 2006
Knight KM, McGowan L, Dickens C, Bundy C. A systematic review of motivational interviewing in physical health care settings. *British Journal of Health Psychology* 2006;**11**(2):319–32.

Lancaster 2005
Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. *Cochrane Database of Systematic Reviews* 2005, Issue 2. [DOI: 10.1002/14651858.CD001292.pub2]

Lawendowski 1998
Lawendowski LA. A motivational intervention for adolescent smokers. *Preventive Medicine* 1998;**5**(3):A39–46.

Martins 2009
Martins Renata K, McNeil Daniel W. Review of Motivational Interviewing in promoting health behaviors. 2009; Vol. 29, issue 4:283–93.

Miller 1983
Miller WR. Motivational interviewing with problem drinkers. *Behavioural Psychotherapy* 1983;**11**:147–72.

Miller 1991
Miller WR, Rollnick S. *Motivational interviewing: Preparing people to change addictive behaviors* . New York: Guildford Press, 1991.

Miller 1994
Miller WR. Motivational interviewing.III.On the ethics of motivational interviewing. *Behavioural and Cognitive Psychotherapy* 1994;**22**(2):111–23.

Miller 2002
Miller WR, Rollnick S. *Motivational interviewing: Preparing people for change*. Guilford Press, 2002.

MINT 2015
Motivational Interviewing Network of Trainers (MINT). MI Bibliography 1983-2009. www.motivationalinterviewing.org/motivational-interviewing-resources (accessed 5th February 2015).

Rice 2013
Rice VH, Hartmann-Boyce J, Stead LF. Nursing interventions for smoking cessation. *Cochrane Database of Systematic Reviews* 2013, Issue 8. [DOI: 10.1002/14651858.CD001188.pub4]

Rollnick 1992
Rollnick S, Heather N, Bell A. Negotiating behaviour change in medical settings:The development of brief motivational interviewing. *Journal of Mental Health* 1992; **1**:25–37.

Rollnick 1995
Rollnick SR, Miller WR. What is motivational interviewing? . *Behavioural and Cognitive Psychotherapy* 1995;**23**(4): 325–34.

Rubak 2005
Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. *British Journal of General Practice* 2005;**55**(513): 305–12.

Schulz 2002a
Schulz KF, Grimes DA. Generation of allocation sequences in randomised trials: chance, not choice. *The Lancet* 2002; **359**(9305):515–9.

Schulz 2002b
Schulz KF, Grimes DA. Allocation concealment in randomised trials: defending against deciphering. *The Lancet* 2002;**359**(9306):614–8.

Song 2014
Song Dan, Xu Tu-Zhen, Sun Qiu-Hua. Effect of motivational interviewing on self-management in patients with type 2 diabetes mellitus: A meta-analysis. 2014; Vol. 1, issue 3:291–7.

Stead 2005
Stead LF, Lancaster T. Group behaviour therapy for smoking cessation. *Cochrane Database of Systematic Reviews* 2005, Issue 2. [DOI: 10.1002/14651858.CD001007.pub2]

Stead 2012
Stead LF, Pereira R, Bullen C, Mant D, Hartmann-Boyce J, Cahill K, et al. Nicotine replacement therapy for smoking cessation. *Cochrane Database of Systematic Reviews* 2012, Issue 11. [DOI: 10.1002/14651858.CD000146.pub4]

Stead 2013
Stead LF, Buitrago D, Preciado N, Sanchez G, Hartmann-Boyce J, Lancaster T. Physician advice for smoking cessation. *Cochrane Database of Systematic Reviews* 2013, Issue 5. [DOI: 10.1002/14651858.CD000165.pub4]

Teeter 2014
Teeter BenjaminS, Kavookjian Jan. Telephone-based motivational interviewing for medication adherence: a systematic review. *Translational Behavioral Medicine* 2014;**4** (4):372–81.

USDHHS 2000
US Department of Health and Human Services. *Health People 2010.I. Understanding and Improving Health Objectives for Improving Health. Part A. Focus Area 1-15.* Washington, DC: USDHHS, 2000.

References to other published versions of this review

Lai 2008
Lai Douglas TC, Qin Y, Tang J-L. Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews* 2008 , Issue 1. [DOI: 10.1002/14651858.CD006936]

Lai 2010
Lai Douglas TC, Cahill K, Qin Y, Tang J-L. Motivational interviewing for smoking cessation. Cochrane Database of Systematic Reviews. John Wiley & Sons, Ltd, 2010, issue 1. [DOI: 10.1002/14651858.CD006936.pub2; CD006936]

* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

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

Bastian 2013

Methods	Study design: Randomized controlled trial Location: USA Setting: Telephone support Recruitment: Lung cancer patients identified relatives and friends who smoked through four clinical sites. Participants gave consent for friend/relative to be contacted. A letter was written to the friend/relative explaining the study and asking them to call a toll-free number if they wanted to decline participation. Those who did not decline were called by the study team 7 days later to assess eligibility
Participants	496 adult smokers, randomized to intervention (245) control (251). 42% M. Mean age 47, Mean cpd 19.5. Motivated to quit
Interventions	1. Control: Self-directed materials: letter from an oncologist encouraging participants to give up smoking, quit kit (including an ALA cessation guide, straws, candy, cards, and a notepad), and an individually-tailored information booklet 2. Intervention: As control, plus 6 weekly telephone calls over the 12-week intervention period- standard smoking cessation counselling using MI techniques and adaptive coping skills training All participants were mailed a 2-week starter kit of nicotine patches and could call and for a 2-week supply as needed Provider: Counsellors
Outcomes	7 day PPA at 2 weeks, 6 and 12 month follow-up Validation: none
Funding source	Supported by the National Cancer Institute grant 5U01-CA-92622, also in part by the Intramural Program of the National Human Genome Research Institute, National Institutes of Health
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated

Bastian 2013 (*Continued*)

Other bias	Low risk	Counsellors received 7 days (40 hrs) of MI training. Intervention manager listened to random sample (15%) of each counsellor's sessions to assess adherence and MI proficiency and provided feedback at weekly meetings

Bock 2008

Methods	Study design: Randomized controlled trial Location: Rhode Island, USA Setting: Observation unit of a hospital emergency department Study: Chest Pain Smoking Study (CPSS) Recruitment: Admission records to identify participants
Participants	543 adult smokers, randomized to intervention (271) usual care (272). 52.9% M; 69. 1% W; Mean age 47.7. Mean cpd 18.9. Motivation to quit not required
Interventions	1. Usual care: Referral sheet to local SC resources 2. Intervention: Single 30-min session, delivered by study counsellors, based on MI, including use of decision-balance tool, summation of reasons to quit versus continuing to smoke etc. If trying to quit, given ALA manual, 2 brief (< 15 min) follow-up telephone calls at 2 and 4 wks after counselling session All quit attempters received brief call on TQD and TQD + 7 All offered NRT if decided to quit Provider: Counsellors
Outcomes	Followed up by questionnaire at 1, 3 and 6m PPA and CA at 6m Validation by saliva cotinine, but results not reported. CA counted as self-reported abstinent at all time points
Funding source	A National Institutes of Health, National Heart, Lung and Blood Institute grant (1 R01HL60986)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated

Bock 2008 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	Low risk	Outcome assessor blinded
Other bias	Low risk	Training of the counsellor described. Intervention component checklists used to ensure treatment fidelity. Intervention component checklists used to ensure treatment fidelity

Bock 2014

Methods	Study design: Randomized controlled trial Location: New England, USA Setting: 3 hospital-based primary care clinics located in separate inner-city hospitals Recruitment: during routine healthcare visits at primary care clinics. Patients invited to participate in a study of smoking patterns and cessation
Participants	846 adult smokers randomized to intervention (406) and control (440), 31.2% M; Mean age 39.6. cpd of at least 10. Mixed motivation to quit
Interventions	1. Control: Smoking cessation assistance following guidelines for best practice, using the 5As. Participants asked about smoking status, assessed for nicotine dependence, advised to quit smoking and offered assistance with quitting (nicotine patches, self-help pamphlets and/or referral to the state quitline) 2. Intervention: As control, plus 45-min individual counselling session with Health Educators, using MI techniques. Participants ready to quit received behavioural skills training. Those who decided to quit during this baseline visit were given 2 follow-up telephone counselling calls (on quit day and 2 weeks later). Those choosing not to quit were called 2 and 4 weeks later All participants received 8 weeks of nicotine patches Provider: Health Educator (counsellor) provided MI element
Outcomes	7-day PPA at 1, 2, 6 and 12 months follow-up Validation: Exhaled CO $\leq$ 5
Funding source	A National Institutes of Health,National Institute on Drug Abuse grant (R01DA010860)
Notes	Outcome data not clearly provided for ITT unadjusted analysis in the paper; therefore we obtained data directly from the author for meta-analyses

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Generated using computerised random number programme

Bock 2014 (*Continued*)

Allocation concealment (selection bias)	Low risk	Allocation provided by computer
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Low risk	MI interventionists were trained and supervised by licensed clinical psychologists.Ongoing fidelity was monitored through selected session observation and weekly clinical supervision. All counselling sessions were tape recorded, and 20% selected at random for review by the study intervention co-ordinator

Borrelli 2005

Methods	Study design: Randomized controlled trial Location: Rhode Island, USA Setting: home-care nursing programme Study: Project CARES Recruitment: Referred by nurse.
Participants	278 adult smokers randomized to intervention (129) and control (144). 46% M. Mean age 57.2. 83.5% W. Mean cpd 21.1. Motivation to quit not required
Interventions	1. Control (standard care): 1 visit plus brief counselling based on 5As (5 - 15 mins) 2. Intervention: 3 x 20-30-min visits by home-care nurse plus 1 follow-up telephone call. Motivational interviewing to explore ambivalence, clarify goals/values, build self efficacy/confidence. CO feedback All received manual *Clear Horizons* Provider: nurses
Outcomes	CA and PPA at 6 and 12m. CA defined as abstinent since last wave of data collection Validation: CO < 10 ppm. Also testimony from informants
Funding source	Grants from the National Cancer Institute (CA74553; R25 CA7972; CA84719)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"We randomly selected 104 of 160 nurses to participate in the study". 98 nurses "were randomized"

Borrelli 2005 (*Continued*)

Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	Assessors "blind to condition"
Other bias	Low risk	MI training described + details of treatment validity. Booster sessions throughout the study to maintain counselling skills. Internal validity ensured by audiotaped supervision on a subsample of counselling sessions, monthly meeting with nurses

Butler 1999

Methods	Study design: Randomized controlled trial Location: S. Wales, UK Setting: 21 general practices (24 registrars) Recruitment: GPs asked to recruit 1st smoker coming to each surgery
Participants	536 adult smokers, randomized to MI (270) or brief advice (266). 29% M. Mean age 41. Mean cpd 25.5. Motivation to quit not required
Interventions	1. Control: Standardized brief advice (2 mins) 2. Intervention: Structural motivational counselling for 1 session (mean 10 mins) by GP Provider: GPs
Outcomes	PPA at 6m (self-reported abstinence in the previous months) Validation: Attempted but abandoned
Funding source	The Welsh Office of Research and Development for Health and Social Care
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Filed in a study pack and had to be opened in order
Allocation concealment (selection bias)	Low risk	Sequential blocks of six numbered sealed envelopes contained three allocations to each group, but the order varied

Butler 1999 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	Low risk	Outcome assessor, blinded to intervention group, chased non-responders at 6m
Other bias	Unclear risk	Training in MI and details of MI provided No treatment fidelity monitoring procedure

Cigrang 2002

Methods	Study design: Randomized controlled trial Location: San Antonio,Tx, USA Setting: Screening clinic at air force base Recruitment: Smokeless tobacco (ST) users invited by phone, based on screening results
Participants	60 active-duty military men, using ST, randomized to intervention (31) or usual care (29). Mean age 31. Had to be motivated to make a quit attempt
Interventions	1. Control: Usual care. Encouraged to quit, and info on signing up to an 8-wk cessation course 2. Intervention: proactively contacted by researcher, asked about use of ST and counselled, and sent *Enough Snuff* manual and an *Enough Snuff* video if wishing to quit. Support calls (X2, 10 mins each) Provider: counsellor
Outcomes	PPA at 3m and 6m Validation: none
Funding source	Not stated
Notes	Data presented split by initial counselling call receivers (11) versus those who took the call + manual and video (20). Combined group used for this review

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated

Cigrang 2002 (*Continued*)

Other bias	Unclear risk	No info on training of therapist; MI intervention adequately described

Curry 2003

Methods	Study design: Randomized controlled trial Location: Seattle, WA, USA Setting: 4 paediatric clinics Recruitment: Mothers attending with their children invited to participate
Participants	303 women, randomized to intervention (156) or control (147). Mean age 34, mean cpd 12, 33% W. Motivation to quit not required
Interventions	1. Control: No intervention 2. Intervention: Paediatrician advice based on 5As (1 - 5 mins). S-H materials for mother. Asked to meet a nurse or health educator who provided MI during visit (mean 13 mins) , tailored around 10 goals. Up to 3 phone calls over 3m from nurse Therapist: Paediatrician + nurse or counsellor
Outcomes	Self-reported 7-day PPA and CA at 3m and 12m Validation: CO < 10 ppm, only for women followed up in person. Tabulated rates based on self report
Funding source	A grant from the National Heart, Lung, and Blood Institute, Bethesda, Md (RO1 HL56772)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	"choosing a Ping-Pong ball out of a brown paper bag"; always at least 4 balls, but proportions could be varied
Allocation concealment (selection bias)	High risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	"Data collection staff had no involvement in treatment delivery"
Other bias	Unclear risk	Equal losses to follow up; Quality of MI was adequate.

Davis 2011

Methods	Study design: Randomized controlled trial Location: USA Setting: Laboratory Recruitment: pre-contemplative and contemplative smokers were recruited from the community: advertisements and direct recruitment (no further explanation). Participants were offered USD 25 for participation
Participants	218 adult smokers randomized to intervention (109) and control (109), 55% M; Mean age 37.6. cpd: 25.4; motivated to quit
Interventions	1. Control: Prescriptive 15-min interview regarding smoking. Described as the current dominant approach (i.e. usual care), which maintains a firm and authoritative approach 2. Intervention: 15-min motivational interview regarding smoking. Motivational interviewing described as seeking to establish supportive and empathic alliance No pharmacotherapy provided Provider: nurses trained by consultants
Outcomes	PPA at 1m and 6m follow-up No validation
Funding source	A grant from The Arizona Disease Control Research Commission
Notes	The outcome used for meta-analysis is PPA reported at both 1m and 6m (i.e., cross between PPA and PA). This outcome was used as for all others the manner of reporting makes it impossible to tell which timepoint numbers referred to (i.e. abstinent at 1m or 6m)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Low risk	Therapists were trained by experts, and consultations recorded and checked in both arms, with those not conforming to protocol excluded

De Azevedo 2010

Methods	Study design: Randomized controlled trial Location: Brazil Setting: Public university hospital Recruitment: patients admitted to a public university hospital approached by research team to take part - screening interview took place at patients' bedside within 72 hours of admission, in which smoking was assessed. Within 48 hours of initial screening, a smoking cessation counsellor interviewed each smoker on their smoking habits, after which they were randomized
Participants	273 adult smokers randomized to intervention (141) and control (132), 63.6% M; Mean age 47; cpd (range = 11 - 20; mixed motivation to quit (90% reported they wanted to quit and 10% they did not)
Interventions	1. Control (Low intensity intervention): 15-min session of individual counselling where participants were advised to stop smoking. Counsellor reviewed the dangers of smoking and benefits of quitting. The counsellor suggested that, after discharge, the participant should seek help to stop smoking 2. Intervention (High intensity intervention): 30-min session of individual counselling consisting of a motivational interview, after hospital discharge. Participants were given 7 follow-up telephone calls over 6m (at 1, 2 and 3 weeks, and at 1, 2, 3 and 4m). Each call lasted 10 mins. It was an opportunity to reinforce motivation for stopping smoking (or maintaining abstinence). Style of interview was in line with MI performed during hospitalization No pharmacotherapy provided Intervention provider: smoking cessation counsellors
Outcomes	7-day PPA at 6m follow-up Validation: None
Funding source	A grant from the Research Foundation of the State of São Paulo (grant no. 06/61885-6)
Notes	There were 3 arms in the study; however, the usual-care arm was not randomized, so were excluded from analyses

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Random number table used
Allocation concealment (selection bias)	Low risk	Allocations were put into opaque envelopes (although not specified who prepared these)
Blinding (performance bias and detection bias) All outcomes	High risk	Counsellors assessed the outcome so could have remembered participants' allocation

De Azevedo 2010 (*Continued*)

Other bias	Unclear risk	The style of interview in both arms was the focus of a 4-hour training session prior to the beginning of the study. Counsellors had a protocol to follow and met fortnightly to discuss concerns; however consultations were not recorded or observed

Dornelas 2000

Methods	Study design: Randomized controlled trial Location: Hartford, CT, USA Setting: Hospital ward Recruitment: Consecutively-admitted inpatients with acute myocardial infarction
Participants	100 current smokers, randomly assigned to intervention (54) or minimal care (46). 78% M, mean age 54, 94% W. Mean cpd 29. Motivation to quit not required
Interventions	1. Control: advice only (about 10 mins), + video and referral to local SC services 2. Intervention: MI and RP. Included 1 bedside tailored counselling session $\simeq$ 20 mins. Telephone follow-up at < 1, 4, 8, 12, 16, 20, 26 wks by telephone) Provider: Psychologist
Outcomes	PPA and CA at 6 and 12m Validation: by 'significant other' for 70%; no biochemical confirmation 5 deaths by 12m, but distribution not reported so denominator unaltered
Funding source	Supported in part by Hartford Hospital Grant 127002.
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	"by drawing random numbers from an envelope"
Allocation concealment (selection bias)	High risk	as above
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Unclear risk	MI counselling detail provided. No measures to ensure fidelity

Ellerbeck 2009

Methods	Study design: Randomized controlled trial Location: Kansas, USA Setting: Rural primary care practices Recruitment: From 50 rural primary care practices in the Kansas Physicians Engaged in Prevention Research network. Trained medical students systematically screened patients, identified smokers, and recruited them for the study; obtaining consent. Participants' contact information was forwarded to research staff who contacted them via telephone, verified eligibility, and conducted the baseline survey
Participants	726 adult smokers randomized to intervention (482) and control (244), 41.5% M; Mean age 47.2; cpd 23.7; mixed motivation to quit (30.4% at preparation stage of quitting, 60.9% at contemplation stage, 8.7% at precontemplation stage)
Interventions	1. Control: a health education mailing that consisted of a welcome letter, information about the use of bupropion and the nicotine patch for smoking cessation, and copies of *You Can Quit Smoking: Consumer Guide* and *When Smokers Quit-The Health Benefits Over Time* 2. Intervention: As control, plus educational support, telephone counselling, periodic progress reports with counselling suggestions faxed to their physician, and a 6-monthly personalised KanQuit newsletter with tips on quitting smoking, Participants assigned to moderate-intensity disease management (MDM) were offered up to 2 telephone-based counselling sessions every 6 months (1 session to promote a quit attempt and 1 additional follow-up session for those who made a quit attempt). Participants assigned to high-intensity disease management (HDM) were offered up to 6 counselling calls every 6 months to either promote quitting or prevent relapse. Counsellors used MI techniques and followed a semi-structured protocol Pharmacotherapy: At baseline, 6, 12, and 18m all participants received an offer of free pharmacotherapy, consisting of either a 6-week course of nicotine patches or a 7-week course of bupropion. Participants with contraindications to both drugs were not eligible to receive medication but could participate in all other aspects of the intervention Provider: Counsellors
Outcomes	7-day PPA assessed at 6, 12, 18 and 24m follow-up Validation: 12 and 24m self report validated by salivary cotinine level < 15 ng/mL in a mailed saliva sample. Because of resistance by participants to providing salivary samples at month 12, validation by proxy report from a significant other at month 24 was used for quitters who did not return a salivary sample. The validated quit rate at 24 mths is a mixture of the 2 approaches
Funding source	A grant from the National Cancer Institute (R01-101963). Study medication provided by GlaxoSmithKline
Notes	The HBM and MDM groups were combined into 1 intervention group for meta-analyses, and compared to the phamacotherapy-alone (PM) group

Risk of bias

Bias	Authors' judgement	Support for judgement

Ellerbeck 2009 (*Continued*)

Random sequence generation (selection bias)	Low risk	A computer-generated random-number table was used to generate allocation cards in blocks of 24, with allocation equally distributed across treatment groups
Allocation concealment (selection bias)	Low risk	To conceal allocation, allocation cards were placed in sequentially numbered, opaque, sealed envelopes. After research assistants verified participant eligibility and completed the baseline assessment, the project director opened the next sequential sealed envelope and determined the participant's treatment allocation
Blinding (performance bias and detection bias) All outcomes	Low risk	Research assistants who were blinded to treatment group assignment conducted assessments by telephone at baseline and at 6, 12, 18, and 24 months
Other bias	Unclear risk	Counsellors received week-long training with certified and experienced MI trainers, and renowned MI experts, where they were taught critical components of MI, encouraging autonomy support, and the MI study protocol. They also received ongoing counselling supervision based on case reports of sessions; however more rigourous fidelity assessment was not carried out

Glasgow 2000

Methods	Study design: Randomized controlled trial Location: Portland, OR, USA Setting: 4 Planned Parenthood clinics Recruitment: Female smokers attending clinic invited
Participants	1154 women, aged 15 - 35, randomized to intervention (578) or control (576). Mean age 24 years. Mean cpd 12. Motivation to quit not required
Interventions	Both groups received 20-sec provider advice 1. Control: Advice + S-H brochure *Smart Moves* 2. Intervention: Video (9 mins) targeted at young women. 12 - 15-min counselling session based on motivational interviewing and barrier-based counselling, personalized strategies, stage-targeted S-H material. Offered telephone support call Provider: 'Planned Parenthood staff'. i.e. Counsellor
Outcomes	7-day and 30-day PPA at 6m Validation: saliva cotinine $\leq$ 10 ng/ml

Glasgow 2000 (*Continued*)

Funding source	A grant from the National Heart, Lung and Blood Institute (5RO1HL52538)	
Notes	26% refused telephone component and 31% of remainder not reached	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"A blocking size of 4 was used in randomizing consenting women at each clinic to 1 of 2 conditions under a fixed randomization schedule"
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	Outcome interviewer "unaware of condition assignments"
Other bias	Low risk	Checks on fidelity of implementation, but delivery of follow up low (43%)

Harris 2010

Methods	Study design: Cluster-randomized controlled trial Location: Midwest USA Setting: College fraternities and sororities (cluster randomised) Recruitment: proactive recruitment at fraternity and sorority chapter meetings at 1 large Midwestern university at the start of 3 academic years (2006 - 2008). Screening took place and eligible students were invited to enrol by completing a baseline survey
Participants	452 adult smokers (college students) randomized to intervention (245) and control (207), 54.4% M; Mean age 19.5; cpd 3.5; mixed motivation to quit (all smokers were recruited; not necessarily interested in quitting but supported their chapter-sponsored health programme)
Interventions	1. Control: up to 4 sessions of MI focused on increasing consumption of fruits and vegetables to at least 5 servings a day. The first 3 sessions occurred approximately every other week following baseline assessment and the fourth session occurred approximately 4 weeks after session 3. Sessions were typically 20 - 30 mins. A self-help guide on the benefits and methods for eating fruit and vegetables was given to participants 2. Intervention: up to 4 sessions of MI focused on motivating and assisting participants to quit cigarette smoking. The first 3 sessions occurred approximately every other week following baseline and the fourth approximately 4 weeks after session 3. Sessions were typically 20 - 30 mins. For students who became motivated to change during the sessions, counsellors used a MI style to follow the outline of a "plan module" in which cognitive-behavioural principles were used to develop a change plan. A self-help guide on quitting was also given to participants

Harris 2010 (*Continued*)

	Pharmacotherapy: Students who smoked at a high level were encouraged to use pharmacotherapy obtainable through the university and other resources Provider: Graduate-level clinical or counselling psychology students
Outcomes	30-day PPA at end of treatment and 6m follow-up Validation: 6m self report validated using saliva cotinine $\leq$ 15 ng/ml
Funding source	A grant from the National Cancer Institute (R01CA107191)
Notes	Participants were very light smokers. Control intervention was not a form of smoking cessation intervention

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Low risk	Clusters were randomized after participants had been recruited and undergone a baseline assessment
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Low risk	Counsellors received more than 100 hours of training in smoking, fruit/vegetable intake and the conduct of MI from experts in each of these topics. The MI training was in accord with guidelines and training materials produced by the Motivational Interviewing Network of Trainers. Counsellors participated in weekly group supervision with supervisors who reviewed one randomly-chosen or particularly challenging audiotaped session per counsellor. Counsellors whose fidelity scores dropped below proficiency received additional supervision and remediation until scores increased or the counsellor was dismissed

Hennrikus 2005

Methods	Study design: Randomized controlled trial Location: Minneapolis, MN, USA Setting: 4 hospitals Study: The TEAM Project Recruitment: Smokers admitted as Inpatients (all diagnoses) to any of the hospitals
Participants	2095 current smokers, randomized to A+C (Advice and counselling: 696), UC (modified usual care: 696) or A (advice only: 703)- not included in meta-analyses. Mean age 47, 47% M, 78% W, mean cpd: not stated. Motivation to quit not required
Interventions	1. Control: modified usual care: 2 S-H manuals tailored for inpatients + directory of local SC resources, + post-discharge letter 2. Intervention A+C: 2 S-H manuals + directory of local SC services, + physician advice to quit (60 sec) + post-discharge letter + nurse counselling (MI + RP) for a mean of 20 mins. Follow up: 3-6 phone calls over 6m (median 10 mins per call). More frequent calls if quit attempt. NRT or bupropion use encouraged but not supplied Provider: Nurse
Outcomes	7-day PPA at 12m Validation: Saliva cotinine (< 15 ng/ml) 12m denominators corrected for deaths (A+C: 27, UC: 17)
Funding source	A grant from the National Institutes of Health (HL54132)
Notes	Only data from interventions A+C and control are used in this review. Data from third arm (Advice only) not used: 2 S-H manuals + directory of local SC services, + physician advice to quit (60 sec) + post-discharge letter

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"randomized to one of three treatment conditions by looking up the next available group assignment on a list on which the three conditions were randomly ordered within blocks of 30 assignments"
Allocation concealment (selection bias)	Low risk	See above
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Unclear risk	Details of counselling described. Training of nurses recorded. Regular meeting throughout study period

Hokanson 2006

Methods	Study design: Randomized controlled trial Location: Minneapolis, MN, USA Setting: International Diabetes Center Study: Diabetes and Reduction in Tobacco Study Recruitment: Current smokers or recent (3m) quitters enrolling in a diabetes education programme, contacted by study nurse
Participants	114 adult smokers with Type 2 diabetes, randomized to intervention (57) or usual care (57). Mean age 54, 57% M, 88% W. Mean cpd 21. Motivation to quit not required
Interventions	Both groups received the BASICS diabetes education programme 1. Control: Written information and referrals to local SC programmes 2. Intervention: individual SC and RP counselling using MI (20 - 30 mins) at the initial study visit + 3 - 6 telephone counselling sessions (each avg 11 mins) Pharmacotherapy: NRT or bupropion offered to quit attempters. Use of NRT and bupropion similar across both groups Provider: Research staff (counsellor)
Outcomes	7-day PPA at 3 and 6m Validation: saliva cotinine (6m only). Not all quitters tested, tabulated data based on self report only
Funding source	A grant from the Minnesota Partnership for Action Against Tobacco
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"a computerized randomization scheme assigning subjects in blocks of 4"
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Unclear risk	Staff received 12 hours of training on SC and MI + ongoing support from study personnel familiar with MI. No fidelity monitoring reported 50% attrition rate by final follow-up

Hollis 2007

Methods	Study design: Randomized controlled trial Location: Oregon USA Setting: Community-based telephone quitline programme Recruitment: Callers invited to participate
Participants	4614 smokers randomized to: Brief counselling (872, no NRT; 868, with NRT), Moderate counselling (718, no NRT; 715, with NRT), or Intensive counselling (720, no NRT; 721, with NRT). 40% M, mean age 41, 90% W. Mean cpd 21. As participants were callers to a telephone quitline they are assumed to be fully or partly motivated to quit
Interventions	Factorial design; 3 levels of counselling, ± offer of nicotine patches. No face-to-face contact 1. Control: Brief counselling (usual care), 15-min call + referral material + tailored S-H materials 2. Intervention: Moderate counselling: 40 mins counselling based on MI + 1 brief call to encourage use of community services, tailored S-H materials 3. Intervention: Intensive counselling: As 2, plus offer of ≤ 4 additional telephone calls. Each call incorporated MI techniques, stage assessment, RP as needed NRT offered free to the 'with NRT' groups Provider: Experienced telephone tobacco counsellors
Outcomes	30-day PPA at 6 and 12m Validation: none
Funding source	A grant from the National Cancer Institute (R01 CA86242). Nicotine patches supplied by GlaxoSmithKline
Notes	Groups 2 and 3 combined vs Group1 in meta-analyses

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"a computer algorithm randomly assigned participants"
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	"Trained assessors blinded to treatment condition conducted follow-up assessments"
Other bias	Low risk	Counsellors received additional training in MI, close adherence to intervention protocol, using computer-driven scripts. Calls taped for quality assurance

Lindqvist 2013

Methods	Study design: Randomized controlled trial Location: Stockholm, Sweden Setting: Telephone smoking quitline. The Swedish National Tobacco Quitline (SNTQ) is a nationwide free-of-charge service that is operated by the Stockholm County Council Health Service and funded by the Swedish Government Recruitment: people who routinely called the quitline were recruited. Clients were informed of the study and asked if they were happy to take part
Participants	772 adult smokers randomized to intervention (296) and control (476), 18.6% M; Mean age 48.6; cpd 15.8; motivated to quit
Interventions	1. Control: standard Swedish national Tobacco Quitline treatment (ST) 2. Intervention: As control, plus MI Further details of treatment arms provided very limited. The client's first call was allocated to the first available counsellor. Whether this counsellor was ST-trained or MI-trained determined which treatment arm the client would belong to for the duration of the study. Smokers could call the quitline more than once - these calls were transferred to a counsellor who belonged to the same treatment arm as the counsellor who had taken the first call, where possible A high proportion of all participants used pharmacotherapy; however it is not clear how this was obtained or whether recommended by study counsellors Provider: SNTQ counsellors: All had received 6 m training in tobacco cessation counselling. A year before the study, most SNTQ counsellors had participated in 2 introductory MI workshops
Outcomes	7-day PPA & 6m CA at 12m follow-up Validation: None
Funding source	The Swedish Cancer Society, Stockholm County Council, the Swedish Heart and Lung Association, the Swedish Research Council, the Swedish Council for Working Life and Social Research and the Swedish National Institute of Public Health
Notes	Reported that baseline characteristics not significantly different across arms but does not report baseline values. Personal characteristics are based on 12 m responders only

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Counsellors were allocated to give a treatment via coin tossing and participants got whichever treatment the first counsellor they spoke to provided
Allocation concealment (selection bias)	High risk	Counsellors knew which treatment they were given and so which group participants would be allocated to

Lindqvist 2013 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	Low risk	Questionnaires administered by post
Other bias	Low risk	Therapists were trained in MI prior to the study and fidelity checks showed that the treatments received by each arm were sufficiently different

Lloyd-Richardson 2009

Methods	Study design: Randomized controlled trial Location: New England, USA Setting: 8 immunology clinics (6 out-patient HIV clinics and 2 primary care medical offices) in south-eastern New England Recruitment: study physicians were trained to ask all patients about their smoking status and to provide brief cessation advice to smokers. Those who smoked, were deemed eligible to participate by their physician, and were willing to speak with a health educator (HE) were referred to the study
Participants	444 HIV-positive, adult smokers, randomized to intervention (232) and control (212); 63.3% M; Mean age 42.0; cpd 18.3; mixed motivation to quit (participants not required to quit smoking or to use the nicotine patch (80% and 20% in each group had high and low motivation respectively))
Interventions	1. Control: NRT + brief standard care intervention (SC). 2 brief sessions, consisting largely of baseline assessments, randomization and brief assessment of quitting plans. Participants returned to the clinic bi-weekly for distribution of additional patches, allowing the HE to briefly (5 mins) reinforce quit efforts, check on patch side effects and answer questions. HEs were instructed to provide praise of participant's efforts and answer any questions asked, but not to initiate additional discussion of the quit effort. Participants unwilling to set a quit date were instructed to contact the HE when they were ready (any time within the next 6m). This reflects the minimum standard of care recommended by the Agency for Health Research and Quality (AHRQ) panel convened to address smoking cessation treatment 2. Intervention: NRT + intensive motivationally enhanced counselling intervention (ME). Participants received 4 30-min intervention sessions, as well as a quit-day counselling call. Quit dates determined by individual participants in consultation with HE. MI elements delivered throughout all contacts. Participants not willing to set a quit date were engaged in discussion of 'quitting as a process' and barriers to quitting Pharmacotherapy: All participants willing to set a quit date were provided with 8 weeks' supply of NRT (delivered via bi-weekly 'patch pickups' scheduled between the participant and the HE) Provider: Health educators (HEs) trained in smoking cessation counselling
Outcomes	7-day PPA at 2, 4 and 6m follow-up Validation: exhaled CO (< 10 ppm)

Lloyd-Richardson 2009 (*Continued*)

Funding source	Grants from the National Institute of Drug Abuse (R01-DA12344-06), the National Heart, Lung and Blood Institute (K23-HL069987), the National Cancer Institute (K07-CA95623), the NIH-funded Transdisciplinary Tobacco Use Research Center (P50 CA084719), NIH-funded Lifespan/Tufts/Brown Center for AIDS Research (P30 AI42853), and by the Robert Wood Johnson Foundation
Notes	Different Ns and different loss to follow-up allocated to intervention and control arms in the Results section in comparison to the participant flow chart. Table 1 seems consistent with text, if you work back percentages. Data inferred based on this assumption as there was no response to a data request from authors

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	Outcome assessors were research staff blind to allocation
Other bias	Unclear risk	Deatils of MI training is sparse, however it is stated that HEs in the MI arm were trained to reinforce participants' beliefs in the ability to make positive changes, and treatment fidelity was monitored and results revealed that ME content delivered to those in the ME condition was appropriate, and that it exceeded significantly that delivered to SC participants (P = 0.001).

Louwagie 2014

Methods	Study design: Randomized controlled trial Location: Soshanguve, South Africa Setting: 6 largest tuberculosis clinics in Soshanguve, a large urban township in the City of Tshwane Metropolitan Municipality in South Africa Recruitment: all newly diagnosed adult patients initiating TB treatment at the 6 clinics were approached to participate in the study
Participants	409 adult smokers newly diagnosed with tuberculosis randomized to intervention (205) and control (204); 90.0% M; Mean age 41.3; cpd 10.0; Participants did not appear to have to want to quit, however motivation was high (9 out of 10 at baseline)

Interventions	1. Control (Brief smoking cessation advice): the following short standardized smoking cessation message from the TB nurse: "Tobacco use is extremely harmful for your health. If you stop smoking now, your TB will heal better and you will have a lower risk of getting TB again in the future. You will also reduce your risk of heart disease and cancer and protect your children against TB. As a professional nurse, I advise you to stop using tobacco in the interests of your health", plus a smoking cessation booklet supplied by the National Council against Smoking of South Africa 2. Intervention (Brief motivational interviewing): As control, plus a brief motivational interviewing session (15 - 20 mins) consisting of a quick assessment, the participant identifying problems and solutions and the setting of targets. Lay health-care workers (LHCWs) helped participants who were already highly motivated to quit and were highly confident about their ability to quit with a quit plan Pharmacotherapy was not provided as smoking cessation medication is expensive and currently not available in public primary care clinics in South Africa Provider: LHCWs provided the MI intervention
Outcomes	7-day PPA at 1m follow-up and PA (allowing 2 weeks for lapses) at 3 and 6m follow-up Validation: only occurred in small subset of participants and so has not been included; however outcomes were the same with validation. As participants did not know whether the monitor was allocated to their clinics at specific time points, this approach introduced a 'bogus pipeline' procedure, thus increasing the likelihood of truthful answers
Funding source	Grants from the KNCV Tuberculosis Foundation (12.402.2/MvdW/ U.10.0696/cal), and the National Research Foundation of South Africa (80843), and by the Global Bridges Health Care Alliance for Tobacco Dependence Treatment
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	The randomization sequence was generated by an independent epidemiologist who was not otherwise involved in the research project, with a 1:1 allocation and random block sizes of 2, 4, 6, 8 and 10
Allocation concealment (selection bias)	Low risk	Current smokers were allocated by the lay health care workers (LHCWs) to either the intervention or the control arm by means of sequentially numbered sealed opaque envelopes, thus ensuring allocation concealment
Blinding (performance bias and detection bias) All outcomes	High risk	Follow-up questionnaires were dispensed by the same LHCWs who provided the intervention treatment

Louwagie 2014 (*Continued*)

Other bias	Low risk	LHCWs received 3 days' in-depth training in tobacco cessation and brief MI for tobacco cessation from an experienced brief MI counsellor and trainer. On-site follow-up practical sessions were organized approximately every 4 months with non-videotaped role plays and informal reinforcement of knowledge and skills

McClure 2005

Methods	Study design: Randomized controlled trial Location: WA, USA Setting: Group Health Co-operative, a staff-model integrated health care organization Recruitment: Women smokers with an abnormal pap smear or colposcopy invited to participate
Participants	275 women, randomized to intervention (138) or control (137). Mean age 33, 82% W. Mean cpd 14. Motivation to quit not required
Interventions	1. Control: usual care: a letter explaining the association between cervical cancer and smoking, S-H booklet, contact information for a phone-based SC treatment programme 2. Intervention: As control, plus ME telephone counselling: + ≤ 4 x 15-min proactive calls, focused on motivation building and strengthening, action plans for quitting or RP strategies, depending on readiness to quit Pharmacotherapy: Both groups allowed to use NRT or bupropion Provider: Counsellors
Outcomes	7-day PPA at 6 and 12m CA (= PPA at 6 and 12m) at 12m Validation: CO < 10 ppm or salivary cotinine, at 12m only. Modified 'bogus pipeline' used at 6m assessment Data are based on self report only
Funding source	Grants from the National Cancer Institute (CA84603; CA74517), and the National Institute on Drug Abuse (DA11194)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"participants were randomly assigned"
Allocation concealment (selection bias)	Unclear risk	Not stated

McClure 2005 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	Low risk	"Interviewers were blinded to participants' randomization status"
Other bias	Low risk	All counsellors were trained in MI. Details of counselling methods, contents, supervision and duration documented

Okuyemi 2013

Methods	Study design: Randomized controlled trial Location: USA Setting: 8 emergency homeless shelters and transitional housing units in Minneapolis/St Paul, Minnesota, USA Recruitment: through health fairs, staff informational sessions, fliers at homeless shelters and word of mouth
Participants	430 homeless adult smokers randomized to intervention (216) and control (214); 74.7% M; Mean age 44.4; cpd 19.3; motivated to quit
Interventions	All participants received a health educational resource called *The Power to Quit: A Quit Smoking Guide*, developed by the project investigators 1. Control: 1-time session of brief advice to quit smoking lasting approximately 10 - 15 mins. Included topics of smoking history, current smoking, direct advice about the health risks of smoking and the health benefits of quitting, affirmation of the participant's decision to quit, an assessment of preparedness to quit and addressing strategies for coping with smoking cues 2. Intervention: 6 individual MI counselling sessions, each lasting 15 - 20 minutes, which occurred at baseline and follow-up at weeks 1, 2, 4, 6 and 8. The focus of the MI sessions was encouraging cessation and NRT adherence Pharmacotherapy: At baseline, participants in both groups received a 2-week supply of 21-mg nicotine patches, and every 2 weeks they received an additional 2-week supply of 21 mg nicotine patches, over the 8-week treatment period Provider: Counsellors
Outcomes	7-day PPA at 8 weeks and 6m follow-up Validation: expired carbon monoxide ($\leq$ 10 ppm). Salivary cotinine testing was performed if the expired CO was greater than 10 ppm. for those who self-reported abstinence. A cut-off of $\leq$ 20 ng/ml for salivary cotinine was used to verify abstinence
Funding source	A grant from the National Heart Lung and Blood Institute (R01HL081522)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Okuyemi 2013 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Was prepared by study statistician, however no detail given on how
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Low risk	MI counsellors received 2 full days of training on the theory and method of conducting MI. The training was conducted by a doctoral-level psychologist on the research team. Following initial training, counsellors received approximately 40 hrs of supervised training.All MI sessions were audio-recorded and reviewed during weekly supervision meetings. During these meetings, tapes were reviewed for treatment fidelity and direct instruction with a licensed clinical psychologist trained in MI

Rigotti 1997

Methods	Study design: Randomized controlled trial Location: Boston, MA, USA Setting: Massachusetts General Hospital Recruitment: Inpatient smokers in medical or surgical services
Participants	650 current smokers, randomized to intervention (325) or control (325). 54% M, mean age 48, mean cpd 23. Motivation to quit not required
Interventions	1. Control: Usual care 2. Intervention: Brief physician advice + 1 bedside counselling session 15 mins, incorporating MI, cognitive-behavioural counselling and RP techniques. S-H materials. 1 - 3 brief telephone calls post-discharge Provider: Research assistant, with nurse supervision
Outcomes	7-day PPA at 6m Validation: Salivary cotinine 35 deaths excluded from MA denominators at 6m
Funding source	Grants from the American Cancer Society, the Massachusetts Division Inc and the National Cancer Institute (CA01673)
Notes	

Risk of bias

Rigotti 1997 (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	"list of eligible smokers was put in random order and patients were recruited consecutively in this order"
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	"The interviewer was blinded to patients' group assignment"
Other bias	Unclear risk	Counselling by research assistant, supervised by a nurse experienced in smoking counselling. Structured protocol used, but detailed of counselling not mentioned

Rohsenow 2014

Methods	Study design: Randomized controlled trial Location: USA Setting: State-funded inner-city residential substance abuse treatment programme with state-wide catchment Recruitment: residents of the abstinence-oriented programme were told the study would provide informational sessions about smoking without requiring cessation, and asked if they would like to take part
Participants	165 adult smokers meeting current alcohol dependence criteria, randomized to intervention (80) and control (85); 57.6% M; Mean age 33.8; cpd 21.2; Did not have to be motivated to quit smoking
Interventions	All participants informed of free access to smoking cessation pamphlets, smoking cessation skills groups, and hard candy 1. Control: brief advice used AHRQ-recommended methods. Initial session (about 15 mins): therapists assessed smoking rate and interest in quitting, directly advised participants to stop smoking now during SUD treatment for their health, and gave advice about useful methods. A consumer guide for smoking cessation, alist of smoking services in the state and pamphlets on smoking cessation were provided. 43 participants were randomized to booster sessions (5 - 15 mins each), 7 and 30 days after the initial session. The remaining 42 participants did not receive boosters 2. Intervention: used motivational therapist style with assessment feedback, based on Miller 1991. Initial session (45 mins) involved discussing pros and cons of smoking, interpreting health risks, costs of smoking, their smoking rate, relationship of smoking to ongoing alcohol use, and their barriers to change with corrective information. 40 participants were randomized to booster sessions (5 - 15 mins each), 7 and 30 days after the initial session. The remaining 40 participants did not receive boosters Booster sessions checkedprogress, engaged in problem-solving, noted successes, repeated advice to quit smoking, and reminded participants of help methods available

	Pharmacotherapy: All participants were informed of free access to NRT (transdermal nicotine or nicotine gum) if medically eligible and willing to cease smoking while using it Provider: interventions were provided by 1 of 3 research therapists, with each conducting both types of treatment
Outcomes	7-day PPA at 1, 3, 6 and 12 month follow-up Validation: exhaled CO $\leq$ 10 ppm
Funding source	A grant from the National Institute of Alcohol Abuse and Alcoholism (1 RO1 AA11318) and two Senior Research Career Scientist Awards from the United States Department of Veterans Affairs
Notes	The study was made up of 4 trial arms: MI with and without booster sessions and brief advice with and without booster sessions. For the purpose of analyses we combined these into 2 groups: 1.MI and 2. brief advice

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Random numbers table within each gender
Allocation concealment (selection bias)	Low risk	Assignments were put in sealed envelopes opened just before the first treatment session
Blinding (performance bias and detection bias) All outcomes	Low risk	Research interviewers blind to allocation carried out all assessments
Other bias	Low risk	Therapists received 30 hours of training in MI including supervised role plays and practice with the treatment manual, conducted by the first author who had received 2-day MI training from Steven Rollnick. Treatment session audiotapes (24% of initial sessions, 19% of booster sessions) were reviewed in weekly group supervision and rated for MI style and adherence to the manual, with immediate feedback to therapists to prevent drift

Severson 2009

Methods	Study design: Randomized controlled trial Location: USA Setting: 24 military dental clinics Recruitment: active-duty US military personnel were recruited during their annual dental examinations
Participants	785 adult military personnel, users of smokeless tobacco, randomized to intervention (392) and control (393); 99.9% M; Mean age 30.4; dependence (use of smokeless tobacco in first 30 mins of waking) 24.0; all smokeless tobacco (ST) users were asked to volunteer regardless of their motivation to quit (6.5 on adaptation of contemplation ladder, rated 1 - 10)
Interventions	1. Control: participants advised to quit ST by their dental provider and referred to a local military tobacco cessation programme 2. Intervention: 3 telephone calls. In the first, counsellors established rapport with participants, obtained ST usage patterns, engaged participants in "change talk", and encouraged them to take action to quit. Participants were given the option of receiving a self-help book and video-based ST cessation programme. Participants who accepted these were asked for permission to be called twice more. The second call was made 3 weeks after quitting materials were mailed. The counsellor discussed the materials and assessed the participant's readiness to quit. If ready to quit or the participant had already initiated a quit, the counsellor discussed plans for quitting. The third call was scheduled a few days after participants' quit dates or, if a quit date was not set, 2 weeks after the second call. During the call, support was provided for quitting and strategies elicited for staying quit and dealing with tough situations. If the participant had relapsed, the focus was on providing support and making another quit attempt No pharmacotherapy Provider: Phone counsellors
Outcomes	CA (over the whole follow-up period) measured at 3 and 6m follow-up Validation: None
Funding source	Congressionally Directed Medical Research Program's Peer Review Medical Research Program (DAMD17-02-2-0)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Outcomes were assessed by postal questionnaire or staff contacted participants by telephone so unblinding may have occurred; however this is unclear

Severson 2009 (*Continued*)

Other bias	Low risk	All phone counsellors received 8 hrs of training from an individual certified by the Motivational Interviewing Network of Trainers (2008). All telephone counselling sessions were scripted and calls were audiotaped. The audiotapes were reviewed weekly by the supervising psychologist, who provided counsellors with constructive feedback to deal with common problems

Soria 2006

Methods	Study design: Randomized controlled trial Location: Albacete, Spain Setting: 2 family health centres Recruitment: Smokers making routine visits to their GPs
Participants	200 smokers, randomized to intervention (114) or control (86). 47% M, mean age 38. Mean cpd 18. Motivation to quit not required
Interventions	1. Control: Brief (3 mins) anti-smoking advice 2. Intervention: 3 x 20-mins MI-based interviews, at intervals to suit doctor and participant Pharmacotherapy: Bupropion offered to highly nicotine-dependent members of both groups Provider: 5 family practitioners
Outcomes	PPA at 6 and 12m Validation: expired CO < 6 ppm
Funding source	Grant from the Department of Health, Health Science Institute of the Government of the Autonomous Communities of Castille - La Mancha (Spain)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"randomly assigned by means of a non-block table of random numbers"
Allocation concealment (selection bias)	Low risk	"non-transparent sealed envelopes containing the interventions"

Soria 2006 (*Continued*)

Blinding (performance bias and detection bias) All outcomes	Low risk	"Statistical analysis was made in blind form, without knowing the identification labels of the groups that were compared"
Other bias	Unclear risk	Trained in MI through role play + videos. Content of training not reported. No reported monitoring of counselling process to ensure treatment fidelity

Stein 2006

Methods	Study design: Randomized controlled trial Location: Providence, RI, USA Setting: 5 methadone maintenance treatment programme centres Recruitment: Offered to smokers routinely attending maintenance clinic
Participants	383 methadone-maintained adult smokers, randomized to maximal (191) or minimal (192) SC programmes. 52% M, mean age 40, 78% W. Mean cpd 27. Motivation to quit not required
Interventions	1. Control: Up to 2 visits, i.e. baseline and quit date (if set). Brief advice using National Cancer Institute's 4As model (< 3 mins), + S-H materials 2. Intervention: Up to 3 visits from study counsellor, i.e. 1 x 30-min MI-based tailored interview, + 15 - 30-min quit date session, + follow-up RP session. Those not ready to quit only received 2 sessions Pharmacotherapy: All participants willing to make quit attempt offered NRT patches Provider: Counsellors
Outcomes	7-day PPA at 3 and 6m Validation: Expired CO < 8 ppm
Funding source	A grant from the National Cancer Institute (R01CA84392). Transdermal nicotine therapy provided by GlaxoSmithKline
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	"research assistants blinded to participant group assignment"

Other bias	Low risk	MI training conducted and monitored to MISC standards.

Tevyaw 2009

Methods	Study design: Randomized controlled trial Location: USA Setting: colleges and universities in a northeastern US state Recruitment: advertisements were posted in campuses, in campus newspapers, and on the Internet (e.g.Craigslist). Interested students contacted the project to be screened for eligibility
Participants	110 adult (18 - 24), student, daily smokers verified by a CO > 10 ppm, randomized to intervention (55) and control (55); 99.9% M; Mean age 19.8; cpd 12.3; Smokers did not require an interest in quitting smoking at time of study entry (5.6 on the contemplation ladder, rated 1 - 10)
Interventions	1. Control: progressive muscle relaxation (REL), matched to the MET intervention for contact time. Therapists followed a standardized manual for implementation. In Session 1, therapists guided the participant through progressive muscle REL exercises. Muscle REL techniques were then practiced during Sessions 2 and 3 2. Intervention: 3x sessions of motivational enhancement therapy (MET), incorporating the central principles described by Miller 1991. The first session (60 mins) focused on enhancing motivation to cut down and quit smoking. Students received information about smoking effects, coping with withdrawal symptoms, and strategies for quitting. The therapist and student developed an action plan for behaviour change. Sessions 2 and 3 (each 30 mins) used MET principles, focused on progress made and planning for the future No pharmacotherapy Intervention provider: 3 female bachelor-level therapists, with 1 - 7 years of clinical experience in adolescent and young adult substance abuse treatment
Outcomes	7-day PPA at 1, 3 and 6m follow-up Validation: salivary cotinine < 15 ng/ml or CO ≤ 8 ppm
Funding source	A grant from the National Institute on Drug Abuse (DA011204), and a Senior Career Research Scientist Award from the Department of Veterans Affairs
Notes	The study was made up of 4 trial arms: MET with and without contingency reinforcement, and REL with and without contingency reinforcement. For the purpose of analyses we combined these into 2 groups: MET and REL

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Tevyaw 2009 (*Continued*)

Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Low risk	Assessors were blind to psychosocial condition
Other bias	Low risk	Training in MET was conducted by the first author (a licensed clinical psychologist) and other faculty members, involving 40 hrs of intensive workshops with didactic material, role-playing, and feedback. The first author, a licensed clinical psychologist, provided weekly group and individual supervision. Adherence ratings to treatment were assessed by the therapist and student separately

Wu 2009

Methods	Study design: Randomized controlled trial Location: USA Setting: Asian community health coalition's member organizations. Community setting in New York City Recruitment: Participants were recruited through the Asian Community Health Coalition's Chinese member organizations by bilingual staff from Temple University's Center for Asian Health in co-operation with trained community volunteers
Participants	139 adult ethnic Chinese smokers, randomized to intervention (67) and control (72); 87.7% M; Mean age 44.4; cpd not stated; motivated to quit
Interventions	1. Control: 4 in-person 60-min health education sessions and general self-help health information, covering nutrition, exercise, and harmful effects of tobacco. Quitting strategies were also provided 2. Intervention: 4 in-person 60-min sessions of AMI counselling and self-help smoking cessation materials. The effects of tobacco use, secondhand smoke, and participants' experiences with smoking were discussed. Participants were counselled about the addictive nature of nicotine, encouraged to examine the pros and cons of smoking, and contemplate quitting behaviour Pharmacotherapy: All participants were provided with an 8-week supply of nicotine patches and given the option of deciding when to start using the patches during the 6-month study period Provider: Counsellors

Wu 2009 (*Continued*)

Outcomes	7-day PPA at 1 week, 1, 3 and 6 month follow-up Validation: expired CO was measured; however results by arm not reported and so non-validated data used
Funding source	A grant from the National Cancer Institute Community Network Program (U01CA114582-02S2)
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not stated
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not stated
Other bias	Low risk	Counselors received initial one-week long training from the Principal Investigator, investigators and project manager. An integrity checklist and onsite observation was used to monitor the fidelity of each intervention session

AHRQ: Agency for Health care Research and Quality
ALA: American Lung Association
AMI: adapted motivational interviewing
CA: continuous abstinence
cpd: cigarettes per day
LHCW: lay health care workers
M: male
MA: meta-analysis
ME: motivational enhancement
MET: motivational enhancement therapy
MI: motivational interviewing
MISC: Motivational Interviewing Skill Code
PA: prolonged abstinence
PPA: point prevalence abstinence
RP: relapse prevention
SC: smoking cessation
S-H: self help
SUD: substance use disorder
TQD: target quit date

W: white

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

Study	Reason for exclusion
Abdullah 2005	No explicit reference to use of Miller's MI
Ahluwalia 2006	Control group received intensive intervention, i.e. 6 counselling sessions and telephone follow-up support. Not routine care/brief advice
Baker 2006	Confounded by use of NRT in the intervention arm only
Breland 2014	Only participants unwilling to quit were given MI; the rest received an alternative intervention path and data can not be separated
Butler 2013	Specifies in paper that the counselling is not truly MI
Calabro 2012	Intervention is based on the transtheoretical model
Carpenter 2004	No explicit reference to use of Miller's MI
Chan 2005	1m follow-up only
Colby 2005	Participants all adolescent smokers
Cornuz 2002	Smoking cessation not the aim of the study
Cossette 2012	Intervention based on stages of change theory
Dixon 2009	The intervention is not based on Miller & Rollnick's MI
Emmons 2001	Smoking abstinence as secondary endpoint. Data not extractable for analysis
Emmons 2005	NRT provided to the intervention arm only
Erol 2008	Not randomized controlled study. Pre-post study design
George 2000	Subjects all with schizophrenia. Not of primary interest in this review
Gilbert 2006	No explicit reference to use of Miller's MI
Gray 2005	Quasi-experimental pilot, significant baseline differences between groups
Groeneveld 2011	Multiple complexities of trial- participants chose an unhealthy behaviour to work on (1 of which was smoking); however it is unclear how the control group chose their behaviour

(*Continued*)

Helstrom 2007	Participants were teenage smokers
Herman 2003	Small-scale exploratory investigation. Total number of events = 3
Hollis 2005	Participants were teenage smokers
Horn 2007	Participants were teenage smokers
Ingersoll 2009	Did not follow participants up until at least six months post-quit (measured abstinence at 3 month follow-up)
Jansink 2009	Main study paper does not investigate/report smoking cessation
Kelly 2006	Participants were teenage smokers
Koelewijn-van Loon 2009	Multiple behaviours addressed in study and smoking subset cannot be separated out
Lakerveld 2013	Intervention based on theory of planned behaviour
Manfredi 2004	Complex intervention, impossible to isolate the effect of MI component
McHugh 2001	No explicit reference to use of Miller's MI
Nohlert 2014	MI was administered in both groups
Okuyemi 2007	Confounded by the use of NRT in the intervention arm only
Persson 2006	No explicit reference to use of Miller's MI
Pisinger 2005a	Smoking reduction study. Cessation data not extractable
Pisinger 2005b	No explicit reference to use of Miller's MI
Smith 2001	Main objective to assess efficacy of stepped-care treatment and relapse prevention
Steinberg 2004	1m follow-up only
Stockings 2011	The intervention consists of a number of components which vary across groups, such as amount of NRT administered and referral to services, in addition to MI
Thomsen 2010	No evidence of MI monitoring
Tonnesen 1996	No explicit reference to use of Miller's MI
Wakefield 2004	Confounded by the use of NRT in the intervention arm only

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

Catley 2012

Trial name or title	Motivational Interviewing for encouraging quit attempts among unmotivated smokers: study protocol, of a randomized, controlled, efficacy trial
Methods	Participants randomized to Motivational Interviewing, Health Education or Brief Advice (2:2:1)
Participants	Adult community resident smokers (N = 255) reporting low motivation and readiness to quit
Interventions	The MI and Health Education group receive 4 individual counselling sessions and the Brief Advice group 1 brief, in-person session, over a 6m period
Outcomes	The primary outcome is self report of 1 or more quit attempts lasting at least 24 hours between randomization and 6m follow-up.The secondary outcome is biochemically confirmed 7-day point prevalence cessation at 6m follow-up
Starting date	October 2010
Contact information	Correspondence to Delwyn Catley at: catleyd@umkc.edu; Department of Psychology, University of Missouri-Kansas City, 5100 Rockhill Road, Kansas City, MO 64110, USA
Notes	

Grossman 2012

Trial name or title	Effectiveness of smoking-cessation interventions for urban hospital patients: study protocol for a randomized controlled trial
Methods	During hospitalization, staff ask patients about smoking and offer NRT on admission and at discharge. Patients are randomized on hospital discharge to 1 of 2 study arms
Participants	Smoking patients discharged from 2 urban public hospitals in New York City
Interventions	Study arms: 1) proactive multi-session telephone counselling with motivational enhancement delivered by study staff; 2) faxed or online referral to the New York State Quitline
Outcomes	Primary outcome: 30-day PPA from smoking at 6m follow-up post-discharge Other outcomes: Cost effectiveness from a societal and a payer perspective, moderation effects of participant location of hospitalization, race/ethnicity, immigrant status, and inpatient diagnosis
Starting date	July 2011
Contact information	Correspondence to Ellie Grossman at: ellie.grossman@nyumc.org; Division of General Internal Medicine, New York University School of Medicine, New York, NY, USA
Notes	

Marshall 2013

Trial name or title	A randomized controlled trial of brief counselling intervention and audio materials for smoking cessation in a low-dose CT (LDCT) screening study
Methods	Smokers could enrol at any time during the LDCT study. Participants were randomized to a control group and an intervention
Participants	Smokers enrolled in a Low-dose CT screening study, aged 60-74years, with >=30 pack-year smoking history
Interventions	Intervention: single face-to-face counselling session on the day of attendance for LDCT screening plus audio cessation advice (on mp3 player), plus written quit materials.The individualized counselling session was given by a thoracic physician using motivational interview techniques. Control: written quit materials only.
Outcomes	Point prevalence self-reported smoking cessation at 1 year, confirmed with exhaled CO measurement where available; > 10 ppm level indicating non-abstinence
Starting date	Unknown
Contact information	Lead author Henry Marshall: Henry.Marshall@health.qld.gov.au
Notes	We have made contact with Dr Marshall, who is currently writing up the manuscript

Martin-Lujan 2011

Trial name or title	The ESPITAP study
Methods	Multicentre randomized clinical trial with an intervention and a control group set in 12 primary care centres in the province of Tarragona (Spain). Participants are given a spirometry test and those with a normal test are randomized to either the intervention or control group
Participants	Current smokers aged between 35 and 70 years with a cumulative habit of more than 10 packs of cigarettes per year, attending primary care for any reason
Interventions	Intervention: Usual advice to quit smoking by a general practitioner as well as a 20-min personalized visit to provide detailed information about spirometry results, during which FEV1, FVC, FEF 25 - 75% and PEF measurements are discussed and interpreted in terms of theoretical values. Additional information includes the lung age index (defined as the average age of a non-smoker with the same FEV1 as the study participant), comparing this with the chronological age to illustrate the pulmonary deterioration that results from smoking. Defined as motivational interviewing designed to encourage smoking cessation Control: A brief visit (5 - 10 mins) in the format usually recommended for primary care professionals: a clear, firm, personalized proposition recommending that they quit smoking, in an empathic and respectful context
Outcomes	Primary outcome: smoking cessation at 12 months
Starting date	June 2008
Contact information	Correspondence to Francisco Martin-Lujan at: fmartin@camfic.org; Study Group on Respiratory Tract Diseases (GEPAR), Primary Care Research Institute (IDIAP) Jordi Gol, Barcelona, Spain

Martin-Lujan 2011 (*Continued*)

Notes	

Schuck 2011

Trial name or title	Effectiveness of proactive telephone counselling for smoking cessation in parents: Study protocol of a randomized controlled trial
Methods	A randomized controlled trial conducted to evaluate the effectiveness of proactive telephone counselling to increase smoking cessation rates. Smoking parents are randomly assigned to either proactive telephone counselling or a control condition
Participants	Smoking parents proactively recruited through their children's primary schools
Interventions	Intervention: proactive telephone counselling consists of up to 7 counsellor-initiated telephone calls (based on cognitive-behavioural skill building and motivational Interviewing), distributed over a period of 3 months. 3 supplementary brochures are also provided Control: A standard brochure to aid smoking cessation
Outcomes	Primary outcome: sustained abstinence between postmeasurement and follow-up measurement; 7-day PPA; 24-hr PPA at both post- and follow-up measurement Several secondary outcomes will also be measured (e.g. smoking intensity, smoking policies at home)
Starting date	February 2011
Contact information	Correspondence to Kathrin Schuck at: k.schuck@bsi.ru.nl; Behavioural Science Institute, Radboud University Nijmegen, Montessorilaan 3, P.O. Box 9104, 6500 HE Nijmegen, The Netherlands
Notes	

FEV: forced expiratory volume
LDCT: low-dose computed tomography
PEF: peak expiratory flow
PPA: point prevalence abstinence

DATA AND ANALYSES

Comparison 1. Motivational Interviewing vs brief advice/usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All studies: longest duration and strictest definition of abstinence	28	16803	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [1.16, 1.36]
2 By therapist	27		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 General practitioner	2	736	Risk Ratio (M-H, Fixed, 95% CI)	3.49 [1.53, 7.94]
2.2 Nurse	5	2256	Risk Ratio (M-H, Fixed, 95% CI)	1.24 [0.91, 1.68]
2.3 Counsellor	22	13593	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [1.15, 1.36]
3 By session duration	25		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Less than 20 minutes	9	3651	Risk Ratio (M-H, Fixed, 95% CI)	1.69 [1.34, 2.12]
3.2 More than 20 minutes	16	10306	Risk Ratio (M-H, Fixed, 95% CI)	1.20 [1.08, 1.32]
4 By number of sessions	27		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Single session	16	12103	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [1.15, 1.40]
4.2 Two or more sessions	11	3928	Risk Ratio (M-H, Fixed, 95% CI)	1.20 [1.02, 1.42]
5 By number of follow-up calls	26		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 No follow-up calls	10	3927	Risk Ratio (M-H, Fixed, 95% CI)	1.41 [1.20, 1.65]
5.2 One or two follow-up calls	8	3895	Risk Ratio (M-H, Fixed, 95% CI)	1.28 [1.05, 1.55]
5.3 More than two follow-up calls	8	8541	Risk Ratio (M-H, Fixed, 95% CI)	1.20 [1.07, 1.34]
6 By control intervention	27	16168	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [1.17, 1.38]
6.1 Self-help smoking cessation support	6	3502	Risk Ratio (M-H, Fixed, 95% CI)	1.11 [0.91, 1.35]
6.2 In person/telephone smoking cessation support	17	10966	Risk Ratio (M-H, Fixed, 95% CI)	1.31 [1.19, 1.45]
6.3 In person smoking health warning	2	945	Risk Ratio (M-H, Fixed, 95% CI)	2.25 [1.41, 3.57]
6.4 No smoking cessation intervention	2	755	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.61, 1.19]
7 By participant motivation to quit	28	16803	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [1.16, 1.36]
7.1 Motivated	6	6511	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [1.13, 1.42]
7.2 Mixed motivation	22	10292	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [1.11, 1.40]
8 By type of tobacco user	28	16803	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [1.16, 1.36]
8.1 Smokeless	2	845	Risk Ratio (M-H, Fixed, 95% CI)	2.39 [1.53, 3.73]
8.2 Smoker	26	15958	Risk Ratio (M-H, Fixed, 95% CI)	1.22 [1.12, 1.33]

Analysis 1.1. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 1 All studies: longest duration and strictest definition of abstinence.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 1 All studies: longest duration and strictest definition of abstinence

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Rohsenow 2014	0/80	3/85		0.4 %	0.15 [0.01, 2.89]
Harris 2010	50/245	51/207		6.3 %	0.83 [0.59, 1.17]
Bastian 2013	29/245	35/251		4.0 %	0.85 [0.54, 1.34]
Bock 2014	48/406	58/440		6.4 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		2.5 %	0.91 [0.51, 1.62]
Rigotti 1997	25/318	27/317		3.1 %	0.92 [0.55, 1.55]
De Azevedo 2010	48/141	45/132		5.3 %	1.00 [0.72, 1.39]
McClure 2005	15/138	14/137		1.6 %	1.06 [0.53, 2.12]
Ellerbeck 2009	71/482	33/244		5.0 %	1.09 [0.74, 1.60]
Stein 2006	10/191	9/192		1.0 %	1.12 [0.46, 2.69]
Hennrikus 2005	66/669	59/679		6.7 %	1.14 [0.81, 1.59]
Hollis 2007	499/2874	250/1740		35.7 %	1.21 [1.05, 1.39]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
Lindqvist 2013	57/296	66/476		5.8 %	1.39 [1.01, 1.92]
Bock 2008	24/271	15/272		1.7 %	1.61 [0.86, 2.99]
Dornelas 2000	19/54	10/46		1.2 %	1.62 [0.84, 3.12]
Okuyemi 2013	20/216	12/214		1.4 %	1.65 [0.83, 3.29]
Glasgow 2000	37/578	22/576		2.5 %	1.68 [1.00, 2.80]
Butler 1999	8/270	4/266		0.5 %	1.97 [0.60, 6.47]
Hokanson 2006	4/57	2/57		0.2 %	2.00 [0.38, 10.49]
Borrelli 2005	9/129	5/144		0.5 %	2.01 [0.69, 5.84]
Cigrang 2002	7/31	3/29		0.4 %	2.18 [0.62, 7.65]
Wu 2009	40/67	19/72		2.1 %	2.26 [1.47, 3.49]
Louwagie 2014	44/205	19/204		2.2 %	2.30 [1.40, 3.81]
Severson 2009	53/392	22/393		2.5 %	2.42 [1.50, 3.89]

(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Davis 2011	1/109	0/109		0.1 %	3.00 [0.12, 72.84]
Soria 2006	21/114	3/86		0.4 %	5.28 [1.63, 17.13]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Total (95% CI)	**9021**	**7782**		**100.0 %**	**1.26 [1.16, 1.36]**
Total events: 1234 (Experimental), 810 (Control)					
Heterogeneity: Chi^2 = 53.06, df = 27 (P = 0.002); I^2 =49%					
Test for overall effect: Z = 5.43 (P < 0.00001)					
Test for subgroup differences: Not applicable					

Analysis 1.2. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 2 By therapist.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 2 By therapist

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 General practitioner					
Butler 1999	8/270	4/266		54.1 %	1.97 [0.60, 6.47]
Soria 2006	21/114	3/86		45.9 %	5.28 [1.63, 17.13]
Subtotal (95% CI)	**384**	**352**		**100.0 %**	**3.49 [1.53, 7.94]**
Total events: 29 (Experimental), 7 (Control)					
Heterogeneity: Chi^2 = 1.36, df = 1 (P = 0.24); I^2 =27%					
Test for overall effect: Z = 2.98 (P = 0.0029)					
2 Nurse					
Hennrikus 2005	66/669	59/679		85.0 %	1.14 [0.81, 1.59]
Curry 2003	4/156	3/147		4.5 %	1.26 [0.29, 5.52]
Hokanson 2006	4/57	2/57		2.9 %	2.00 [0.38, 10.49]

(*Continued* . . .)

(. . . *Continued*)

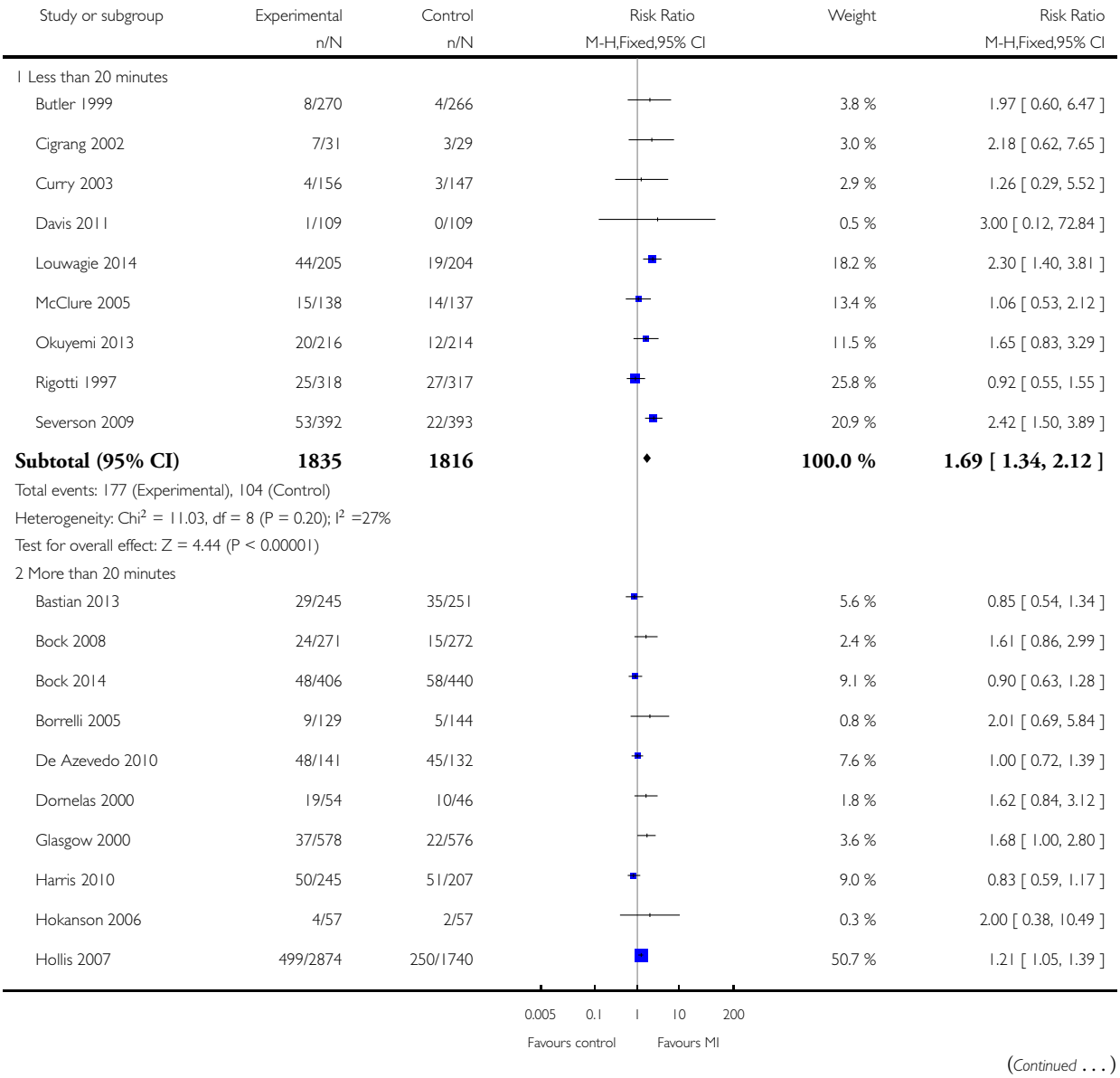
Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Borrelli 2005	9/129	5/144		6.9 %	2.01 [0.69, 5.84]
Davis 2011	1/109	0/109		0.7 %	3.00 [0.12, 72.84]
Subtotal (95% CI)	**1120**	**1136**		**100.0 %**	**1.24 [0.91, 1.68]**
Total events: 84 (Experimental), 69 (Control)					
Heterogeneity: Chi² = 1.67, df = 4 (P = 0.80); I² =0.0%					
Test for overall effect: Z = 1.38 (P = 0.17)					
3 Counsellor					
Rohsenow 2014	0/80	3/85		0.4 %	0.15 [0.01, 2.89]
Harris 2010	50/245	51/207		7.1 %	0.83 [0.59, 1.17]
Bastian 2013	29/245	35/251		4.5 %	0.85 [0.54, 1.34]
Bock 2014	48/406	58/440		7.2 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		2.8 %	0.91 [0.51, 1.62]
De Azevedo 2010	48/141	45/132		6.0 %	1.00 [0.72, 1.39]
McClure 2005	15/138	14/137		1.8 %	1.06 [0.53, 2.12]
Ellerbeck 2009	71/482	33/244		5.6 %	1.09 [0.74, 1.60]
Stein 2006	10/191	9/192		1.2 %	1.12 [0.46, 2.69]
Hollis 2007	499/2874	250/1740		40.1 %	1.21 [1.05, 1.39]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
Lindqvist 2013	57/296	66/476		6.5 %	1.39 [1.01, 1.92]
Bock 2008	24/271	15/272		1.9 %	1.61 [0.86, 2.99]
Dornelas 2000	19/54	10/46		1.4 %	1.62 [0.84, 3.12]
Okuyemi 2013	20/216	12/214		1.6 %	1.65 [0.83, 3.29]
Glasgow 2000	37/578	22/576		2.8 %	1.68 [1.00, 2.80]
Cigrang 2002	10/31	5/29		0.7 %	1.87 [0.73, 4.82]
Hokanson 2006	4/57	2/57		0.3 %	2.00 [0.38, 10.49]
Wu 2009	40/67	19/72		2.4 %	2.26 [1.47, 3.49]
Louwagie 2014	44/205	19/204		2.5 %	2.30 [1.40, 3.81]
Severson 2009	53/392	22/393		2.8 %	2.42 [1.50, 3.89]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Subtotal (95% CI)	**7412**	**6181**		**100.0 %**	**1.25 [1.15, 1.36]**
Total events: 1107 (Experimental), 714 (Control)					
Heterogeneity: Chi² = 43.95, df = 21 (P = 0.002); I² =52%					
Test for overall effect: Z = 5.03 (P < 0.00001)					

Analysis 1.3. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 3 By session duration.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 3 By session duration



Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Less than 20 minutes					
Butler 1999	8/270	4/266		3.8 %	1.97 [0.60, 6.47]
Cigrang 2002	7/31	3/29		3.0 %	2.18 [0.62, 7.65]
Curry 2003	4/156	3/147		2.9 %	1.26 [0.29, 5.52]
Davis 2011	1/109	0/109		0.5 %	3.00 [0.12, 72.84]
Louwagie 2014	44/205	19/204		18.2 %	2.30 [1.40, 3.81]
McClure 2005	15/138	14/137		13.4 %	1.06 [0.53, 2.12]
Okuyemi 2013	20/216	12/214		11.5 %	1.65 [0.83, 3.29]
Rigotti 1997	25/318	27/317		25.8 %	0.92 [0.55, 1.55]
Severson 2009	53/392	22/393		20.9 %	2.42 [1.50, 3.89]
Subtotal (95% CI)	**1835**	**1816**		**100.0 %**	**1.69 [1.34, 2.12]**
Total events: 177 (Experimental), 104 (Control)					
Heterogeneity: Chi^2 = 11.03, df = 8 (P = 0.20); I^2 =27%					
Test for overall effect: Z = 4.44 (P < 0.00001)					
2 More than 20 minutes					
Bastian 2013	29/245	35/251		5.6 %	0.85 [0.54, 1.34]
Bock 2008	24/271	15/272		2.4 %	1.61 [0.86, 2.99]
Bock 2014	48/406	58/440		9.1 %	0.90 [0.63, 1.28]
Borrelli 2005	9/129	5/144		0.8 %	2.01 [0.69, 5.84]
De Azevedo 2010	48/141	45/132		7.6 %	1.00 [0.72, 1.39]
Dornelas 2000	19/54	10/46		1.8 %	1.62 [0.84, 3.12]
Glasgow 2000	37/578	22/576		3.6 %	1.68 [1.00, 2.80]
Harris 2010	50/245	51/207		9.0 %	0.83 [0.59, 1.17]
Hokanson 2006	4/57	2/57		0.3 %	2.00 [0.38, 10.49]
Hollis 2007	499/2874	250/1740		50.7 %	1.21 [1.05, 1.39]

(*Continued . . .*)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Lloyd-Richardson 2009	21/232	21/212		3.6 %	0.91 [0.51, 1.62]
Rohsenow 2014	0/80	3/85		0.6 %	0.15 [0.01, 2.89]
Soria 2006	21/114	3/86		0.6 %	5.28 [1.63, 17.13]
Stein 2006	10/191	9/192		1.5 %	1.12 [0.46, 2.69]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Wu 2009	40/67	19/72		3.0 %	2.26 [1.47, 3.49]
Subtotal (95% CI)	**5739**	**4567**		**100.0 %**	**1.20 [1.08, 1.32]**
Total events: 863 (Experimental), 548 (Control)					
Heterogeneity: Chi^2 = 33.83, df = 15 (P = 0.004); I^2 =56%					
Test for overall effect: Z = 3.54 (P = 0.00039)					

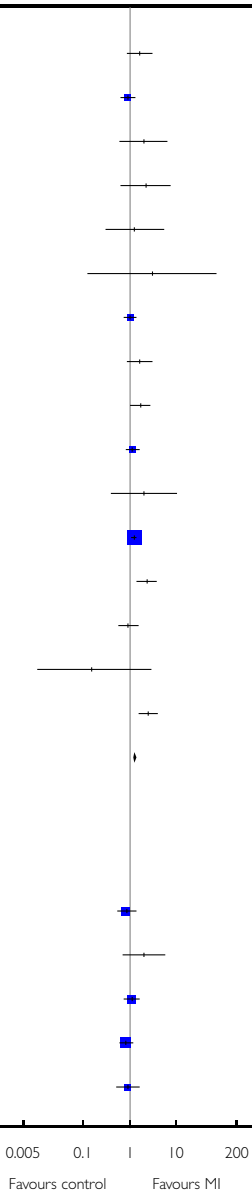
Analysis 1.4. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 4 By number of sessions.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 4 By number of sessions

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Single session					
Bock 2008	24/271	15/272		2.5 %	1.61 [0.86, 2.99]
Bock 2014	48/406	58/440		9.2 %	0.90 [0.63, 1.28]
Butler 1999	8/270	4/266		0.7 %	1.97 [0.60, 6.47]
Cigrang 2002	7/31	3/29		0.5 %	2.18 [0.62, 7.65]
Curry 2003	4/156	3/147		0.5 %	1.26 [0.29, 5.52]
Davis 2011	1/109	0/109		0.1 %	3.00 [0.12, 72.84]
De Azevedo 2010	48/141	45/132		7.7 %	1.00 [0.72, 1.39]
Dornelas 2000	19/54	10/46		1.8 %	1.62 [0.84, 3.12]
Glasgow 2000	37/578	22/576		3.6 %	1.68 [1.00, 2.80]
Hennrikus 2005	66/669	59/679		9.7 %	1.14 [0.81, 1.59]
Hokanson 2006	4/57	2/57		0.3 %	2.00 [0.38, 10.49]
Hollis 2007	499/2874	250/1740		51.6 %	1.21 [1.05, 1.39]
Louwagie 2014	44/205	19/204		3.2 %	2.30 [1.40, 3.81]
Rigotti 1997	25/318	27/317		4.5 %	0.92 [0.55, 1.55]
Rohsenow 2014	0/80	3/85		0.6 %	0.15 [0.01, 2.89]
Severson 2009	53/392	22/393		3.6 %	2.42 [1.50, 3.89]
Subtotal (95% CI)	**6611**	**5492**		**100.0 %**	**1.26 [1.15, 1.40]**
Total events: 887 (Experimental), 542 (Control)					
Heterogeneity: Chi^2 = 26.36, df = 15 (P = 0.03); I^2 =43%					
Test for overall effect: Z = 4.63 (P < 0.00001)					
2 Two or more sessions					
Bastian 2013	29/245	35/251		15.9 %	0.85 [0.54, 1.34]
Borrelli 2005	9/129	5/144		2.2 %	2.01 [0.69, 5.84]
Ellerbeck 2009	71/482	33/244		20.1 %	1.09 [0.74, 1.60]
Harris 2010	50/245	51/207		25.4 %	0.83 [0.59, 1.17]
Lloyd-Richardson 2009	21/232	21/212		10.1 %	0.91 [0.51, 1.62]



(*Continued . . .*)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
McClure 2005	15/138	14/137		6.5 %	1.06 [0.53, 2.12]
Okuyemi 2013	20/216	12/214		5.5 %	1.65 [0.83, 3.29]
Soria 2006	21/114	3/86		1.6 %	5.28 [1.63, 17.13]
Stein 2006	10/191	9/192		4.1 %	1.12 [0.46, 2.69]
Tevyaw 2009	4/55	0/55		0.2 %	9.00 [0.50, 163.27]
Wu 2009	40/67	19/72		8.4 %	2.26 [1.47, 3.49]
Subtotal (95% CI)	**2114**	**1814**		**100.0 %**	**1.20 [1.02, 1.42]**
Total events: 290 (Experimental), 202 (Control)					
Heterogeneity: Chi^2 = 25.81, df = 10 (P = 0.004); I^2 =61%					
Test for overall effect: Z = 2.17 (P = 0.030)					

Analysis 1.5. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 5 By number of follow-up calls.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

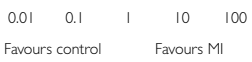
Outcome: 5 By number of follow-up calls

Study or subgroup	Favours experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 No follow-up calls					
Harris 2010	50/245	51/207		26.7 %	0.83 [0.59, 1.17]
Bastian 2013	29/245	35/251		16.7 %	0.85 [0.54, 1.34]
Stein 2006	10/191	9/192		4.3 %	1.12 [0.46, 2.69]
Lindqvist 2013	57/296	66/476		24.5 %	1.39 [1.01, 1.92]
Okuyemi 2013	20/216	12/214		5.8 %	1.65 [0.83, 3.29]
Butler 1999	8/270	4/266		1.9 %	1.97 [0.60, 6.47]
Wu 2009	40/67	19/72		8.9 %	2.26 [1.47, 3.49]
Louwagie 2014	44/205	19/204		9.2 %	2.30 [1.40, 3.81]
Soria 2006	21/114	3/86		1.7 %	5.28 [1.63, 17.13]
Tevyaw 2009	4/55	0/55		0.2 %	9.00 [0.50, 163.27]
Subtotal (95% CI)	**1904**	**2023**		**100.0 %**	**1.41 [1.20, 1.65]**
Total events: 283 (Favours experimental), 218 (Control)					
Heterogeneity: Chi² = 29.34, df = 9 (P = 0.00057); I² =69%					
Test for overall effect: Z = 4.15 (P = 0.000033)					
2 One or two follow-up calls					
Bock 2014	48/406	58/440		33.4 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		13.2 %	0.91 [0.51, 1.62]
Ellerbeck 2009	71/482	33/244		26.3 %	1.09 [0.74, 1.60]
Bock 2008	24/271	15/272		9.0 %	1.61 [0.86, 2.99]
Borrelli 2005	9/129	5/144		2.8 %	2.01 [0.69, 5.84]
Cigrang 2002	7/31	3/29		1.9 %	2.18 [0.62, 7.65]
Severson 2009	53/392	22/393		13.2 %	2.42 [1.50, 3.89]
Davis 2011	1/109	0/109		0.3 %	3.00 [0.12, 72.84]
Subtotal (95% CI)	**2052**	**1843**		**100.0 %**	**1.28 [1.05, 1.55]**
Total events: 234 (Favours experimental), 157 (Control)					
Heterogeneity: Chi² = 14.75, df = 7 (P = 0.04); I² =53%					

(*Continued . . .*)

(. . . *Continued*)

Study or subgroup	Favours experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Test for overall effect: Z = 2.48 (P = 0.013)					
3 More than two follow-up calls					
Rigotti 1997	25/318	27/317		5.6 %	0.92 [0.55, 1.55]
De Azevedo 2010	48/141	45/132		9.7 %	1.00 [0.72, 1.39]
Hennrikus 2005	66/669	59/679		12.2 %	1.14 [0.81, 1.59]
Hollis 2007	499/2874	250/1740		64.7 %	1.21 [1.05, 1.39]
Curry 2003	4/156	3/147		0.6 %	1.26 [0.29, 5.52]
Dornelas 2000	19/54	10/46		2.2 %	1.62 [0.84, 3.12]
Glasgow 2000	37/578	22/576		4.6 %	1.68 [1.00, 2.80]
Hokanson 2006	4/57	2/57		0.4 %	2.00 [0.38, 10.49]
Subtotal (95% CI)	**4847**	**3694**		**100.0 %**	**1.20 [1.07, 1.34]**
Total events: 702 (Favours experimental), 418 (Control)					
Heterogeneity: Chi^2 = 5.05, df = 7 (P = 0.65); I^2 =0.0%					
Test for overall effect: Z = 3.15 (P = 0.0016)					



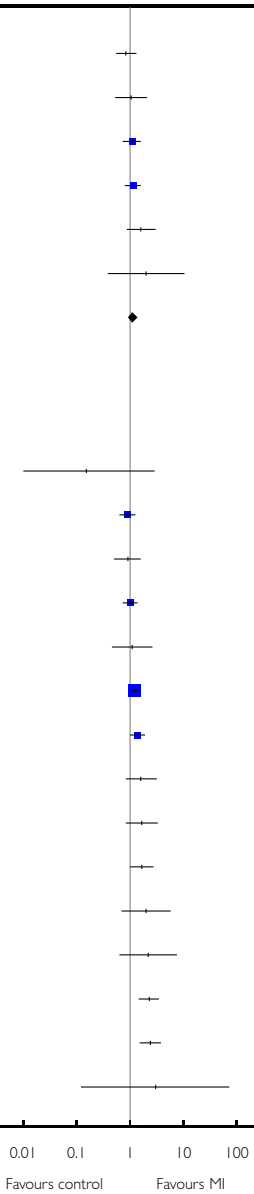
Analysis 1.6. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 6 By control intervention.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 6 By control intervention

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Self-help smoking cessation support					
Bastian 2013	29/245	35/251		4.1 %	0.85 [0.54, 1.34]
McClure 2005	15/138	14/137		1.7 %	1.06 [0.53, 2.12]
Ellerbeck 2009	71/482	33/244		5.2 %	1.09 [0.74, 1.60]
Hennrikus 2005	66/669	59/679		6.9 %	1.14 [0.81, 1.59]
Bock 2008	24/271	15/272		1.8 %	1.61 [0.86, 2.99]
Hokanson 2006	4/57	2/57		0.2 %	2.00 [0.38, 10.49]
Subtotal (95% CI)	**1862**	**1640**		**19.9 %**	**1.11 [0.91, 1.35]**
Total events: 209 (Experimental), 158 (Control)					
Heterogeneity: Chi^2 = 3.19, df = 5 (P = 0.67); I^2 =0.0%					
Test for overall effect: Z = 1.04 (P = 0.30)					
2 In person/telephone smoking cessation support					
Rohsenow 2014	0/80	3/85		0.4 %	0.15 [0.01, 2.89]
Bock 2014	48/406	58/440		6.6 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		2.6 %	0.91 [0.51, 1.62]
De Azevedo 2010	48/141	45/132		5.5 %	1.00 [0.72, 1.39]
Stein 2006	10/191	9/192		1.1 %	1.12 [0.46, 2.69]
Hollis 2007	499/2874	250/1740		36.8 %	1.21 [1.05, 1.39]
Lindqvist 2013	57/296	66/476		6.0 %	1.39 [1.01, 1.92]
Dornelas 2000	19/54	10/46		1.3 %	1.62 [0.84, 3.12]
Okuyemi 2013	20/216	12/214		1.4 %	1.65 [0.83, 3.29]
Glasgow 2000	37/578	22/576		2.6 %	1.68 [1.00, 2.80]
Borrelli 2005	9/129	5/144		0.6 %	2.01 [0.69, 5.84]
Cigrang 2002	7/31	3/29		0.4 %	2.18 [0.62, 7.65]
Wu 2009	40/67	19/72		2.2 %	2.26 [1.47, 3.49]
Severson 2009	53/392	22/393		2.6 %	2.42 [1.50, 3.89]
Davis 2011	1/109	0/109		0.1 %	3.00 [0.12, 72.84]



(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Soria 2006	21/114	3/86		0.4 %	5.28 [1.63, 17.13]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Subtotal (95% CI)	**5965**	**5001**		**70.5 %**	**1.31 [1.19, 1.45]**
Total events: 894 (Experimental), 548 (Control)					
Heterogeneity: Chi^2 = 34.76, df = 16 (P = 0.004); I^2 =54%					
Test for overall effect: Z = 5.44 (P < 0.00001)					
3 In person smoking health warning					
Butler 1999	8/270	4/266		0.5 %	1.97 [0.60, 6.47]
Louwagie 2014	44/205	19/204		2.3 %	2.30 [1.40, 3.81]
Subtotal (95% CI)	**475**	**470**		**2.7 %**	**2.25 [1.41, 3.57]**
Total events: 52 (Experimental), 23 (Control)					
Heterogeneity: Chi^2 = 0.06, df = 1 (P = 0.81); I^2 =0.0%					
Test for overall effect: Z = 3.43 (P = 0.00060)					
4 No smoking cessation intervention					
Harris 2010	50/245	51/207		6.5 %	0.83 [0.59, 1.17]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
Subtotal (95% CI)	**401**	**354**		**6.9 %**	**0.85 [0.61, 1.19]**
Total events: 54 (Experimental), 54 (Control)					
Heterogeneity: Chi^2 = 0.29, df = 1 (P = 0.59); I^2 =0.0%					
Test for overall effect: Z = 0.94 (P = 0.34)					
Total (95% CI)	**8703**	**7465**		**100.0 %**	**1.27 [1.17, 1.38]**
Total events: 1209 (Experimental), 783 (Control)					
Heterogeneity: Chi^2 = 51.80, df = 26 (P = 0.002); I^2 =50%					
Test for overall effect: Z = 5.56 (P < 0.00001)					
Test for subgroup differences: Chi^2 = 13.55, df = 3 (P = 0.00), I^2 =78%					

Analysis 1.7. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 7 By participant motivation to quit.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 7 By participant motivation to quit

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Motivated					
Bastian 2013	29/245	35/251		4.0 %	0.85 [0.54, 1.34]
Hollis 2007	499/2874	250/1740		35.7 %	1.21 [1.05, 1.39]
Lindqvist 2013	57/296	66/476		5.8 %	1.39 [1.01, 1.92]
Okuyemi 2013	20/216	12/214		1.4 %	1.65 [0.83, 3.29]
Cigrang 2002	7/31	3/29		0.4 %	2.18 [0.62, 7.65]
Wu 2009	40/67	19/72		2.1 %	2.26 [1.47, 3.49]
Subtotal (95% CI)	**3729**	**2782**		**49.3 %**	**1.27 [1.13, 1.42]**
Total events: 652 (Experimental), 385 (Control)					
Heterogeneity: Chi^2 = 11.85, df = 5 (P = 0.04); I^2 =58%					
Test for overall effect: Z = 3.96 (P = 0.000074)					
2 Mixed motivation					
Rohsenow 2014	0/80	3/85		0.4 %	0.15 [0.01, 2.89]
Harris 2010	50/245	51/207		6.3 %	0.83 [0.59, 1.17]
Bock 2014	48/406	58/440		6.4 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		2.5 %	0.91 [0.51, 1.62]
Rigotti 1997	25/318	27/317		3.1 %	0.92 [0.55, 1.55]
De Azevedo 2010	48/141	45/132		5.3 %	1.00 [0.72, 1.39]
McClure 2005	15/138	14/137		1.6 %	1.06 [0.53, 2.12]
Ellerbeck 2009	71/482	33/244		5.0 %	1.09 [0.74, 1.60]
Stein 2006	10/191	9/192		1.0 %	1.12 [0.46, 2.69]
Hennrikus 2005	66/669	59/679		6.7 %	1.14 [0.81, 1.59]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
Bock 2008	24/271	15/272		1.7 %	1.61 [0.86, 2.99]
Dornelas 2000	19/54	10/46		1.2 %	1.62 [0.84, 3.12]
Glasgow 2000	37/578	22/576		2.5 %	1.68 [1.00, 2.80]
Butler 1999	8/270	4/266		0.5 %	1.97 [0.60, 6.47]

(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Hokanson 2006	4/57	2/57		0.2 %	2.00 [0.38, 10.49]
Borrelli 2005	9/129	5/144		0.5 %	2.01 [0.69, 5.84]
Louwagie 2014	44/205	19/204		2.2 %	2.30 [1.40, 3.81]
Severson 2009	53/392	22/393		2.5 %	2.42 [1.50, 3.89]
Davis 2011	1/109	0/109		0.1 %	3.00 [0.12, 72.84]
Soria 2006	21/114	3/86		0.4 %	5.28 [1.63, 17.13]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Subtotal (95% CI)	**5292**	**5000**		**50.7 %**	**1.25 [1.11, 1.40]**
Total events: 582 (Experimental), 425 (Control)					
Heterogeneity: Chi^2 = 41.00, df = 21 (P = 0.01); I^2 =49%					
Test for overall effect: Z = 3.71 (P = 0.00020)					
Total (95% CI)	**9021**	**7782**		**100.0 %**	**1.26 [1.16, 1.36]**
Total events: 1234 (Experimental), 810 (Control)					
Heterogeneity: Chi^2 = 53.06, df = 27 (P = 0.002); I^2 =49%					
Test for overall effect: Z = 5.43 (P < 0.00001)					
Test for subgroup differences: Chi^2 = 0.03, df = 1 (P = 0.87), I^2 =0.0%					

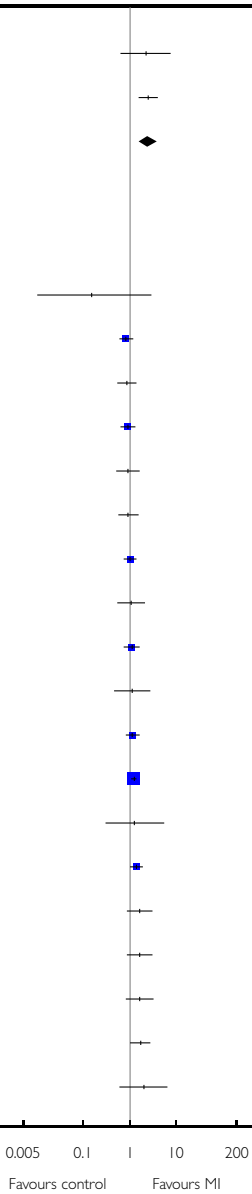
Analysis 1.8. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 8 By type of tobacco user.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 8 By type of tobacco user

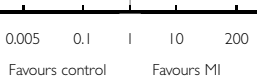
Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Smokeless					
Cigrang 2002	7/31	3/29		0.4 %	2.18 [0.62, 7.65]
Severson 2009	53/392	22/393		2.5 %	2.42 [1.50, 3.89]
Subtotal (95% CI)	**423**	**422**		**2.9 %**	**2.39 [1.53, 3.73]**
Total events: 60 (Experimental), 25 (Control)					
Heterogeneity: Chi^2 = 0.02, df = 1 (P = 0.88); I^2 =0.0%					
Test for overall effect: Z = 3.82 (P = 0.00013)					
2 Smoker					
Rohsenow 2014	0/80	3/85		0.4 %	0.15 [0.01, 2.89]
Harris 2010	50/245	51/207		6.3 %	0.83 [0.59, 1.17]
Bastian 2013	29/245	35/251		4.0 %	0.85 [0.54, 1.34]
Bock 2014	48/406	58/440		6.4 %	0.90 [0.63, 1.28]
Lloyd-Richardson 2009	21/232	21/212		2.5 %	0.91 [0.51, 1.62]
Rigotti 1997	25/318	27/317		3.1 %	0.92 [0.55, 1.55]
De Azevedo 2010	48/141	45/132		5.3 %	1.00 [0.72, 1.39]
McClure 2005	15/138	14/137		1.6 %	1.06 [0.53, 2.12]
Ellerbeck 2009	71/482	33/244		5.0 %	1.09 [0.74, 1.60]
Stein 2006	10/191	9/192		1.0 %	1.12 [0.46, 2.69]
Hennrikus 2005	66/669	59/679		6.7 %	1.14 [0.81, 1.59]
Hollis 2007	499/2874	250/1740		35.7 %	1.21 [1.05, 1.39]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
Lindqvist 2013	57/296	66/476		5.8 %	1.39 [1.01, 1.92]
Bock 2008	24/271	15/272		1.7 %	1.61 [0.86, 2.99]
Dornelas 2000	19/54	10/46		1.2 %	1.62 [0.84, 3.12]
Okuyemi 2013	20/216	12/214		1.4 %	1.65 [0.83, 3.29]
Glasgow 2000	37/578	22/576		2.5 %	1.68 [1.00, 2.80]
Butler 1999	8/270	4/266		0.5 %	1.97 [0.60, 6.47]



(*Continued . . .*)

(. . . *Continued*)

Study or subgroup	Experimental n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Hokanson 2006	4/57	2/57		0.2 %	2.00 [0.38, 10.49]
Borrelli 2005	9/129	5/144		0.5 %	2.01 [0.69, 5.84]
Wu 2009	40/67	19/72		2.1 %	2.26 [1.47, 3.49]
Louwagie 2014	44/205	19/204		2.2 %	2.30 [1.40, 3.81]
Davis 2011	1/109	0/109		0.1 %	3.00 [0.12, 72.84]
Soria 2006	21/114	3/86		0.4 %	5.28 [1.63, 17.13]
Tevyaw 2009	4/55	0/55		0.1 %	9.00 [0.50, 163.27]
Subtotal (95% CI)	**8598**	**7360**		**97.1 %**	**1.22 [1.12, 1.33]**
Total events: 1174 (Experimental), 785 (Control)					
Heterogeneity: Chi^2 = 44.41, df = 25 (P = 0.01); I^2 =44%					
Test for overall effect: Z = 4.69 (P < 0.00001)					
Total (95% CI)	**9021**	**7782**		**100.0 %**	**1.26 [1.16, 1.36]**
Total events: 1234 (Experimental), 810 (Control)					
Heterogeneity: Chi^2 = 53.06, df = 27 (P = 0.002); I^2 =49%					
Test for overall effect: Z = 5.43 (P < 0.00001)					
Test for subgroup differences: Chi^2 = 8.35, df = 1 (P = 0.00), I^2 =88%					



APPENDICES

Appendix 1. CRS Search Strategy 2015 Update

#1 (motivat* NEAR2 interview*):TI,AB,MH,EMT,KY,XKY,KW,XRT
#2 (motivat* NEAR2 enhanc*):TI,AB,MH,EMT,KY,XKY,KW
#3 (motivat* NEAR2 (session* OR counsel* OR practi* OR behav*)):TI,AB
#4 #1 OR #2 OR #3
#5 motivation*:MH,EMT,XKY,KY,KW
#6 (2009 or 2010 or 2011 or 2012 or 2013):YR
#7 #4 AND #6
#8 (#4 AND #6) AND (INREGISTER) [SET 1, 96]
#9 #5 AND #6
#10 (#5 AND #6) AND (INREGISTER)
#11 (#10 not #8) AND (INREGISTER) [SET 2, 139]
Notes: Line #8 Set 1 identifies the most relevant records. Line #11 identifies records with the keyword 'motivation' not otherwise identified, and is over sensitive/.
In lines 4 and 5 'motivat*' captures the variants of 'motivational' used in the original search strategy.

WHAT'S NEW

Last assessed as up-to-date: 14 November 2014.

Date	Event	Description
5 January 2015	New search has been performed	Updated with 14 new included studies
5 January 2015	New citation required but conclusions have not changed	Authors have changed. Main conclusions remain stable, with only minor changes in subgroup findings

HISTORY

Protocol first published: Issue 1, 2008

Review first published: Issue 1, 2010

Date	Event	Description
5 September 2011	Amended	Reference to companion review updated
10 February 2010	Amended	Spelling correction in tables and change in
21 October 2008	Amended	Converted to new review format

CONTRIBUTIONS OF AUTHORS

NLH assessed eligibility, extracted data, performed the analysis and wrote the review.

RB and TT assessed eligibility, extracted data and commented on drafts of the review.

DECLARATIONS OF INTEREST

All authors declare that they have no competing interests

SOURCES OF SUPPORT

Internal sources

- University of Oxford, UK.

Computer and database use

- University of Plymouth, UK.

Computer use

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

1. We now exclude non-randomized controlled trials, to keep the quality of the evidence as high as possible.

2. We now exclude pregnant women and adolescents who smoke, as their particular needs and circumstances warrant them being treated as separate populations. They are covered in other Cochrane reviews: pregnant women (Chamberlain 2013) and adolescents (Grimshaw 2013).

3. We have broadened the participant definition to 'tobacco user', and have included one trial of smokeless tobacco use cessation. Sensitivity analyses excluding this trial demonstrated no difference in the review's findings.

4. The cost-effectiveness hypothesis is now removed.

5. We have added sub-group analyses, splitting studies by 1) type of control intervention; 2) participant motivation to quit; 3) type of tobacco user, i.e. smoker or smokeless tobacco user.

INDEX TERMS

Medical Subject Headings (MeSH)

Behavior Therapy [*methods]; Hotlines; Motivation; Motivational Interviewing [*methods]; Randomized Controlled Trials as Topic; Smoking [*psychology; *therapy]; Smoking Cessation [psychology]

MeSH check words

Humans