

Enhancing partner support to improve smoking cessation (Review)

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TABLE OF CONTENTS

HEADER	1
ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	2
OBJECTIVES	3
METHODS	3
RESULTS	4
DISCUSSION	5
AUTHORS' CONCLUSIONS	6
ACKNOWLEDGEMENTS	6
REFERENCES	7
CHARACTERISTICS OF STUDIES	10
DATA AND ANALYSES	20
Analysis 1.1. Comparison 1 Partner intervention versus control, Outcome 1 Abstinence at 6-9 months.	20
Analysis 1.2. Comparison 1 Partner intervention versus control, Outcome 2 Abstinence at 12+ months.	21
WHAT'S NEW	21
HISTORY	21
CONTRIBUTIONS OF AUTHORS	22
DECLARATIONS OF INTEREST	22
SOURCES OF SUPPORT	22
INDEX TERMS	22

[Intervention Review]

Enhancing partner support to improve smoking cessation

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ABSTRACT

Background

While many cessation programmes are available to assist smokers in quitting, research suggests that partner involvement may encourage long-term abstinence.

Objectives

The purpose of this review was to determine if an intervention to enhance partner support helps smoking cessation when added as an adjunct to a smoking cessation programme.

Search strategy

The search was performed in: Cochrane Tobacco Addiction Group specialized register (Oct 2007), Cochrane controlled trials register (Oct 2007), (1966-Oct 2007), MEDLINE (1966-Oct 2007), EMBASE (1974-Oct 2007), PsycINFO (1861-Oct 2007). The search terms used were smoking (prevention, control, therapy), smoking cessation, and support (family, marriage, spouse, partner, sexual partner, buddy, friend, co-habitees, and co-worker).

Selection criteria

Randomized controlled trials of smoking cessation interventions that compared an intervention that included a partner support component with an otherwise identical intervention and reported follow up of six months or longer.

Data collection and analysis

Two authors independently identified the included studies and extracted data using a structured form. A third author was consulted to aid in the resolution of discrepancies. Abstinence, biochemically validated if possible, was the primary outcome measure and was extracted at two post-treatment intervals: 6-9 months and >12 months. The scores of PIQ (partner interaction questionnaire) were also analyzed to assess partner support. A fixed-effect model was used to pool relative risks from each study and estimate a summary effect.

Enhancing partner support to improve smoking cessation (Review)

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1

Main results

A total of 49 articles were identified for this review. Only ten articles (11 studies, >2000 participants) met the inclusion criteria. The definition of partner varied between studies. All studies gave self-reported smoking cessation rates, but there was limited biochemical validation of abstinence. The risk ratio for self-reported abstinence at 6-9 months was 1.01 (95% CI, 0.86 to 1.18); and at 12 months post-treatment was 1.04 (95% CI, 0.87 to 1.24). Of the six studies that measured partner support at follow up, only two studies reported significant increase in partner support in the intervention groups.

Authors' conclusions

In this review of randomized controlled trials of interventions designed to enhance partner support for smokers in cessation programmes, we failed to detect an increase in quit rates. Limited data from several of the trials suggest that these interventions did not increase partner support either. No conclusions can be made about the impact of partner support on smoking cessation. More systematic intervention to affect partnership significantly should be delivered if partner support were part of an existing cessation programme.

PLAIN LANGUAGE SUMMARY

Are there ways to help partners and others to give more effective support to people who are trying to quit smoking

Smokers who get support from partners and other people are more likely to quit. Interventions intended to improve the support received have not been shown to increase long-term quit rates compared to a smoking cessation programme without a partner support component. The interventions may not have successfully changed the support provided.

BACKGROUND

Despite the decrease in the number of adult smokers in many developed countries over the past 30 years the number of smokers in developing countries is on the rise. Smoking still remains the leading cause of preventable disease and death in the US causing over 440,000 deaths annually (MMWR 2002).

Smoking cessation is an important behaviour change that can have significant effects on health outcomes. Although effective cessation interventions exist, their overall effect is modest and they do not reach many high-risk smokers (Fiore 1997). The initiation, maintenance and cessation of smoking is strongly influenced by other family members. Smokers are more likely to marry smokers, to smoke the same number of cigarettes as their spouse, and to quit at the same time (Venters 1984). Smokers who are married to non-smokers or ex-smokers are more likely to quit and remain abstinent (Price 1981; Waldron 1989; Hanson 1990; McBride 1998). In addition, married smokers have higher quit rates than those who are divorced, widowed or have never married (Waldron 1989). Several studies have demonstrated that support from the spouse is highly predictive of successful smoking cessation (Graham 1971; Ockene 1982; Gulliver 1995; Coppotelli 1985). In particular, supportive behaviours involving cooperative behaviours, such as talking the smoker out of smoking the cigarette, and reinforcement, such as expressing pleasure at the smoker's efforts to quit, predict suc-

cessful quitting (Mermelstein 1983; Coppotelli 1985). Negative behaviours, such as nagging the smoker and complaining about smoking are predictive of relapse. One study found that supportive behaviours were associated with initial smoking cessation, while negative or critical behaviours were associated with earlier relapse (Roski 1996).

Two additional areas of research suggest that partner involvement may be an effective intervention for smoking cessation. Family and social support has been shown to be an effective intervention for improving other health behaviours, such as dietary changes (Anonymous 1994), weight reduction (Black 1990) and medication compliance (Morisky 1983). Second, family approaches have been effective in the treatment of other addictions, especially alcohol and drug dependencies (Edwards 1995; Liddle 1995). Family interventions or programmes have become a standard part of most substance abuse programmes. The Agency for Healthcare Quality and Research (AHRQ) guidelines for treating tobacco use and dependence recommend family and social support interventions as components of effective cessation in the category of 'extra-treatment social support' (Fiore 2000). This recommendation was made with a 'B' strength of evidence classification. However, initial trials of partner support for smoking cessation have been disappointing. In reviewing their own studies of social support

interventions for smoking cessation, Lichtenstein and colleagues stated that their interventions did not improve smoking cessation rates, nor were they able to improve the level of partner support (Lichtenstein 1986).

Given the strong association between partner support and successful smoking cessation and the promise of family and social support interventions in related fields, it seems premature to conclude that partner support interventions are not an effective component to cessation programmes. Although support from a spouse has been shown to be highly predictive of successful smoking cessation (Graham 1971; Ockene 1982) the literature in this area is somewhat confusing. More recently published clinical trials (McIntyre-Kingsolver 1986; Ginsberg 1992) have shown no significant effect of partner support on smoking cessation. Two recent systematic reviews have addressed the effectiveness of partner or social support interventions in smoking cessation. Both have concluded that these interventions may be of some benefit. May 2000 included studies of partner support with any length of follow up. The authors did not perform a meta-analysis because of the diverse nature of the included studies. A second systematic review, conducted for the previous version of the AHRQ guideline on smoking cessation (Fiore 2000) summarized randomized trials assessing interventions to 'increase social support in the smoker's environment' as one type of counselling or behavioural therapy. Our review of the reference list suggests that none of the studies of partner support interventions that we identified was included in this part of the systematic review (Fiore 2000, Table 20).

OBJECTIVES

The purpose of this review is to determine if an intervention to enhance partner support helps smoking cessation when added as an adjunct to a smoking cessation programme, and to estimate the size of any effect.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized controlled clinical trials of smoking cessation interventions that compared an intervention that included a partner support component with an otherwise identical intervention, and reported follow up of six months or more.

Types of participants

Smokers of either gender and any age, irrespective of their initial level of nicotine dependency, recruited from any setting, and who agreed to participate in a smoking cessation programme. Pregnant/non-pregnant and married/unmarried smokers were included.

Types of interventions

Partners were defined as spouses, friends, co-workers, 'buddies', or other significant others who supported the smokers as a part of the cessation programme to which they were assigned. A partner support intervention could be directed at the smoker, the partner or both, with the aim of assisting the smoker to quit. Examples included training smokers in obtaining social support, encouraging increased contacts between smokers and supportive partners, providing training or written materials to partners to assist them in engaging in supportive behaviours, or intervening with smoker/partner pairs in couple therapy or in larger groups to encourage supportive interactions. Some studies were excluded because the partner support intervention was not the only component being tested.

Types of outcome measures

The primary outcome was self-reported abstinence of the smoker (not the partner) or biochemical assessment (carbon monoxide levels, saliva cotinine/thiocyanate), assessed at least six months following the initiation of treatment. Studies reporting either self-reported or biochemically validated smoking status were included. Other outcomes considered for this review were number of cigarettes per day and carbon monoxide levels at 6-9 months and >12 months post-treatment intervals. However, since these data was not adequately reported, the analyses were not performed. We also considered the intermediate outcome of level of partner support, as assessed by the Partner Interaction Questionnaire (PIQ), or by other methods.

Search methods for identification of studies

We identified randomized controlled studies that referred to smoking cessation with the use of partner support from the following databases: Cochrane Tobacco Addiction Group specialized register (Oct 2007), Cochrane controlled trials register (CENTRAL) (Oct 2007), MEDLINE (1966-Oct 2007), EMBASE (1974-Oct 2007), PsycINFO (1861-Oct 2007). The search strategy included the following terms:

1. smoking cessation
2. smoking/pc, th [Prevention & Control], Therapy]
3. family support/ or marriage support/ or spouse support/ or partner support/ or sexual partners support/ or buddy/ or friend/ or co-habitees/ or coworker.

In addition, we reviewed the bibliographies of all included articles for additional trials. We also consulted researchers and experts in the field of smoking cessation for additional published and unpublished sources.

For previous versions of this review we conducted searches of the following databases, but did not repeat them for this update: CDC and Prevention-Tobacco Information and Prevention Database (Mar 2004), CINAHL (1966-Jul 2000), ERIC, PsychLit, & Dissertation Abstracts (1861-Dec 1999), HealthStar (1975-Jul 2000) CDC Tobacco Information and Prevention Database, Cancer Lit (1966-April 2004), and SSCI (1972-April 2004).

Data collection and analysis

Two authors (EP, FT) independently extracted data using a structured form. A third author (LB) was consulted to aid in the resolution of discrepancies. Abstinence was the primary outcome. Following changes to the Cochrane Tobacco Addiction Group's recommended method of data analysis since this review was last updated, we have changed the way in which we summarize the effects of treatment. We now use the risk ratio rather than the odds ratio for summarizing individual trial outcomes and for estimates of pooled effect. We estimated a pooled weighted average of risk ratios using the Mantel-Haenszel fixed-effect method, with 95% confidence intervals. The scores of PIQ (partner interaction questionnaire) were also analyzed to assess partner support.

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

We identified a total of 49 articles from the initial screen for this review, including 10 articles newly identified for the update in 2007. Only 10 articles (representing 11 studies) met the inclusion criteria. The majority of the randomized clinical trial studies were excluded because the intervention group received other smoking cessation interventions, in addition to a partner intervention, that were not received by the control group. Five studies did not have a minimum follow up of six months ([Gardner 1982](#); [Albrecht 1998](#); [West 1998](#); [Andersen 2005](#); [Loke 2005](#)). Three articles were duplicate publications of the included studies ([Nyborg 1985](#); [Mermelstein 1986](#); [Schoenbach 1992](#)). [Mermelstein 1986](#) was a duplicate of [McIntyre-Kingsolver 1986](#), though it appeared to include some additional data. [McIntyre-Kingsolver](#) completed a clinical trial comprising two groups (spouse training group and no spouse training group). [Mermelstein 1986](#) repeated the same clinical trial with another control group of un-paired singles. They

then combined all the data for the two trials in their analyses presented in [McIntyre-Kingsolver 1986](#).

The 11 included studies were published between 1981 and 2006, covering a total of 2172 participants (1048 intervention/ 1124 control). The number of participants per study ranged from 24 to 1003. The Nyborg trial ([Nyborg 1986A](#); [Nyborg 1986B](#)) was treated as two separate studies because of the complexity of the intervention method which included a 'therapist administered couples intervention' and a 'self-administered/minimal contact couples intervention'. Both the study subject and partner were smokers with the intention to quit.

The average age of smokers among the 11 studies ranged from 25 to 44. [Orleans 1991](#) was the only study to report that the minimum age was less than 18 years. Participants reported smoking an average of 13 to 29 cigarettes per day at baseline. Overall there were more women in the studies (range 50-100% female). One study enrolled pregnant women, some of whom had already quit spontaneously ([McBride 2004](#)). Partners were defined in three major categories:

- 1) spouse, friend, relative and/or co-worker ([Malott 1984](#); [Glasgow 1986](#); [McIntyre-Kingsolver 1986](#); [Nyborg 1986A](#); [Nyborg 1986B](#); [Orleans 1991](#); [Ginsberg 1992](#); [McBride 2004](#));
- 2) Buddy ([Gruder 1993](#)), and
- 3) Fellow cessation participants ([Powell 1981](#); [May 2006](#)).

The smoking status of partners varied, but the majority of them were nonsmokers. Post-treatment follow up was reported at a minimum of five days to two months, and to a maximum of six to sixteen months.

Cessation techniques included nicotine gum, psychotherapy, television programmes, self-help manuals, group meetings, and/or quitting guides. The partner support interventions included empathy exercises, video tapes, strategy booklets, group meetings with support manuals, monitoring booklets, behavioural technique sessions, social support guides, telephone calls from a counsellor, and/or a telephone contact system. Most studies manipulated the partner support component by general methods (video tape, booklet, support manual, guide, phone contact, lecture, demonstration, practice exercise) ([Powell 1981](#); [Malott 1984](#); [Glasgow 1986](#); [McIntyre-Kingsolver 1986](#); [Orleans 1991](#); [Ginsberg 1992](#)). Four studies gave group training to the partners for partner intervention ([Nyborg 1986A](#); [Nyborg 1986B](#); [Gruder 1993](#); [May 2006](#)). Control groups were generally defined as 'no contact' with a partner. However, group sessions with other attempted quitters were used ([McIntyre-Kingsolver 1986](#); [May 2006](#)), as well as weekly phone contact with a therapist ([Nyborg 1986A](#); [Nyborg 1986B](#)). Across all studies combined, control groups consisted of: self-help manual/instruction, nicotine gum, television programmes, weekly group meetings or contact with therapist, and psychotherapy.

Risk of bias in included studies

Each article was assigned a quality score using the Jadad 5-point scale (Jadad 1996). Points were assigned according to 1) the presence of randomization (0-1), 2) double blinding (0-1) and 3) description of withdrawals and drop-outs (0-1). None of the studies was described as double-blind, since partner support is an interactive process. Each study could therefore only receive a maximum total of three points, with an extra point possible for describing an appropriate method of randomization). All studies were described as randomized. May 2006 received a score of three points. Seven studies received a score of two points (Powell 1981; Malott 1984; McIntyre-Kingsolver 1986; Orleans 1991; Ginsberg 1992; Gruder 1993; McBride 2004), and three studies received a score of one point as they did not include a description of withdrawals or dropouts (Glasgow 1986; Nyborg 1986A; Nyborg 1986B). Allocation concealment was unclear for the studies in this review.

Another consideration for quality is biochemical validation of quitting. Biochemical validation was intended as an inclusion criterion for the primary outcome, but was not performed in every study. Seven studies used cotinine, thiocyanate or carbon monoxide validation of all or most self-reported abstinence (Malott 1984; McIntyre-Kingsolver 1986; Glasgow 1986; Orleans 1991; Ginsberg 1992; McBride 2004; May 2006); one study attempted to collect saliva samples for validation but was not successful due to outside influences (Gruder 1993); and two articles (three studies) did not attempt any validation (Powell 1981; Nyborg 1986A, Nyborg 1986B,).

Effects of interventions

At six to nine months, all 11 studies reported abstinence rates of 0 to 65% for the intervention groups and 0 to 88% for control groups. The highest cessation rates were from two small studies (Powell 1981; Ginsberg 1992). McBride 2004 also reported high abstinence rates because participants were women recruited in early pregnancy, some of whom had already quit. Four studies reported rates of 20%-30% (Malott 1984; Glasgow 1986; McIntyre-Kingsolver 1986; Nyborg 1986A) The remaining four studies had cessation rates of less than 20% for both intervention and control groups. Six studies reported abstinence rates at 12+ months. (Powell 1981; McIntyre-Kingsolver 1986; Orleans 1991; Ginsberg 1992; Gruder 1993; McBride 2004). Rates were 14 to 59% for intervention groups and 15 to 64% for control groups. There was no evidence of substantial between-study heterogeneity, so we estimated a pooled relative risk (RR) for the effect of intervention on abstinence at both post-treatment intervals. There was no evidence of an effect at either follow-up point: at six to nine months RR 1.01, 95% CI 0.86 to 1.18; at 12+ months RR 1.04, 95% CI 0.87 to 1.24).

Though six studies reported the number of cigarettes smoked per day at baseline (Powell 1981; Glasgow 1986, Malott 1984, Orleans 1991; McBride 2004; May 2006), only Orleans and Powell re-

ported complete data. Only incomplete data was available for one month and six month intervals, so data were not available to measure summary effect. Only two studies reported carbon monoxide levels at pre-intervention baseline and at one month, but the data were incomplete (Glasgow 1986; Malott 1984).

Seven studies assessed PIQ scores as a measure of partner support. Two (Ginsberg 1992; Gruder 1993) reported that partner support was increased after the partner support intervention; three studies (Malott 1984; McIntyre-Kingsolver 1986; Orleans 1991) reported no difference between intervention group and control group. One study in pregnant women found no difference between conditions but reported a decline in positive partner support between baseline and 12 months postpartum, and a decrease in negative partner support during pregnancy but an increase postpartum; partners reported little change in their positive and negative support (McBride 2004). One study (Glasgow 1986) did not report a difference of PIQ scores between the groups.

DISCUSSION

Social support is known to be an important determinant of success in smoking cessation efforts, so it is reasonable to expect that an intervention designed to increase support from a partner might lead to greater rates of successful smoking cessation. In our review we were unable to demonstrate such an effect, or at least to demonstrate one which persisted for six months or longer. The failure to show conclusively such an effect by an analysis of existing trials does not necessarily mean that partner support interventions are ineffective. There are a number of possible other explanations for our failure to find an effect.

First, the studies we identified may not have been adequately powered to detect the effects of a partner support intervention. In the AHRQ meta-analysis (Fiore 2000) it was estimated that social support interventions might increase smoking cessation rates by three to five per cent. While a change of this magnitude would be highly clinically significant because of the major adverse effects of smoking on health, it is too small to be reliably identified by studies with the small sample sizes of the ones we reviewed. Though the summary effect sizes from our analysis are not statistically significant, and the confidence intervals are narrow, the trials are homogeneous in their interventions, so a clinically important difference cannot be absolutely ruled out.

A second possibility is that partner support may lead only to short-term but not to long-term success in smoking cessation. We excluded some trials from this review because they provided only data on short-term follow up, despite the fact that they showed positive results within that short-term time frame (West 1998; Albrecht 1998).

A third possibility is that the interventions used in the studies may not have been effective in actually increasing the amount of

support provided by the subjects' partners. Seven of the included studies used the Partner Interaction Questionnaire (PIQ) to assess the amount of partner support provided. This scale consists of a list of positive (supportive) and negative (critical) behaviours by the partner concerning the subject's smoking. Of the seven studies that measured partner support and follow up there was no difference in the PIQ scores between the groups in three (Malott 1984; McIntyre-Kingsolver 1986; Orleans 1991). One study reported that positive partner support declined, and negative partner support increased in U-shape after the partner support intervention (McBride 2004). One study (Ginsberg 1992) demonstrated an increase in partner closeness in the intervention group which was associated with higher abstinence rates. Another (Malott 1984) found negative interaction criticism to be associated with lower abstinence rates, which is consistent with the findings from observational studies.

Another possible difficulty in assessing this literature is that a number of different forms of partner support have been used in the interventions. Partners were defined as spouse/intimate other, friend, relative or co-worker. Three studies (Ginsberg 1992; Glasgow 1986; Orleans 1991) used a combination of partner types, thereby causing heterogeneity within the studies. Also, smoking status of partners was not always reported. This may be an important variable in the effectiveness of the intervention and could have been unevenly distributed despite randomization. Unfortunately the number of included studies and subjects was too small to conduct sensitivity analyses on this variable.

The AHRQ Clinical Practice Guidelines (Fiore 2000) recommended 'helping smokers obtain social support outside of treatment' as an effective counselling and behavioural therapy (strength of evidence = B). The review gave an estimated OR of 1.5 (95% CI 1.1 to 2.1) for smoking cessation interventions to increase extra-treatment social support (Fiore 2000, p66, table 20). The review included randomized controlled trials with a follow-up period of at least five months, but the studies used in the meta-analysis of various types of behavioural and counseling therapies do not include the studies identified for this review, and did include studies in which the addition of social support was not the only difference between intervention and control groups. The guidelines are due to be updated in 2008 and may no longer recommend this component of an intervention.

These studies suggest that partner support and the absence of partner criticism may be important in smoking cessation, but that these behaviours are not easily changed by the interventions used in these studies. Because the interventions primarily used education and problem solving, the failure of these interventions to increase smoking cessation may result partly from their lack of systemic orientation. Smoking is a complex behaviour that is influenced by biological factors (nicotine addiction), individual psychological issues, extra-familial social relationships and pressures, as well as the marital relationship. Supportive behaviours by the spouse are part of a complex marital relationship and are probably related to overall marital quality and satisfaction. Unfortunately, none of these observational or experimental studies of smoking cessation has measured any marital variables (other than spousal support), such as marital communication or satisfaction. Some of these studies do support the general finding in marital research that negative spousal interactions have a greater impact on outcomes than positive interactions (Rook 1984).

AUTHORS' CONCLUSIONS

Implications for practice

We failed to detect an increase in quit rates. Limited data from several of the trials suggest that these interventions did not increase partner support either. No conclusions can be made about the impact of partner support on smoking cessation.

Implications for research

Additional studies with larger samples are needed to adequately explore the effects of partner support interventions for smoking cessation. In future studies, partner support should be routinely measured as an intermediate outcome. Pre-existing support and partner smoking status need to be controlled for. Interventions should pay more attention to the quality of the partner interaction and be more effective at increasing partner support.

ACKNOWLEDGEMENTS

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Ginsberg 1992

Methods	Random assignment. quality score: 1+0+1
Participants	N=64, 54% Female, Mean age=38.2 yrs. Mean # cigarettes smoked per day=25.6 Partner=spouses/intimate others (64%), friends (33%), relatives (3%) % non-Smoking partners=66
Interventions	(1) Nicotine Gum + Psychotherapy: 2 mg nicotine gum, instructions for gum use and education materials, quitting strategy selection, relapse prevention skill training, public commitment to abstinence, costs/benefits exercise, and psychoeducational materials. (4 week programme) (n=33). (2) Nicotine Gum + Psychotherapy + Partner Support: 2 mg nicotine gum, instructions for gum use and education materials, quitting strategy selection, relapse prevention skill training, public commitment to abstinence, costs/benefits exercise, psychoeducational materials, partner empathy exercise, PS video tape, PS strategy booklet, personalized support strategy, and signed support agreements. (5 week programme). (n=31).
Outcomes	Written questionnaire, self-report, carbon monoxide test at weeks 0,4,12,26 & 52. Biochemical analysis of urine cotinine & thiocyanate at weeks 26 & 52.
Notes	For purposes of this analysis, the nicotine only group (n=35) was omitted. The nicotine gum+psychotherapy group was used as the control.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Glasgow 1986

Methods	Random group assignment. quality score: 1+0+0
Participants	N=29, 69% Female, Mean age=33.5 yrs. Mean # cigarettes smoked per day=25.5 Partner=Significant other outside of work setting (spouse, close friends) % non-smoking partners=not stated
Interventions	(1) Basic programme: 6 weekly group meetings (n=13). (2) Basic programme+Social Support condition: 6 weekly group meetings, partner provided support during non-work hours, partners received a support manual in bi-weekly installments.

Glasgow 1986 (Continued)

	(6 week programme) (n=16).	
Outcomes	Self reports, exam and weigh of saved cigarette butts, and 2 biochemical measures of smoking exposure; carbon monoxide and saliva thiocyanate. Pretest, posttest & 6m follow-up.	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Gruder 1993

Methods	Random assignment by site. quality score: 1+0+1	
Participants	N=506, 62% Female, Mean age=42.3 yrs. Mean # cigarettes smoked per day=28 Partner='buddy' % non-smoking partner=100%	
Interventions	(1) No-contact control group: received self help manual and instructions to watch a TV programme (n=235). (20 day programme). (2) Social support (SS): received a Quitters guide, attend 3 weekly 90-min group meetings during 20 days and receive 2 leader-initiated phone calls 1&2 mos after programme ended, and to bring a non-smoking buddy to the second group meeting. Buddies received a 'buddy guide'. Smokers received instruction on how to get help from buddies and neutralize unhelpful people. (n=271) (20 day programme).	
Outcomes	Self report abstinence rates only. Attempts were made to validate these rates by using saliva cotinine, but this was unsuccessful. MA uses point prevalence abstinence at 6 & 12 m.	
Notes	The discussion condition group (n=287) was excluded from this analysis because it did not instruct buddies on specific ways to be helpful. The SS group was used as the intervention group. The study attempted to validate quit rates by saliva cotinine, however many subjects refused due to a possible fear of that AIDS testing would also be done.	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Malott 1984

Methods	Random assignment. quality score: 1+0+1	
Participants	N=24, 83% Female, Mean age=34 yrs. Mean # cigarettes smoked per day=24 Partner=same sex, co-workers % non-smoking partner=not stated	
Interventions	(1) Standard controlled smoking: 6 weekly group meetings-50 minutes each. (6 week programme) (n=12). (2) Controlled smoking + Partner support: 6 weekly group meetings, received 'Partners Controlled Smoking Manual', and monitoring booklets were used. (6 week programme) (n=12).	
Outcomes	Self report , lab analysis of spent cigarette butts, carbon monoxide tests, and post-treatment questionnaire. 6m follow up	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

May 2006

Methods	Random assignment by group quality score: 1+0+2	
Participants	N=564, 62% Female, Mean age=43.6 yrs. Mean # cigarettes=23 Partner=smoker attending same cessation group	
Interventions	(1) Control condition: 6 weekly 1.5-1 hour group sessions (n=238, 20 groups) (2) Buddy condition: Buddy system was used (choosing someone in a group to be a buddy). Buddy intervention occurred during final 20 minutes of 2nd session. (n=238, 14 groups)	
Outcomes	Self reports, carbon monoxide test at weeks 0, 1, 4, 26	
Notes	Nicotine replacement therapy or bupropion was not withheld. 4 buddy groups and 2 solo groups used NRT or bupropion.	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

McBride 2004

Methods	Random assignment quality score: 1+0+1	
Participants	N=385 pregnant women, 44% already abstinent, mean age=24 yrs % subjects married=96% Mean#cigarettes smoked per day before pregnancy=13 Partners=mean age 25, % non-smoking partners=46	
Interventions	(1) Women-only: self-help guide, late-pregnancy relapse prevention kit, 6 counseling calls (2) Partner-assisted: women-only intervention+ partner support intervention (booklet, companion video, 6 counseling calls	
Outcomes	Self-reported abstinence. Saliva samples collected by mail at 28 weeks pregnancy & 12m postpartum but not used to confirm self report. 6m & 12m post-partum point prevalence abstinence used in MA PIQ & general emotional & instrumental support assessed	
Notes	For purpose of this analysis, the usual care group (n=118) was omitted. Partners who smoked were given self-help cessation guides, free nicotine patches, and counselling.	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

McIntyre-Kingsolver 1986

Methods	Random assignment quality score: 1+0+1	
Participants	N=64, 58% Female, Mean age=38.4 yrs. Mean # cigarettes smoked per day=25.6 Partner=spouse, or spouse equivalent (live-in) % non-smoking partners=84%	
Interventions	(1) Standard treatment: 6 weekly 2 hour group sessions (n=31) (6 week programme). (2) Spouse training: 6 weekly 2 hour group sessions. Spouses attended each session (n=33) (6 week programme).	
Outcomes	Self-reported smoking behaviour, informants report of subjects smoking behaviour (spouse support group only), expired air carbon monoxide, saliva thiocyanate, demographic and smoking history data, and partner interaction questionnaire. 6m & 1 year abstinence in MA	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description

McIntyre-Kingsolver 1986 (Continued)

Allocation concealment?	Unclear	B - Unclear
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Nyborg 1986A

Methods	Random assignment. quality score: 1+0+0
Participants	N=32, 50% Female, Mean Age=34.2 yrs. Mean # cigarettes smoked per day=>20 Partner=live-in and seeking to quit (65% married) % non-smoking partners=0%
Interventions	Self-administered/ minimal contact: 1) Individual training: behavioural treatment manual as self help, minimal contact via telephone by a therapist on a weekly basis. (8 week programme) (n=8). 2) Couple training: behavioural treatment manual as self-help + couples received weekly therapist phone contact and therapist feedback. (n=8) (8 week programme).
Outcomes	Self-reported abstinence only. 6m abstinence in MA
Notes	Effort-only control group was not included in the study analyses, so there was no data to include for this group. The therapy and self-admin interventions used 'individual training' as the control groups respectively.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Nyborg 1986B

Methods	Random assignment. quality score: 1+0+0
Participants	N=32, 50% Female, Mean Age=34.2 yrs. Mean #cigarettes smoked per day=>20 Partner=live-in and seeking to quit (65%married) % non-smoking partners=0%
Interventions	Therapist-administered treatment: 1) Individual training: Couples received weekly treatment sessions on behavioural techniques. Conway manual was used. (n=8) (8 week programme). 2) Couples training: Couples received additional written materials which provided instruction for mutual support and received therapist feedback in treatment sessions. (n=8) (8 week programme).

Nyborg 1986B (Continued)

Outcomes	Self-reported abstinence only. 6m abstinence in MA	
Notes	Effort-only control group was not included in the study analyses, so there was no data to include for this group. The therapy and self-admin interventions used 'individual training' as the control groups respectively.	
Risk of bias		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Orleans 1991

Methods	Random assignment. quality score: 1+0+1	
Participants	N=1003, 63% Female, Mean age=44.4 yrs. Mean #cigarettes smoked per day=26 Partner=Spouse, close friend, co-worker. % non-smoking partner=not stated	
Interventions	(1) Self-quitting only group: 28 page quitting-guide, 4-week monitored nicotine fading programme, Experimental self quit guide (n=502) (4 week programme). (2) Self-quitting materials+social support instruction: 28 page quitting-guide, 4-week monitored nicotine fading programme, 16-page social support guide (n=501) (4 week programme).	
Outcomes	Follow-up assessments at 8 & 16 months. Biochemical assessment of saliva cotinine or thiocyanate at 16m, most self report confirmed, self-report rates presented.	
Notes	This study had 2 intervention and 2 control groups. Only 1 of each was included. The support group that included a telephone counselling component was excluded (n=510) as well as the enhanced 'usual care' control condition (n=508).	
Risk of bias		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Powell 1981

Methods	Random assignments. quality score: 1+0+1	
Participants	N=45, 64% Female, Mean Age=36 yrs Mean #cigarettes smoked per day=29 Partner=fellow participants in the cessation programme. %Non-smoking partner= NA	
Interventions	All subjects attended a 5-day pre-treatment programme prior to assignment in an intervention or control group. This included an introductory meeting and 4 consecutive treatment meetings (all 1.5 hours each), lectures, demonstrations, practice exercises, aversive smoking and teaching self-control. Upon completing this subjects were given follow-up questionnaires and assigned to a maintenance programme. Each subject was required to pay \$25 (non-refundable) and a \$30 refundable deposit. (1)No contact control (4 week programme) (n=17). (2) Telephone contact system: allowed subjects to phone one-another, but not the experimenter (n=17) (4 week programme).	
Outcomes	Pretreatment questionnaire, mail-in follow-up questionnaire at 6 & 12m. No biochemical assessment	
Notes	The 4-week support group (n=17) was excluded from this analyses. Telephone contact system group was used as the intervention group. Self reported abstinence only.	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

MA - meta-analysis

PIQ - Partner Interaction Questionnaire

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Albrecht 1998	Follow up was less than 6 months
Albrecht 2006	Unpublished data were sought, but could not be used
Andersen 2005	Follow up was less than 6 months
Audrey 2004	Not an RCT

(Continued)

Carlson 2002	Not an RCT
Daniel 2004	Not an RCT
Digusto 1995	Intervention group did not receive partner support
Donatelle 2000	Control group did not receive the financial incentive intervention that was given to the treatment group participants
Gardner 1982	Follow up was less than 6 months
Glad 1978	Support Group not defined
Hamilton 1979	Intervention group did not receive partner support intervention
Janis 1970	Control group received partner support intervention
Jason 1987	Intervention group did not receive partner support intervention
Kendrick 1995	Control group received a partner support intervention
Klerman 2001	Control group did not receive the group sessions that were given to the intervention group.
Kviz 1994	Not an RCT
Lichtenstein 2002	Control group received partner support intervention
Loke 2005	Follow up was less than 6 months
McIntyre 1983	Duplicate data published in McIntyre-Kingsolver 1986
McMahon 1998	Control group did not receive intervention
McMahon 2000	Control group did not receive the cognitive behavioural intervention that was given to the intervention group.
Mermelstein 1986	Duplicate data of McIntyre-Kingsolver 1986. They combined the data of McIntyre 1986 (included study) with a second study that included intervention subjects without partners.
Moller 2003	Control group received partner support intervention
Murray 1995	Not an RCT
Nevid 1997	Control group received partner support intervention
Nyborg 1985	Duplicate data of Nyborg 1986
Park 2006	Not an RCT

(Continued)

Patten 2004	Control group received partner support intervention
Picardi 2002	Not an RCT
Pirie 1997	Not an RCT
Rohrbaugh 2001	Not an RCT
Salina 1994	No partner support intervention
Schoenbach 1992	Duplicate data of Orleans 1991
Sheahan 1997	Not an RCT (No control group)
Solomon 2005	Intervention group did not receive partner support
Sorensen 1993	Not an RCT
Stanton 2004	Intervention group did not receive partner support
Wakefield 1998	Not an RCT
West 1998	Follow up less than 6 months
Westmaas 2002	Not an RCT

DATA AND ANALYSES

Comparison 1. Partner intervention versus control

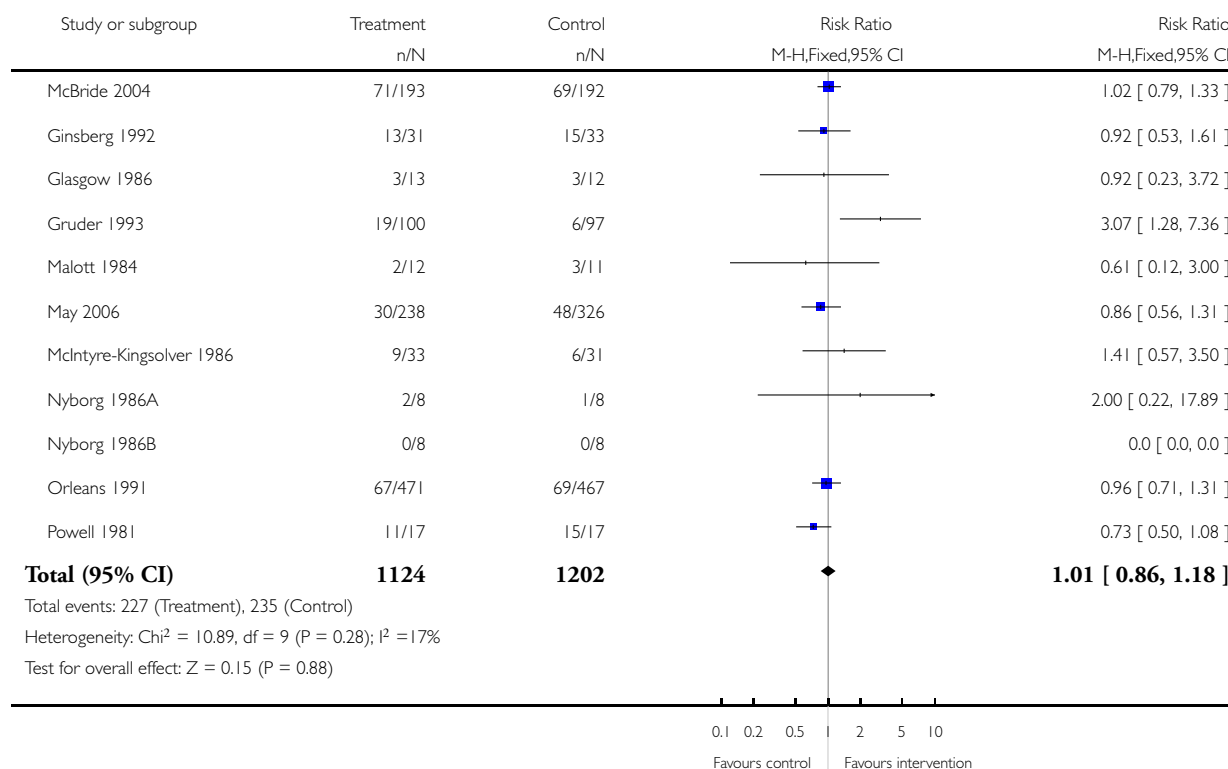
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Abstinence at 6-9 months	11	2326	Risk Ratio (M-H, Fixed, 95% CI)	1.01 [0.86, 1.18]
2 Abstinence at 12+ months	6	1672	Risk Ratio (M-H, Fixed, 95% CI)	1.04 [0.87, 1.24]

Analysis 1.1. Comparison 1 Partner intervention versus control, Outcome 1 Abstinence at 6-9 months.

Review: Enhancing partner support to improve smoking cessation

Comparison: 1 Partner intervention versus control

Outcome: 1 Abstinence at 6-9 months

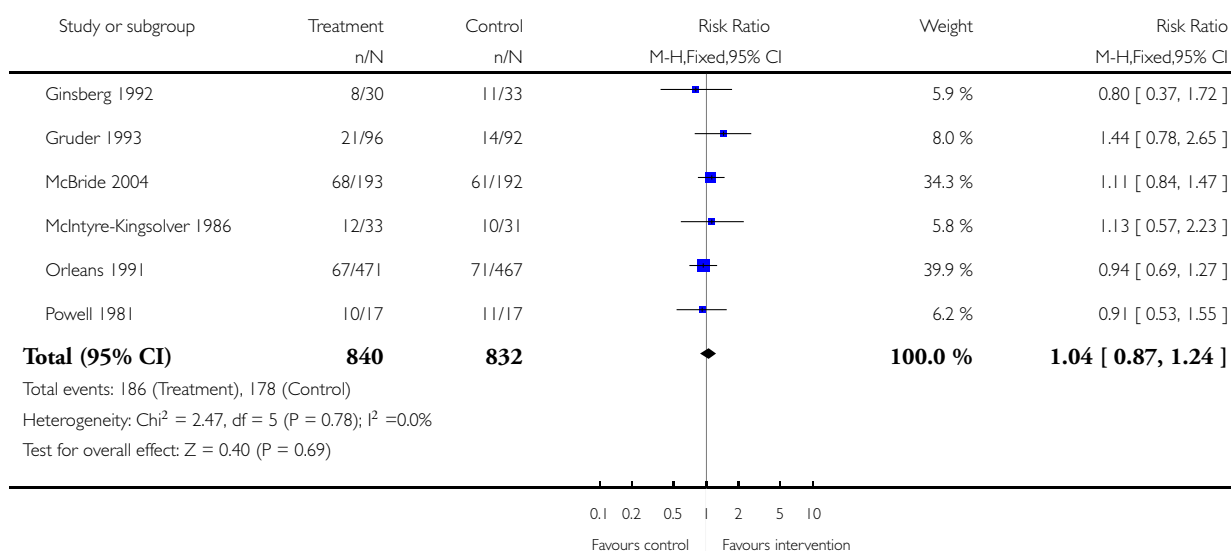


Analysis 1.2. Comparison 1 Partner intervention versus control, Outcome 2 Abstinence at 12+ months.

Review: Enhancing partner support to improve smoking cessation

Comparison: 1 Partner intervention versus control

Outcome: 2 Abstinence at 12+ months



WHAT'S NEW

Last assessed as up-to-date: 24 February 2008.

Date	Event	Description
25 February 2008	New search has been performed	A total of 10 new articles were found in the updated search in October 2007, and two included randomized trials that satisfied the inclusion criteria. A minor update has been made to the body of the review and the conclusions remain as before.

HISTORY

Protocol first published: Issue 1, 2001

Review first published: Issue 1, 2002

Date	Event	Description
17 April 2008	Amended	Converted to new review format.
11 May 2004	New search has been performed	A total of 9 new articles were found in the updated search in April 2004, but none included randomized trials that satisfied the inclusion criteria. No changes have been made to the body of the review and the conclusions remain as before.

CONTRIBUTIONS OF AUTHORS

Eal-Whan Park, MD, as primary author for this review, originated the concept for this research. He conducted data extraction and co-wrote most of the review.

Jennifer Schultz coordinated all aspects of this review. She has maintained all data files, processed results and co-wrote some of the research.

Fred Tudiver, MD also conducted the data extraction and co-wrote much of the research.

Tom Campbell, MD has previously published in this area and was consulted to assist with co-writing the introduction and discussion.

Lorne A. Becker, MD served as a consultant for the design of this research. He assisted reviewers (EP, FT) in reaching consensus with data discrepancy. He has assisted with the data analysis for this research.

DECLARATIONS OF INTEREST

None known

SOURCES OF SUPPORT

Internal sources

- SUNY Upstate Medical University- Department of Family Medicine, USA.
- Dankook University, Department of Family Medicine, Korea, Republic of.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Social Support; *Spouses; Interpersonal Relations; Randomized Controlled Trials as Topic; Smoking Cessation [*psychology]

MeSH check words

Humans