
Chronic Disease & Injuries
Chronic Disease Prevention
Family Health
Reproductive Health

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The Effectiveness of Postpartum Smoking Relapse Prevention Strategies

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To determine the effectiveness of interventions included in the Mandatory Health Programs and Services Guidelines (MHPG), the following systematic reviews were completed and funded by the Public Health Research, Education and Development (PHRED) Program of the Public Health Branch, Ontario Ministry of Health.

1998 - 1999

- Health Hazard Investigation
  - Emergency Response to Acute Environmental Hazards
  - Strategies to Enhance Public Awareness of Environmental Risks

- Chronic Diseases and Injuries
  - Chronic Disease Prevention
    - Community interventions to Enhance Fruit and Vegetable Consumption
    - Use of Coalitions in Heart Health, Tobacco Use Reduction and Injury Prevention
    - Community-Based Heart Health Programs
    - School-Based Adolescent Risk Behaviour Prevention Programs

- Family Health
  - Sexual Health
    - Adolescent Pregnancy Prevention Strategies
  - Child Health
    - Professionally Led Parenting Groups
    - Peer/Paraprofessional 1:1 Interventions in Improving Maternal/Child Health
    - Public Health Nurse Home Visiting
    - Curriculum Suicide Prevention Programs for Adolescents

- Infectious Diseases
  - Day Care Centre Infection Control Interventions
  - Adolescent STD Prevention Strategies

1999 - 2000

- Chronic Diseases and Injuries
  - Chronic Disease Prevention
    - Postpartum Smoking
    - Cervical Cancer Screening Interventions

- Injury Prevention
  - Anticipatory Care Interventions with Community Dwelling Elderly

- Family Health
  - Sexual Health
    - Youth to Youth Peer Health Promotion
  - Child Health
    - Healthy Feeding in Infants Under One Year of Age
    - Injury Prevention in Children & Adolescents

- Infectious Diseases
  - Needle Exchange Programs
  - Online Computer Support Groups for Adults
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PREFACE

The Public Health Branch of the Ontario Ministry of Health released new Mandatory Health Programs and Services Guidelines (MHPSG) in December 1997. Although the MHPSG provide guidelines for a wide range of public health practices in Ontario, the strength of evidence for many of the guidelines has not been summarized in a systematic way.

The Effective Public Health Practice Project (EPHPP), under the auspices of the Public Health Research, Education and Development (PHRED) Program develops and provides systematic reviews of the effectiveness of specific requirements of the MHPSG. Each review is linked to one of the three general standards or three program standards. The reviews summarize the best available research evidence for public health practice in these areas. Research evidence is one piece of information needed to inform decision making in public health. Other factors, such as the local environment, local priorities, and available resources are also important.

The reviews are conducted by review groups composed of members of the Ontario PHRED Program Health Units as well as representatives from other Health Units around the province. The PHRED Provincial Operations Committee oversees the project.

Potential review topics are initially identified through a survey of public health practitioners and managers across Ontario. Each review group follows a systematic approach that includes comprehensive search strategies and quality assessment of each primary research study selected for inclusion in the review.

One of the primary objectives of EPHPP is to ensure that the information is relevant to public health practitioners in the field. We contact Medical Officers of Health, Program Managers and others to ask for volunteer experts to take on the role of peer reviewers for the draft reports.

The EPHPP project has many benefits. Public Health professionals develop skills in conducting systematic reviews and increase their awareness of the importance and feasibility of evidence-based practice. Through this project, we established new links with the Cochrane Collaboration. Reviews are in the process of being registered with the various Cochrane Review Groups, making the reviews accessible to the international public health community. Finally, by providing education, support and a collegial atmosphere in which to expand and share public health research, EPHPP has contributed to the development of a strong province-wide network of public health professionals.
Postpartum Smoking Relapse Prevention Strategies

Public Health Mandate

Public health departments are mandated to provide services for both pregnant and postpartum women. Service delivery strategies include prenatal classes, postnatal home visits, breastfeeding classes, and parent-baby support groups. Public Health Units in Ontario are also responsible for promoting and protecting the health of children. Increasing the proportion of smoke-free homes and increasing the proportion of infants breastfed up to six months of age are means of achieving this goal.

Background

Approximately 20 to 40% of pregnant women stop smoking spontaneously, usually in the first trimester of pregnancy. Another 8 to 15% stop smoking with the assistance of a smoking cessation program. Despite what is often a prolonged period of abstinence, about 60% of women who stop smoking during their pregnancy relapse before their infant is six months of age.

Postpartum smoking relapse is of concern for three major reasons. First, in comparison with women who are able to remain abstinent, women who resume smoking have an increased risk of the direct long-term health effects of smoking (e.g. lung cancer, heart disease). Second, infants whose parents smoke are more likely to be exposed to environmental tobacco smoke (ETS) in the home. ETS exposure increases an infant’s risk of developing chronic middle ear infections, upper respiratory tract infections and sudden infant death syndrome. Among infants and young children with asthma, exposure to ETS increases the risk of more frequent and more severe asthmatic attacks. Third, women who smoke are less likely to
breastfeed their infant and more likely to introduce solid food early than either non-smokers or women who quit during pregnancy and stay quit postpartum.

Issue

Public health professionals play a key role in the provision of services to prenatal and postnatal women in the community. With knowledge about effective strategies to reduce the risk of postnatal smoking relapse, they are well positioned to have a significant impact on this problem. Reducing postpartum smoking relapse rates would decrease the number of infants and young children exposed to environmental tobacco smoke in the home and contribute to decreases in the long-term health effects of smoking among women.

Finding the Answers

The purpose of this systematic review is to determine the effectiveness of strategies to reduce smoking relapse during the postpartum period. Nineteen studies were initially found to be relevant, four of these were methodologically strong. Because of the smoking cessation focus for many of these studies, early or mid-pregnancy has been the most common time period for delivering relapse prevention interventions.

What’s the Evidence?

- There is limited emerging evidence that a theoretically-based, multi-component intervention of sufficient intensity, provided during the postpartum period, can have a modest effect on patterns of smoking relapse at six months postpartum.

- There is no evidence to suggest that relapse prevention strategies which lack an appropriate theoretical base, consist of brief and infrequent interventions, and are provided in an antenatal clinic setting, reduce postpartum smoking relapse rates.

- Teaching women how to resist urges to smoke and how to avoid situations where they are tempted to smoke does not equip them with an adequate set of skills needed to maintain cessation status during pregnancy or postpartum.

- The optimum timing (early, mid or late pregnancy; and/or postpartum), frequency, and
Research has consistently identified the presence of a smoking partner as a strong determinant of postpartum smoking relapse. However, an examination of relapse prevention strategies targeting both women and their partners is absent from the literature.

Implications for Practice and Research

- Relapse prevention strategies need to be supported by a strong theoretical base and provided with adequate intensity to influence the complex nature of postpartum smoking relapse.

- It is unlikely that a single brief counseling session added to postpartum home visits (with or without selfhelp materials) would constitute an intervention of adequate intensity to effectively reduce postpartum smoking relapse rates.

- A holistic approach to the issue of postpartum smoking relapse prevention is required. Relapse prevention strategies should be targeted at women, their partners, close friends and family members. Those providing interventions should work directly with the women and their partners, rather than working only with women and expecting the women in turn, to influence their partners.

- Women living with partners who smoke are especially vulnerable for postpartum smoking relapse. These women should be a priority for postpartum smoking relapse prevention programs.

- Future interventions targeting relapse prevention during pregnancy and postpartum should address the link between a woman’s choices about smoking and infant feeding.

- Future research should examine tailored strategies for sub-groups of women requiring different types of support and interventions to achieve continued smoking cessation postpartum (e.g. women who quit spontaneously versus those who quit with the
assistance of a smoking cessation program; women whose partners smoke versus women whose partners are non-smokers).

- Intervention studies of postpartum smoking relapse prevention need to measure a variety of outcomes including number of cigarettes smoked daily, patterns of smoking, partner’s smoking status during pregnancy, and the existence and enforcement of household rules regarding environmental tobacco smoking.

- Future research needs to be built on the convergence of what has been learned in different areas of the literature including: links between smoking and infant feeding choices, effective strategies to reduce ETS exposure in the home, role transitions experienced by new parents and relapse prevention strategies examined in the addictions literature.

More Sources of Information


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Postpartum Smoking Relapse Prevention Strategies

Issue
Public health professionals play a key role in the provision of services to prenatal and postnatal women in the community. With knowledge about effective strategies to reduce the risk of postnatal smoking relapse, they are well positioned to have a significant impact on this problem. Reducing postpartum smoking relapse rates would decrease the number of infants and young children exposed to environmental tobacco smoke in the home and contribute to decreases in the long-term health effects of smoking among women.

Background
Approximately 20 to 40% of pregnant women stop smoking spontaneously, usually in the first trimester of pregnancy. Another 8 to 15% stop smoking with the assistance of a smoking cessation program. Despite what is often a prolonged period of abstinence, about 60% of women who stop smoking during their pregnancy relapse before their infant is six months of age.

Postpartum smoking relapse is of concern for three major reasons. First, in comparison with women who are able to remain abstinent, women who resume smoking have an increased risk of the direct long-term health effects of smoking (e.g. lung cancer, heart disease). Second, infants whose parents smoke are more likely to be exposed to environmental tobacco smoke (ETS) in the home than infants of parents who do not smoke. ETS exposure increases an infant’s risk of developing chronic middle ear infections, upper respiratory tract infections and sudden infant death syndrome. Among infants and young children with asthma, exposure to ETS increases the risk of more frequent and more severe asthmatic attacks. Third, women who smoke are less likely to breastfeed their infant and more likely to introduce solid food early than either non-smokers or women who quit during pregnancy and stay quit postpartum.

Public Health Mandate
Public health departments are mandated to provide services for both pregnant and postpartum women. Public Health Units in Ontario are also responsible for promoting and protecting the health of children.
What’s the Evidence?

- Emerging evidence from rigorous research indicates that a theoretically-based, multi-component intervention of sufficient intensity, provided either during the pregnancy or during the postpartum period can have a modest effect on patterns of smoking relapse at six months postpartum (e.g. decreased rates of resuming daily smoking, reduced average number of cigarettes smoked daily).

- Teaching women how to resist urges to smoke and how to avoid situations where they are tempted to smoke does not provide them with the skills needed to maintain cessation status during pregnancy or postpartum.

Implications

- A holistic approach to the issue of postpartum smoking relapse prevention is required. Relapse prevention strategies should be targeted at women, their partners, close friends and family members. Those providing interventions should work directly with the women and their partners, rather than working only with women and expecting the women, in turn, to influence their partners.

- It is unlikely that a single counselling session added to postpartum home visits (with or without self-help materials) would constitute an intervention of adequate intensity to effectively reduce postpartum smoking relapse rates.

- Women living with partners who smoke are especially vulnerable for postpartum smoking relapse. These women should be a priority for postpartum smoking relapse prevention programs.

- Future research needs to be built on the convergence of what has been learned in different areas of the literature including: links between smoking and infant feeding choices, effective strategies to reduce ETS exposure in the home, role transitions experienced by new parents and relapse prevention strategies examined in the addictions literature.

- Future interventions targeting relapse prevention during pregnancy and postpartum should address the link between woman’s choices about smoking and infant feeding.

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ABSTRACT

Objectives
The objective of this review was to examine the effectiveness of strategies to prevent postpartum smoking relapse.

Methods
In order to retrieve published and unpublished literature, five databases were searched electronically, six journals were hand-searched, requests were posted on list-servers, and key informants were contacted. The search resulted in the retrieval of 177 articles of which 25 were judged to be relevant. Two sets of articles described the same studies, resulting in 19 relevant studies. The methodology of these studies was assessed, yielding one strong, three moderate, and 15 weak overall validity ratings.

Results
There is emerging biochemically confirmed evidence from a single study suggesting that a theoretically based, multi-component intervention of sufficient intensity, provided during the postpartum period, can have a modest effect on postpartum smoking relapse rates at six months postpartum.

There is no evidence to suggest that relapse prevention strategies which lack an appropriate theoretical base, consist of brief and infrequent interventions, and are provided in an antenatal clinic setting reduce postpartum smoking relapse rates.

The optimum timing (early, mid or late pregnancy; and/or postpartum), frequency, and mix of postpartum smoking relapse prevention strategies have not yet been determined.

The presence of a smoking partner and other social contacts who smoke are important determinants of postpartum smoking relapse.

Conclusions
Future relapse prevention strategies need to be supported by a strong theoretical base and provided with adequate intensity to influence the complex nature of postpartum smoking relapse.

A holistic approach to the issue of smoking relapse prevention is required.
BACKGROUND

Introduction

Smoking and Smoking Cessation During Pregnancy
Smoking during pregnancy is a well-researched issue which gained prominence during the 1980s. The U.S. Surgeon General’s landmark report on the causal links between smoking during pregnancy and perinatal health outcomes highlighted the importance of this research by conclusively documenting the adverse impacts of smoking during pregnancy on health (DHHS, 1990). Adverse perinatal outcomes causally linked to smoking during pregnancy include intrauterine growth retardation, preterm birth, low birth weight, abruptio placenta, placenta previa, stillbirths, and spontaneous abortions. It is estimated that if all pregnant smokers were to quit, fetal and infant deaths would drop by 10% (Kramer, 1987; Silins, Semenciw, Morrison, et al., 1985).

Several large-scale population studies have documented changes in smoking rates among pregnant women over the past two decades. Although all of these studies share the limitation of using self-reported rather than biochemically confirmed smoking status, they indicate an overall trend of declining smoking rates during pregnancy. These studies also suggest that changes in smoking prevalence rates among pregnant women reflect changes in smoking prevalence rates in the general population (Edwards et al., 1996; Health Canada, 1993).

Cycle 3 of the Survey on Smoking in Canada documented the prevalence of smoking among women of reproductive age. Among this group, smoking rates were 29% for women aged 15 to 19, 34% for those aged 20 to 24 and 32.4% for women aged 24 to 44. This survey revealed that among women aged 20 to 44 who had been pregnant in the previous five years, 19% smoked ‘regularly during their most recent pregnancy.’ Sixty-eight per cent of current smokers smoked during their more recent pregnancy. This latter statistic is indicative of a substantial proportion of women (32%) who had quit smoking during their pregnancy but returned to smoking at some stage postpartum (Edwards, 1997).

Although the overall Canadian trend suggests a decline in self-reported smoking rates during pregnancy, considerable regional differences are evident. Stewart, Potter, Dulberg, et al. (1995) compared the prevalence of smoking before and during pregnancy for two population-based cohorts of women interviewed in 1982 and 1993. Results of these Ottawa-Carleton studies indicate that smoking rates during the first trimester of pregnancy decreased from 28.5% in 1983 to 18.7% in 1992. Two factors contributed to this change. The proportion of women who smoked before pregnancy declined from 37.4% to 26.4% and the proportion of women who stopped smoking during the first trimester of pregnancy increased from 23.9% to 29.2%. In Nova Scotia, Dodds (1995) found that between 1988 and 1992, the overall smoking rate for women who delivered a baby remained relatively stable at 32%. However, smoking rates among pregnant women over the age of 34 increased. In 1996, Ratner, Johnson and Bottorff (1997) screened 7,056 women admitted for labour and delivery to five hospitals in the Lower Mainland, B.C., for inclusion in a randomized controlled trial of smoking relapse prevention. Only 9.5% reported smoking during pregnancy. Despite a likely underestimation of true prevalence, due to the exclusion of women at high risk for
smoking, these data are consistent with other research indicating that British Columbia experiences the lowest smoking prevalence rates in Canada (Health Canada, 1993, 1994, 1999). These varying rates underscore the need to consider regional differences in smoking rates among various sub-populations of pregnant women.

International studies clearly reflect a decrease in smoking prevalence among pregnant women over the past two to three decades. In an early study using data from two national natality surveys in the U.S., Kleinman and Kopstein (1987) reported age-specific changes in smoking rates during pregnancy between 1967 and 1980. Smoking rates among married teenagers were essentially constant between 1967 and 1980. However, for married mothers twenty years of age or older, smoking prevalence rates declined from 40 to 25% among Whites, and from 33 to 23% among Blacks. The largest proportion of this change was accounted for by women with 16 or more years of education. A more recent study in the U.S. indicates a continued decline. Buescher (1997) used birth certificate data to compare the smoking status of pregnant women between 1988-89 and 1993-94. Smoking rates decreased from 21.6 to 17.4% over this five year period. In 1989, the Norwegian Cancer Society initiated a national campaign against smoking during pregnancy (Eriksson, Salvesen, Haug & Eik-Nes, 1996). A significant reduction in smoking rates among pregnant women was reported following implementation of the campaign. Self-reported smoking rates declined from 34% in 1987 to 22% in 1994 with the largest decrease occurring among younger women (24 years or younger).

**Smoking Relapse and Relapse Prevention During Pregnancy and Postpartum**

In the 1990s, a growing body of evidence confirmed a link between passive smoke exposure and infant health. The U.S. Report on Environmental Tobacco concluded that there are causal links between passive smoke exposure and infant health (DHHS, 1990). Infants and young children who are exposed to cigarette smoke in the home have higher rates of sudden infant death syndrome, chronic ear infections, and acute respiratory tract infections. Children with asthma experience more severe and more frequent attacks. Data on the health effects of passive smoking brought into focus the role of other family members, and in particular the woman’s partner, in exposing infants to passive smoke. In addition to the compelling infant health reasons for smoking relapse prevention during pregnancy and postpartum, women who are able to sustain their quit efforts will experience improved health outcomes and a reduced risk of premature mortality due to lung cancer, chronic obstructive pulmonary diseases, and heart disease. This evidence influenced a shift in the orientation of intervention studies from a focus on smoking cessation during pregnancy to postpartum relapse prevention.

A substantial number of women quit smoking on their own during pregnancy. Spontaneous quit rates have been estimated to range from 18 to 42% (Gillies, Power, Turner & Madeley, 1990; Mullen, Quinn & Ershoff, 1990; O’Campo, Faden, Brown & Gielen, 1992; Petersen, Handel, Kotch, Podedworny & Rosen, 1992; Windsor, Boyd & Orleans, 1998). Women who quit smoking during pregnancy most often do so during the first trimester (Erikkson et al., 1996; Mullen, Quinn & Ershoff, 1990; Stewart, Potter, Dulberg et al., 1995). In addition to those women who quit spontaneously, another 8 to 15% stop smoking with the assistance of a smoking cessation program (Windsor, Cutter & Morris, 1985). Some authors have reported that a reduction in cigarette consumption is more likely than complete smoking cessation during pregnancy. In a British study, Campion, Owen and McNeil (1994) found that 35% of women reduced the number of cigarettes smoked while only 26% quit smoking. Among those cutting down, the
average number of cigarettes smoked daily decreased by one third. Although relatively few studies have documented the smoking patterns of women’s partners during pregnancy, evidence suggests that women are more likely to change their smoking status during pregnancy than are their partners (Edwards et al., 1996; Stewart et al., 1995).

Despite prolonged periods of abstinence during pregnancy, approximately 60% of women resume smoking prior to six months postpartum (Edwards et al., 1996; Johnson, Ratner, Bottorff, Hall, & Dahainten, in press; Ratner, Johnson, Bottorff, Dahainten, & Hall, in press; Secker-Walker, Solomon, Flynn et al., 1995; Secker-Walker, Solomon, Flynn, Skelly & Mead, 1998). These high rates of postpartum relapse have been documented for women who quit spontaneously and for women who stopped smoking with the assistance of cessation programs. However, there is some evidence suggesting that among spontaneous quitters, women who quit early in their pregnancy are less likely to relapse than those who quit late. Sexton, Hebel and Fox (1987) found that approximately 53% of early and 84% of late spontaneous quitters relapsed by three months postpartum. By three years postpartum, relapse rates were approximately 60% and 90% for early and late spontaneous quitters, respectively. Fingerhut, Kleinman and Kendrick (1990) found that 66% of early quitters and 81% of late quitters relapsed within one year postpartum. Although more research is required, the timing of spontaneous quitting may impact relapse rates.

Several hypotheses may explain high postpartum relapse rates among spontaneous quitters. First, spontaneous quitters may become abstinent because they are highly susceptible to the social desirability to be abstinent. Once the social pressure to remain abstinent for the sake of the fetus disappears, and the stresses and triggers that were previously associated with smoking re-emerge, the temptation to smoke may become overwhelming (Edwards & Sims-Jones, 1998). Second, spontaneous quitters may fail to anticipate future difficulties associated with remaining abstinent because of the ease with which they were able to quit (Edwards & Sims-Jones, 1998). They may be surprised when relapse occurs and lack the skills to deal with what Marlatt (1985) terms the ‘abstinence violation effect’. Third, some women intend to return to smoking postpartum having centred their decision to quit smoking around the baby’s health.

Spontaneous quitters require feedback that promotes a realistic understanding of the social, cognitive, and behavioural forces at work as they progress through the stages of pregnancy and motherhood, and the stages of smoking cessation (Prochaska & DiClemente, 1983). Relapse rates in this sub-population might be reduced by interventions that promote anticipation and management of potential risks for relapse (Edwards & Sims-Jones, 1998).

The paucity of research on the psychosocial predictors of smoking cessation and relapse among pregnant and postpartum women has recently been underscored in a meta-analysis of smoking during pregnancy studies (Windsor et al., 1998). A theoretical framework within which to understand smoking cessation and relapse is lacking (Edwards et al., 1996). This has contributed to inconsistencies in the selection of potential predictors for smoking cessation. Prolonged breastfeeding has been associated with a decreased likelihood of smoking relapse (O’Campo et al., 1992; McBride & Pirie, 1990). A number of studies have also demonstrated that the partner’s smoking status and support are determinants of pregnant and postpartum women’s smoking choices (Edwards & Sims-Jones, 1998; Gwede, McDermott, Marty,
Munodawafa, & Roger, 1992; Haug, 1992; Seversen, Andrews, Lichtenstein, Wall, & Ackers, 1997; Wergelend, Strand & Bjerkedal, 1996). Johnson et al. (2000) found that low self-efficacy, many attempts to quit, and high smoking rates among social contacts were predictors of relapse at six months postpartum. Predictors of relapse for the same group of women at 12 months postpartum included breastfeeding, mental health, presence of a smoking partner and the number of cigarettes smoked by the mother (Ratner et al., in press). Confidence in quitting and remaining abstinent (Gwede et al., 1992; Secker-Walker, 1998a; Seversen et al., 1997), the presence of an environmental smoke policy in the home (Gwede et al., 1992) and preoccupation with weight loss have also been found to significantly predict relapse (McBride & Pirie, 1990; Severson et al., 1997).

Pregnant women quit smoking predominantly due to concerns about the health of the fetus (Edwards & Sims-Jones, 1998). Breastfeeding can provide a postpartum extension for the time period when women continue to remain abstinent for the baby’s health rather than their own. This explanation is supported by research linking relapse rates and breastfeeding. Smoking rates are consistently higher among women who bottle feed than women who breastfeed (Barnes, Stein, Smith & Pollock, 1997; Johnson et al. in press; Håkansson & Carlsson, 1992; Håkansson & Cars, 1988; Piper & Parks, 1996). After controlling for sociodemographic variables, Edwards et al. (1998) found that current smokers were 2.5 to 3.5 times more likely to not breastfeed at birth, to discontinue breastfeeding early and to introduce solid foods early in comparison with non-smokers. Women who had stopped smoking during pregnancy and remained abstinent postpartum reported infant feeding patterns similar to those of non-smokers.

In parallel with the mothers’ primary focus on the fetus or baby, societal tolerance for smoking among pregnant women is low (Edwards & Sims-Jones, 1998; Edwards et al., 1996). Women report intolerance demonstrated by partners, families, friends and coworkers whose express concern is the health of the fetus or baby rather than the health of the mother. A postpartum shift in societal norms relieves the new mother from the pressure that may have previously encouraged her to remain abstinent (Edwards & Sims-Jones, 1998). This underscores the importance of developing interventions that target the dormant risk factors associated with the mother’s needs.

Problems and Gaps in the Current Literature
Conspicuous by their absence from the literature on smoking cessation and relapse are a number of issues that may prove crucial in our theoretical understanding of postpartum relapse prevention and the development of effective interventions. These are briefly summarized below.

A recent update of the Cochrane review (Lumley et al., 1998) on effective strategies for smoking cessation during pregnancy concluded that in comparison with usual care, smoking cessation interventions provided during pregnancy reduced maternal smoking during late pregnancy, decreased the rate of low birth weight infants, and increased average birth weight. Authors of this meta-analysis highlighted several limitations of reviewed studies including the lack of information on smoking patterns of pregnant women’s family and friends. In their meta-analysis of prenatal smoking cessation trials, Mullen, Ramirez and Groff (1994) suggested that higher quit rates resulted from more intense interventions which included strategies such as intensive counselling, use of multiple contacts, provision of supportive materials, and patient follow-up. Other authors (Greaves, 1993; Oakley, 1989) using a sociological framework, have critiqued...
approaches to smoking cessation during pregnancy, arguing that they reinforce underly-
ing societal values suggesting that pregnant women should shoulder all of the respon-
sibility for smoking cessation during pregnancy.

In a review of the evidence on smoking during pregnancy and postpartum supported by Health Canada (Edwards et al., 1996), smoking cessation intervention studies were assessed using Windsor’s methodological criteria for smoking during pregnancy. Among the experimental and quasi-experimental intervention studies with a relapse prevention component, only nine measured smoking relapse rates postpartum. Only one of these studies (Faden et al., 1992) included an intervention explicitly designed to target postpartum smoking relapse prevention. However, no details of the intervention were provided and follow-up rates of less than 40% precluded a comparison of study groups. Research recommendations arising from this review included the need to document:

- the natural history of smoking and smoking cessation during pregnancy and postpartum;
- the meaning of smoking in the lives of prenatal and postpartum women;
- the changes in smoking behaviour that occur in the context of the physiological changes of childbearing; and,
- perceptions of social norms concerning smoking during pregnancy and postpartum.

More recently, Windsor et al. (1998) presented a meta-evaluation of research conducted between 1986 and 1998 in the area of smoking cessation provided during pregnancy. Of 23 studies, only 11 had sufficient methodological rigour to produce results with high internal validity. Despite the influence of partners on women’s smoking choices, only a handful of these studies incorporated partner support strategies.

**Review Question and Objectives**

The objectives of this review were:

- To determine the effectiveness of strategies provided during pregnancy and/or postpartum to reduce smoking relapse during the postpartum period.
- To determine whether smoking relapse interventions that target the partner or family members yield any improved benefits over smoking relapse interventions targeting the woman alone.
- To compare the effectiveness of smoking relapse interventions during pregnancy vs interventions during pregnancy and postpartum or during the postpartum period only.

**METHODS**

**Criteria for Study Selection**

All abstracts were reviewed for potential relevance. If there was any doubt about the potential relevance of the article, it was requested. Only articles published in English and French were retrieved. In addition to published articles, copies of six reports/unpublished manuscripts provided by two groups of researchers were reviewed for relevance. In situations where a single study was described across a number of
publications, the cumulative findings from the published research are reported for this single study.

Retrieved articles were assessed for relevance by two independent reviewers using specific criteria. Discrepancies were recorded, discussed and resolved. Articles were defined as relevant if they met all of the following criteria: 1) the study must include an intervention and a control group; 2) the intervention must include strategies targeting postpartum smoking relapse; 3) outcomes must include a measure of postpartum smoking relapse rates; 4) the timing of the intervention must be during pregnancy and/or postpartum; 5) the target of the intervention must be either a woman or her partner or both the woman and her partner.

Search Strategy
Strategies to search electronic data bases for published articles were developed by a professional librarian in collaboration with one project team member. The search strategies were based on our prior experience in completing a systematic literature review for a Health Canada document. Searches were conducted for studies from 1992 to 1998 of MEDLINE, HealthSTAR, CINAHL and PsycINFO. Database-specific search terms were used for each of four areas: smoking cessation and partner support, smoking and breastfeeding, smoking and pregnancy/postpartum, and ETS and children’s health (see Appendix 1).


References cited in relevant articles were reviewed and those thought to be potentially relevant were obtained. Articles were obtained even if they predated the time-span of the search period. Requests for unpublished literature were forwarded to key researchers in the field including Joan Bottorff, Joy Johnson, Daniel Ershoff, Patricia Mullen, Roger Secker-Walker & Richard Windsor.

Review Procedures
Quality Assessment
All relevant articles were assessed by two independent reviewers using the Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project. This tool assesses six component criteria including selection bias, study design, confounders, blinding, validity/reliability of the data collection, and documentation of withdrawals/dropouts. Studies with four strong component ratings and no weak ratings were classified as ‘strong.’ Studies with less than four strong component ratings and one weak rating were classified as ‘moderate.’ Studies with two or more weak component ratings were classified as ‘weak.’

Core Data Extraction and Outcome Assessment
Core data and outcome assessment information were extracted independently by two reviewers using the tool designed for the PHRED reviews. Reviewers consulted with
each other concerning ambiguous or complex information (e.g., intervention descriptions including their timing, duration, and theoretical bases were often difficult to determine).

We were unable to contact authors of reports to obtain an elaborated description of methods or interventions described in the papers. However, we did have available some of the resource materials used by the projects (e.g., interventions booklets) and referred to these as needed to determine whether any relevant aspects of the intervention were missing from the narrative description of the published articles.

RESULTS

Research Results
Of the 177 articles requested, 172 had been retrieved at the time this report was written. Twenty-five articles (14.5%) met the relevance criteria. There were three sets of articles where the same study was described in multiple publications. Thus, a total of 19 research studies were found. There was complete agreement on reviewer’s ratings regarding the relevance of studies. However, there were some discrepancies on the ratings regarding the inclusion of strategies targeting postpartum smoking relapse. These disagreements were resolved through discussion. They were largely attributable to differences of opinion about the inclusion of relapse prevention strategies in the intervention due to the limited detail included in descriptions of interventions.

Among the 147 articles not meeting the relevance criteria, 114 (77.6%) were not intervention studies. Among the 33 (22.4%) intervention articles, seven lacked a control group, and 29 did not include a measure of postpartum smoking relapse rates.

For all intervention articles, the timing of the intervention and the involvement of the woman and/or her partner were documented. Thirty-five (62.5%) of the 52 intervention studies reported an intervention provided exclusively during the pregnancy. The majority of the intervention articles (71.4%) described cessation strategies directed only to the pregnant woman.

Quality Assessment
With respect to global ratings, the two reviewers disagreed on two of the 19 studies (10.5%). One was due to an oversight and the other due to differences in the interpretation of the criteria. Disagreements were resolved through discussion. Of the remaining 17 studies on which overall agreement occurred, disagreement on component ratings was present for ten studies (58.8%). Of these disagreements, five were due to oversights, one was due to differences in the interpretation of criteria and four were due to differences in the interpretation of the study. All disagreements were resolved through discussion.

Findings
Unless otherwise stated, results are drawn from the 19 research studies (summarized in 25 publications) found to be relevant on review. All relevant articles reported relapse rates in the postpartum period. One study was rated as ‘strong,’ three as ‘moderate’ and fifteen as ‘weak’ according to the quality assessment criteria. The most problematic component criterion was assessor/participant’s ‘blinding’ in 15 of the 19 relevant articles, followed by withdrawals/dropouts (11/19), confounders (6/19), selection bias (5/19),
validity/reliability of data collection (4/19) and study design (1/19). It is important to note that of the 16 weak studies, a subset of ten had only two weak component ratings, the minimal requirement for a globally ‘weak’ classification. In eight of these ten articles, ‘blindness’ was rated as weak due to lack of information. These included Gillies et al. (1990); Gielen et al. (1997); Haug, Fugelli, Aarø, and Foss (1994); Hjalmarson, Hahn and Svanberg (1991); Svanberg (1992); Mayer, Hawkins and Todd (1990); Seversen et al. (1997); Wall, Seversen, Andrews, Lichtenstein and Zoref (1995); and Walsh, Redman, Brinsmead, Burne and Melmeth (1997). Had adequate information been provided on ‘blinding’, these otherwise sound articles could have been reclassified to ‘moderate’, thus contributing to a broader and stronger base of information from which to draw conclusions. These eight studies will referred to as ‘borderline’.

A common methodological problem was the difference in the unit of allocation and the unit of analysis. Clinic sites and practitioners were the most common unit of allocation while women were the most common unit of analysis.

Unless otherwise stated, the four strong/moderate studies form the basis for the statements regarding the effectiveness of interventions. The eight borderline studies will be examined for confirmatory evidence. Results are presented in four sections.

- Intervention Strategies
- The Effect of Interventions on Postpartum Relapse and Smoking Behaviour
- Relapse Prevention Among Spontaneous Quitters
- The Role of Partners in Postpartum Smoking Relapse

**Intervention Strategies**

**Strong and Moderate Studies**

The four studies were identified as strong or moderate included intervention strategies that specifically targeted the maintenance of postpartum smoking cessation. Their design and results are summarized in Table 1.

The strong study by Johnson et al. (2000) used an intervention based on Marlatt’s relapse model (Marlatt, 1985) that targeted the postpartum relapse process by building skills for dealing with high-risk situations and providing techniques for dealing with slips. Johnson’s intervention, provided by trained nurses, was rather extensive in counselling about strategies for dealing with cravings, problem solving for high-risk situations, cognitive restructuring of slips, and means of maintaining a smoke-free environment. An initial counselling session that was followed-up by regular telephone contact provided weekly during the first postpartum month, and then biweekly during the second and third postpartum months. Telephone calls were quite short, lasting an average of 4.5 minutes (SD = 1.5 minutes).

Secker-Walker et al. (1994) focused primarily on quitting during pregnancy. The intervention, administered by three trained counselors, included individualized but structured counselling on smoking cessation and maintenance delivered once at the beginning of prenatal care, at 36 weeks gestation, and at six weeks postpartum. The first intervention included risk information, problem solving with respect to the decision to quit, the negotiation of a quit date, strategies for dealing with high risk situations, and the provision of an information booklet on quitting. At 36 weeks gestation and at six weeks postpartum, counselling dealt with the health effects of environmental smoke on
children, parental modelling of smoking behaviour, and efforts to encourage smokers to quit.

As part of the same overall study, Secker-Walker et al. (1998a) examined the effectiveness of a smoking cessation (relapse prevention) intervention and provided relapse prevention training (Secker-Walker et al., 1998b). Trained physicians delivered structured advice during the first prenatal visit to women in the control and intervention groups. Structured physician advice given to women who were still smoking at their first prenatal visit included the following elements: describing the risks of smoking, acknowledging the problem, providing support, obtaining a commitment to quit or reduce, and explaining the cessation program. Women in the intervention group were referred to the smoking cessation intervention. In the relapse prevention study (Secker-Walker et al., 1998b), the same structured physician advice was given to women who had spontaneously quit smoking before the first prenatal visit, except that emphasis was placed on the importance of staying quit and an information booklet was provided. Women in the intervention group were referred to the relapse prevention intervention. Interventions were delivered by trained nurses. In both studies, interventions were delivered at the first, second, third, and fifth prenatal visits, and again at the 36th week of pregnancy. No postpartum counselling was provided. The duration of counselling sessions was not described although an article referenced by the authors suggests that trained residents take less than five minutes to administer a similar intervention (Secker-Walker, Solomon, Flynn, et al., 1992). The control groups received ‘usual care’ which consisted of the structured advice only.

Wakefield and Jones’ (1998) intervention involved the provision of one-to-one counselling and written material once at the first prenatal visit and again in-hospital after the delivery. The intervention was provided by midwives. The prenatal counselling session involved a discussion centered around a physical model simulating fetal heart rate changes in response to smoking by the mother. Advice and booklet information were also given on the risks of smoking for the woman and the fetus, how to quit smoking, and how to avoid relapse. An information booklet was provided for smoking partners. After delivery and before leaving hospital, further advice was provided on infant health and other issues such as breastfeeding and weight loss.

Borderline Studies
The intervention strategies for the eight borderline studies along with the remaining eleven studies included in this review are summarized in Appendix 2. Only one study made reference to a theoretical basis for selecting a self-help strategy (Gielen et al., 1997). All eight studies provided interventions that incorporated some form of relapse prevention. Six of the seven studies focused their interventions on pregnant women. Two exclusively targeted the postpartum period (Seversen et al., 1997; Wall et al., 1995).

Five of the six pregnancy interventions consisted of an initial counselling or advice session in early pregnancy when the women were trained to use self-help material (Gielen et al., 1997; Gillies et al., 1990; Haug et al., 1994; Mayer et al., 1990; Walsh et al., 1997). The self-help material typically consisted of formal guides such as the Windsor guide (Gielen et al., 1997; Gillies et al., 1990; Haug et al., 1994; Hjamarlson et al., 1991; Mayer et al., 1990; Walsh et al., 1997) or material adapted from a variety of sources including the American Cancer Society, American Lung Association, and the American Health Foundation. Hjamarlson et al. (1991) distributed the Windsor guide
without offering any training or follow-up sessions. Three of the pregnancy interventions provided only one initial counselling session lasting a maximum of 15 minutes (Gielen et al., 1997; Gillies et al., 1990; Haug et al., 1994). One study provided advice and training on self-help guides for participants early in pregnancy and again at delivery (Gielen et al., 1997; Walsh et al., 1997). In two studies, encouragement and risk information were provided by the physician during hospital pregnancy visits (Haug et al., 1994), during 36 week pre-pregnancy visits (Walsh et al., 1997), or by letters of encouragement (Gielen et al., 1997).

Seversen et al. (1997) and Wall et al. (1995) described postpartum interventions. The minimal care condition administered to all women included written material on the adverse effects of passive smoke and a letter from the pediatrician describing his/her concern about the consequences of passive smoke. The extended intervention consisted of two minutes of advice and written brochures provided at well-baby visits in postpartum week two, month two, month four, and month six. At these visits, women were given a videotape (and VCR) demonstrating the detrimental health effects of passive smoke and the benefits of quitting. Mothers were also provided with no-smoking signs to put on the crib and fridge. Educational material focused on the health effects of quitting, strategies for quitting, role modelling, and a letter to the father.

Other intervention strategies described included behavioural contracting to establish a quit date (Mayer et al., 1990; Seversen et al., 1997; Wall et al., 1995; Walsh et al., 1997), rewarding cessation (e.g., eligibility to enter a lottery based on biochemically validated abstinence, Walsh et al., 1997), social support offered by inviting participation of accompanying adults in the program (Walsh et al., 1999) and self monitoring (Gillies et al., 1990; Mayer et al., 1990).

In summary, interventions were delivered by a variety of health care professionals including, trained counselors (Gielen et al., 1997); pediatricians, nurses, general practitioners, and obstetricians with or without formal training in the study intervention (Haug et al., 1994; Hjamarlson et al., 1991; Seversen et al., 1997; Wall et al., 1995; Walsh et al., 1997), designated researchers (Gillies et al., 1990) and health educators (Mayer et al., 1990). Interventions were delivered in a number of settings including antenatal clinics (Gielen et al., 1997; Gillies et al., 1990; Hjamarlson et al., 1991), and general and specialist physician practices (Haug et al., 1994; Seversen et al., 1997; Wall et al., 1995).

The Effect of Interventions on Postpartum Relapse and Smoking Behaviour

Strong and Moderate Studies

Postpartum Interventions

In a Canadian study, Johnson et al. (2000) enrolled postpartum women who had quit spontaneously during their pregnancy. This was the only strong/moderate study reporting an intervention provided exclusively during the postpartum period. The individually tailored intervention involved weekly follow-up telephone counselling for the first postpartum month, and bi-weekly follow-up telephone counselling during the second and third postpartum months. The control group received ‘usual care.’ Smoking cessation was verified through exhaled carbon monoxide testing at baseline, six months and 12 months postpartum (Ratner et al., in press). There were no significant differences in the number of cigarettes smoked between the intervention and control groups at six or 12 months postpartum. Nor did the intervention have a significant
impact on biochemically validated relapse rates at six or 12 months postpartum. However, significantly more women in the control group (41.7%) compared to the intervention group (24.8%) relapsed within the first 12 weeks postpartum (p<.05). Johnson et al. (2000) also completed a logistic regression analysis to control for significant confounding variables (self-efficacy, number of quit attempts, and exposure to other smokers). Absolute abstinence was defined as a carbon monoxide reading of less than 10 ppm. Relative to the control group, membership in the intervention group was protective against relapse at six months postpartum with an odds ratio for relapsing of 0.52 (95% CI 0.29, 0.93) for the intervention group. The presence of social contacts who smoke was the most important covariate (OR=2.97; 95% CI 1.38, 6.40). Self-efficacy (OR=.97; 95% CI 0.96, 0.99) and number of previous quit attempts (OR=1.12; 95% CI 1.01,1.24) had weaker effects. At 12 months postpartum, the intervention group had significantly higher self-efficacy scores than the ‘usual’ care group, suggesting a steady decline in self-efficacy for the ‘usual’ care group across all 12 months, but a stabilization in self-efficacy scores for the intervention group between six and 12 months postpartum. Continual breastfeeding to 12 months postpartum, high mental health scores, and non-smoking partners all provided a protective effect against relapse at 12 months postpartum (with relapse defined as a self-reported return to daily smoking).

Prenatal Interventions
An American study of cessation strategies in combination with relapse prevention yielded slightly different results. Secker-Walker et al. (1998a, 1998b) enrolled pregnant women who smoked at least one cigarette per day at their first prenatal visit into a smoking cessation program, and women who had spontaneously quit before their prenatal visit into a relapse prevention intervention. Physicians and nurses delivered individual counselling and structured advice on five prenatal visits up to the 36th week gestation. No interventions were provided during the postpartum period. None of the postpartum smoking data were biochemically validated. At one year postpartum, significantly more women receiving the cessation intervention reported not smoking or a reduction in consumption of at least 50% compared to women receiving ‘usual care’ (OR = 2.26; 95% CI 1.14, 4.49). Significantly fewer intervention (36.8%) than control women (50.9%) reported increased cigarette consumption (OR =.56; 95% CI .33, .96). However, there was no significant difference in relapse rates between women in the intervention and control groups (55% vs 48%) even after controlling for confounding variables in a logistic regression analysis.

In a similar study (Secker-Walker et al., 1994), women received individualized but structured counselling on smoking cessation and maintenance, during pregnancy and at six weeks postpartum. Postpartum abstinence rates were assessed at various time points up to 54 months postpartum. Overall, there were no significant differences in postpartum quit rates between control and intervention groups. In a stratified analysis, only data from a Maternal Infant Care clinic, and not data from privately funded clinics, indicated that significantly more intervention than control women remained continuously abstinent at 36 months postpartum (10.1% vs 1.3%, p<.05). The authors offer no theoretical reason for the differential effect except to suggest that since the Maternal Infant Care clinics serve a lower income clientele, lack of money to buy cigarettes along with counselling may have accounted for the effectiveness of the intervention in this sub-group. Self-reported smoking rates were not biochemically validated and the subgroup differences may reflect differential over-reporting of quit rates between the two groups.
The last moderate study (Wakefield & Jones, 1998), targeted pregnant women who smoked at least two cigarettes per day. The first intervention, administered one-on-one at the first prenatal visit by midwives, included the provision of advice and booklet information on the health risks of smoking, strategies for quitting and avoiding relapse. After delivery and before leaving hospital, the women were again reminded of the above issues and were also given advice and booklet information on weight loss and breastfeeding. No significant differences in quit attempts or in continuous cessation were found either during pregnancy or at six month follow-up.

Borderline Studies
In parallel with the strong/moderate studies, the borderline studies showed mixed effects. The intervention described by Wall et al. (1995) intervention emphasized extended postpartum quitting and relapse prevention in addition to a minimal smoking cessation intervention during pregnancy. Women who were smokers one month prior to becoming pregnant were enrolled at two weeks postpartum. Significantly lower relapse rates (45% vs 55%) and higher quit rates (5.9% vs 2.7%) were found for the extended care group compared to minimal care at six months postpartum. Using the same methodology, Seversen et al. (1997), showed that the significant effect of intervention on relapse rates at six months postpartum dissipated by the 12th postpartum month. Svanberg (1992) provided a multi-component self-help program and found that there were more continuous quitters in the intervention group (10.4%) compared to the control group at eight weeks postpartum (5.2%, OR=0.50; 95% CI 0.30; 0.90). Gillies et al. (1990) provided a multi-component intervention with counselling, literature and carbon monoxide self-monitoring, but the timing and frequency of intervention components were not described. They found that the intervention resulted in significantly more women in the intervention group (18%) than the control group (11%) being continuously abstinent until six months postpartum (p<.05). Gielen et al. (1997) were unable to analyze six month postpartum data because so few women had quit smoking (n=13 for the experimental and control groups combined). Haug et al. (1994) provided pregnant women with a 15-minute advice session accompanied by Windsor’s self-help guide (Windsor & Smith, 1991) and health care professional reinforcement. They found no significant differences in continuous abstinence rates between intervention and control groups and reported drop-out rates of over 50%. Mayer et al. (1990) found no significant differences between two intervention groups and a control group in relapse rates at five weeks postpartum. Walsh et al. (1997) reported significantly more self-reports of abstinence in the intervention group (10%) compared to controls (1%, p=.006) at six months postpartum. Biochemically confirmed cessation rates were 8% in the intervention group and 0% in the control group (p=.004).

Overall, findings in the remainder of the weak studies provide minimal support for the effectiveness of intervention strategies in preventing postpartum relapse. However, interventions minimally targeted post partum relapse and were not adequately grounded in theory. Half of these studies found no effect of intervention on relapse rates (Gebauer et al., 1998; Mullen et al., 1990; Secker-Walker et al., 1995; Vineis et al., 1993). A few found significant effects (Lillington, 1997; Petersen et al., 1992; Langford et al., 1983) but suffered from serious methodological flaws. Walsh et al. (1997), the strongest of these studies, made use of a multi-component smoking cessation program involving self-help components and counselling administered twice during the pregnancy. Results indicate significant, but modest effects on continued smoking cessation at six months postpartum.
Relapse Prevention Among Spontaneous Quitters
Few studies in this literature review specifically examined spontaneous quitters as a sub-population of pregnant women with differential intervention needs. All of the women in the strong study reported by Johnson et al. (2000) were spontaneous quitters. However, none of the moderate studies dealt with spontaneous quitters. Of the borderline studies, Gillies et al. (1990) reported that relapse prevention strategies had their greatest effect among spontaneous quitters compared to women who quit with the help of cessation interventions. Among the early/spontaneous quitters, significantly more were still abstinent at six months postpartum (77% (64/83) in the intervention than in the control group (29% (14/49). No significant differences in quit rates were reported for women who quit with the aid of the intervention compared to controls. These cessation rates were not biochemically validated. Of the weak studies, Mullen et al. (1990) found no significant differences in relapse rates over the first six postpartum months between intervention and control groups for spontaneous quitters (38.3% and 36.4%, respectively) or for baseline smokers (33.3% and 42.8%, respectively). Postpartum data were not biochemically validated. Petersen et al. (1992) reported that a self-help intervention with greater clinician involvement was successful in reducing relapse rates compared to controls for both spontaneous quitters and baseline smokers. In contrast, the self-help intervention without extended clinician involvement had a significant impact on relapse rates only for the baseline smokers.

The Role of Partners in Postpartum Smoking Relapse
Limited or absent partner involvement in interventions was common across all studies. A few studies included minimal strategies targeting male partners such as sending a letter to the partner (Wall et al., 1995) or providing women with written material which they were encouraged to share with their partner (Wakefield & Jones, 1998). In the latter study, partners were not directly involved in treatment, but rather were given a booklet through the woman. Although significantly more intervention than control partners reported attempting to quit during pregnancy, no significant between-group differences in self-reported smoking by partners were found at six months postpartum follow-up. Postpartum quit rates for women did not differ between groups. None of the weak studies involved partners in the intervention nor assessed partner support. No studies encouraged the participation of other family members in supporting a woman’s smoking cessation efforts.

DISCUSSION
Discussion of the results is based on the four strong/moderate studies that emerged from the quality assessment. The conclusions drawn from these studies were confirmed on the basis of the sub-group of borderline studies. Postpartum smoking relapse prevention strategies have most often been part of research studies which focused primarily on smoking cessation during pregnancy. In most of these studies, relapse prevention strategies are poorly described, lack a theoretical base and consist of brief, infrequent or diluted interventions provided in an antenatal clinic setting. They also neglect potentially important determinants of abstinence such as the importance of negotiating environmental tobacco smoking rules in the home, obtaining the support of partners, family and friends to remain abstinent and encouraging/assisting women to rethink their non-smoking strategies in relation to being a new mother rather than being pregnant. Early/mid-pregnancy has been the most common time period for delivering
relapse prevention strategies. Most interventions were provided by practitioners whose practice was predominantly focused on the health of pregnant women. Both of these factors may have inadvertently conveyed a message that smoking cessation efforts are important only during pregnancy.

**Effectiveness of Interventions**

**Strong/Moderate Studies**

The four strong/moderate studies provide emerging evidence that interventions targeting postpartum relapse prevention can be effective in reducing relapse rates (Johnson et al., in press; Secker-Walker et al., 1994; Secker-Walker et al., 1998a, 1998b; Wakefield & Jones, 1998). These studies suggest that theoretically based, multi-component interventions that involve multiple levels of the health care system and are delivered over an extended period of time may be effective in preventing smoking relapse among postpartum women. In contrast, interventions limited in intensity and duration will fare no better than the usual prenatal physician advice.

Johnson et al. (2000) provides the most convincing evidence that postpartum relapse prevention strategies can be effective. Using Marlatt’s relapse prevention model (1985) as a basis for their intervention, Johnson et al. (2000) showed that relapse can be effectively reduced. Importantly for future research, they demonstrated the need to control for confounding variables, especially the number of social acquaintances who smoke. Neither Secker-Walker et al. (1994) nor Wakefield and Jones (1998) showed significant effects of the interventions on relapse. The latter studies suggest that focusing an intervention primarily on the pregnancy period will not protect against postpartum relapse even if attention is drawn to relapse issues.

The timing of relapse prevention interventions is an important issue requiring further study. Johnson et al. (2000) and Ratner et al. (2000) found increased smoking rates from six months to 12 months postpartum in both intervention and control groups and concluded that, overall, the intervention exercised no impact on some women and acted primarily by delaying relapse in others. These findings suggest a need to extend interventions and measure effectiveness beyond six months postpartum. Six months postpartum may represent a crucial transition point marked by the return to work, reduction in the social pressure to remain abstinent, and increased exposure to biopsychosocial factors that were previously associated with smoking (Edwards et al., 1996; Edwards & Sims-Jones, 1998). The importance of providing interventions in the postpartum period still may not be widely accepted. In the discussion of their non-significant results, Secker-Walker (1998a, 1998b) concluded that interventions provided during the prenatal period should be more intensive. However, Johnson et al. (2000) suggest that more complex and intensive interventions should be delivered over a longer postpartum period in order to provide skills for maintaining lasting abstinence.

The examination of predictors of relapse at different follow-up periods is important in developing interventions that can appropriately differentiate and target short-term and long-term risk factors for relapse (Edwards et al., 1996). The Johnson study (Johnson et al., in press; Ratner et al., in press) showed that low self-efficacy and number of quit attempts were uniquely predictive of relapse at six months postpartum while breastfeeding and mental health were unique predictors of relapse at 12 months postpartum. In contrast, social support and pre-pregnancy smoking intensity were important predictors throughout the one year postpartum period. At six months postpartum, the impact of social support was expressed more generally in the number of
social contacts who smoked. By the end of one year postpartum, the supportive role of the woman’s partner emerged as a more crucial factor in the maintenance of smoking abstinence. These data add to the growing body of evidence demonstrating that the partner’s smoking status and support are key determinants of a pregnant and postpartum woman’s smoking choices (Edwards & Sims-Jones, 1998; Gwede, et al., 1992; Haug, 1992; Seversen, et al., 1997; Wergelend, Strand and Bjerkedal, 1996). Confidence in remaining abstinent, and breastfeeding are other predictors that have also received support in the literature. Unfortunately, the relative importance of these predictors cannot be properly evaluated because of the lack of research (Edwards et al., 1996; Windsor et al., 1998). More importantly, our knowledge base of predictors will remain fragmented until a coherent theory of smoking behaviour, cessation, and relapse among pregnant/postpartum women is developed to explain why and how smoking behaviour evolves before, during, and after pregnancy.

**Borderline Studies**

Wall et al. (1995) and Seversen et al. (1997) provide the most convincing evidence among weak studies that postpartum relapse prevention strategies can be effective. Wall et al. (1995) found significantly lower postpartum relapse rates in the extended intervention compared to the minimal intervention. Importantly, their reduced relapse rates (45%) for the intervention group were lower than those reported for postpartum women in general (60%). Although Johnson et al. (2000) provided more counselling sessions than did Wall et al. (1995), the former were telephone calls while the latter were face-to-face interviews. In addition, Johnson’s interventions ended earlier in the postpartum period (third postpartum month) while Wall’s continued until the sixth postpartum month. However, by 12 months postpartum, women who received the extended intervention were just as likely to have relapsed as women in the control group (Seversen et al., 1997). These studies lend some support for the argument to offer interventions beyond six months postpartum and continue follow-up for at least 12 months post-delivery.

Most of the weak studies cited resisting urges or temptations to smoke as the major skill training component of relapse prevention strategies. Booklets and pamphlets were often provided as self-help intervention support material with minimal advice or counselling. Several authors provided videos, while others gave women posters or cards to display in their homes indicating a smoke-free environment. The few studies reporting compliance found low to moderate participation. There is no evidence to suggest that these interventions, when used alone, change smoking relapse rates either late in the pregnancy or within the first six months following a mother’s delivery.

**Methodological Issues**

The appropriate design of intervention studies is crucial to improving our understanding of postpartum relapse prevention. It is hoped that the development and use of criteria for evaluating the design and methodology of intervention studies will promote better research. Salient issues encountered in this literature review include intervenor/participant blindness with respect to conditions and the use of experimental designs, validation of outcome measures, selection bias, control over confounding variables (statistically or methodologically), and drop-outs. There is also a need for more complete descriptions of the interventions and the training given to those responsible for administering the interventions.
Confirmed self-reported smoking abstinence using some form of biochemical monitoring is generally supported (Windsor, Boyd, & Orleans, 1998). The meta-analysis of intervention research reported by Windsor et al. (1998) is particularly timely in suggesting that while biochemical monitoring is an important requirement in the validation of self-reports of smoking behaviour, its exclusive use for validating group differences in smoking intensity may be inappropriate since the metabolism of nicotine may vary significantly on the basis of factors unrelated to smoking intensity. The metabolism of nicotine may in fact differ on the basis of age (Swan, Habina, Means, et al., 1993) and race (Wagenknecht, Cutter, Haley, et al., 1990).

There have been few attempts to undertake economic analyses of alternative smoking cessation programs for pregnant women. Cost-effectiveness studies of relapse prevention strategies are needed in the future. Windsor et al. (1998) raise the question of whether providing spontaneous quitters with relapse prevention programs for pregnant smokers would be as cost-effective as smoking cessation interventions.

**Spontaneous Quitters**

The four strong/moderate studies provided no useful research data on spontaneous quitters. Johnson et al. (2000) did not include a sample of non-spontaneous quitters for comparison with their spontaneous quitters. Secker-Walker et al. (1998b) found that their intervention was unsuccessful in preventing relapse in spontaneous quitters over and above the effectiveness of ‘usual’ care. Unfortunately, no comparison was made between these women and baseline smokers who had quit with the help of the intervention in a parallel study (Secker-Walker et al., 1998a). Among the borderline studies, only one study (Gillies et al., 1990) provided some data on spontaneous quitters. Although these authors reported that the relapse prevention intervention had its greatest effect among spontaneous quitters compared to women who quit with the help of the intervention, the comparative data were not provided. None of the weak studies (Mullen et al., 1990; Petersen et al., 1992) found any differential treatment effects on relapse rates between spontaneous vs non-spontaneous quitters.

Some research suggests that early spontaneous quitters remain abstinent longer than late spontaneous quitters (Fingerhut et al., 1990; Sexton et al., 1987), but data contrasting spontaneous quitters with women who quit with the aid of an intervention is lacking. Although quitting early in pregnancy and without the help of an intervention seems to provide a unique window of opportunity for offering relapse prevention strategies, the apparent ease with which some spontaneous quitters change a complex behaviour like smoking may lead to unrealistically high self-confidence in remaining abstinent. As a consequence, the perception may arise that relapse prevention strategies are unnecessary. Spontaneous quitters may be particularly susceptible to peer pressure for quitting during pregnancy, and may become vulnerable to relapse as societal pressure to remain abstinent decreases and the social-behavioural-cognitive issues that were previously associated with smoking, regain prominence (Edwards et al., 1996; Edwards et al., 1997).

**Theoretical Basis for Relapse Prevention**

With the exception of the Johnson et al. (2000) study, few authors referred to a theoretical model in describing the development of their relapse prevention interventions. The meaningful interpretation of data and the development of effective treatment models require a theoretical framework. Social learning theory guided an intervention described
CONCLUSIONS

There is emerging evidence that multi-component postpartum relapse prevention strategies of sufficient intensity can reduce relapse rates. Few studies provided in-depth information on the duration and content of training programs. The optimal timing of relapse prevention strategies (early, mid or late pregnancy; or postpartum) and the optimal frequency of interventions have not yet been determined. Patient characteristics may be important in determining the type and timing of appropriate interventions. Future research should examine tailored strategies for sub-groups of women, such as spontaneous quitters, who may require different types of support and interventions to achieve continued postpartum smoking abstinence. Successful relapse prevention requires a more holistic approach targeting the various stages of cessation and abstinence that may be present during and after pregnancy. Interventions should be applied in a more systematic way by involving all levels of the health care system that come in contact with women and their partners during pregnancy and postpartum to ensure maximal effectiveness. Successful relapse prevention will also include a broader network of support for the mother, principally direct treatment involvement by the partner. In the end, only a sound theoretical basis for an intervention will permit the development of effective and efficient strategies.

Implications for Practice

Postpartum smoking relapse prevention interventions cannot be appropriately targeted unless screening procedures are in place to assess the smoking history of pregnant women. Screening procedures should include questions about the smoking status of a woman’s partner and ETS exposure. Screening may uncover sub-populations such as spontaneous quitters who require specialized interventions. A more holistic approach that directly incorporates the partner in the quitting/abstaining process is required since it is known that women whose partners smoke are more likely to resume smoking than those with non-smoking partners. The former group may require more intensive postpartum relapse prevention interventions with strategies reflecting the partner’s influence.

Relapse prevention strategies should be considered an integral part of smoking cessation programs. However, to be effective, relapse prevention interventions must be theoretically sound and of adequate intensity to support women in their resolve to remain abstinent. It appears unlikely that a brief counselling session added on to a postpartum home visit or a telephone call will provide the intensity of intervention required to reduce the risk of relapse. Furthermore, postpartum smoking relapse prevention strategies should address the myriad of influences on a woman’s decision about smoking which are specific to the transitions she experiences during the postpartum period.

Because a substantial proportion of women who stop smoking during pregnancy resume smoking postpartum, smoking relapse prevention strategies need to be provided in combination with effective measures to reduce household ETS exposure among young infants and children.
Implications for Research

Future research is needed to test theoretically sound interventions which are convergent with relevant research including the role of the partner in smoking cessation, links between smoking and infant feeding choices, effective strategies to reduce ETS exposure in the home, role transitions experienced by new parents, relapse prevention strategies examined in the addictions literature, the effectiveness of multi- vs single-component interventions and differences in social norms regarding smoking during pregnancy and postpartum. Future research should examine tailored strategies for sub-groups of women requiring different types of support and interventions to achieve continued smoking cessation postpartum (e.g., women who quit spontaneously vs those who quit with a smoking cessation program; women with smoking vs non-smoking partners; women intending to bottlefeed vs women planning to breastfeed).

Studies should be methodologically sound in order to permit valid conclusions. Sample sizes with adequate power, blinding to ensure internal validity, and adequate periods of follow up are essential. Although attrition is inevitable, a thorough explanation of the reasons for attrition permits a better understanding of sample bias. The ‘dose’ of intervention received by patients needs to be documented (e.g., number and length of counselling sessions). To aid data interpretation, a variety of outcome measures need to be assessed including relapse rates, number of cigarettes smoked daily, patterns of smoking, partner’s smoking status during pregnancy and postpartum, home rules regarding environmental tobacco smoking and their enforcement in the home, levels of environmental tobacco smoke exposure in the home, and cessation self-efficacy. Since pregnant women are subject to societal pressure to remain abstinent, validation of self-reports using biochemical procedures is crucial to permit confident conclusions concerning the effectiveness of interventions. Controlling for confounding variables, especially the number of social contacts who smoke, age, and education is also important.

Finally, comparative studies are needed to examine the cost-effectiveness of relapse prevention strategies vs pregnancy cessation programs and to assess the provision of relapse prevention strategies by various types of health care providers such as public health nurses, pediatricians, lay health visitors, midwives, and prenatal class teachers.

Key Messages

- **Relapse prevention can make a difference**
  There is limited emerging evidence suggesting that a theoretically based, multi-component intervention of sufficient intensity, provided during the postpartum period can have a modest effect on patterns of smoking relapse at six months postpartum. The effect dissipates by 12 months postpartum, suggesting that current interventions are initially unsuccessful for some individuals and only delay relapse for others.

- **Studies lack a sound theoretical basis for proposed interventions**
  In most of the relevant studies, relapse prevention strategies are poorly described, lack a theoretical base, and consist of brief and/or infrequent interventions provided in an antenatal clinic setting. Resisting urges or temptations to smoke is frequently cited as the major skill training component of relapse prevention strategies. There is no evidence to suggest that these interventions, when used alone, significantly
change smoking relapse rates either late in the pregnancy or within the first six months following a mother’s delivery.

- **Interventions are inappropriate for the complex nature of smoking and relapse**
  In general, relapse prevention interventions are overly simplistic. Although some authors make reference to behavioural and cognitive determinants of smoking, the actual interventions do not reflect the complexity of issues involved in smoking-related choices. The components of the interventions do not reflect what authors describe as key dimensions of the problem. Teaching women how to resist urges to smoke and how to avoid situations where they are tempted to smoke does not provide an adequate set of skills to maintain cessation status during pregnancy or postpartum. In addition, these studies typically made use of self-help methods with a very limited number of counselling sessions often lasting between two and 15 minutes, provided by a range of practitioners with limited or unknown training. A more holistic approach to smoking relapse prevention would address the role of partners and other family members in helping the mother maintain smoking cessation during the postpartum period.

- **Appropriately targeting behaviour with appropriate frequency and timing**
  There is a need to develop treatments that effectively target the various behavioural/cognitive stages that underlie the evolving nature of pregnancy/postpartum periods and the various stages of quitting/abstinence. The optimum timing (early, mid or late pregnancy; and/or postpartum), frequency, and mix of postpartum smoking relapse prevention strategies have not yet been determined. In most studies, interventions target pregnancy and ignore the importance of the postpartum period in affecting the health of both mother and child.

- **Outcome measures need to span the range of behaviours**
  The effectiveness of an intervention should be measured using a wide range of outcomes for both the mother and her partner during pregnancy and postpartum, e.g., the number of cigarettes consumed per day, patterns of smoking, environmental tobacco smoking rules and their enforcement in the home, levels of environmental tobacco smoke exposure in the home and perception of risk.

- **Need to identify sub-populations that exhibit differential sensitivity to interventions**
  Future research should examine tailored strategies for sub-groups of women requiring different types of support and intervention to achieve continued smoking cessation postpartum. Spontaneous quitters may exhibit a different window of opportunity for relapse prevention. Some research shows that spontaneous quitters have higher levels of self-efficacy than warranted. As a result, they may be more susceptible to postpartum risk factors for relapse. Their needs should perhaps be addressed differently than women who quit smoking in the course of a treatment program. Demographic factors such as age and education play a differential role in adherence and success.
## Table 1: Included Studies
### Summary of Strong and Moderate Articles

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Intervention</th>
<th>Outcomes/Results/Comments</th>
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</table>
| Johnson et al.,  | RCT with postpartum women who quit smoking     | Counseling based on Marlatt relapse model included information on risks of smoking, skills to deal with high risk situations and cognitive restructuring to deal with slips, information on maintaining a smoke-free environment. After the in-hospital intervention, 8 telephone sessions, weekly during the first postpartum month and biweekly in the two subsequent months, were designed to help maintain smoking cessation. | Relapse rates 6 months postpartum:  
1) Non-significantly more self-reports for controls (71.4%) compared to intervention women (60%)(OR=0.60, 95% CI, 0.35 to 1.02)  
2) Non-significantly more controls (73%) than intervention women (62.4%) after carbon monoxide validation had smoked at all (OR=0.61, 95% CI, 0.36 to 1.05)  
3) Significantly more controls (41.7%) self-reported relapsing within 12 weeks of delivery compared to the intervention group (24.8%; p<.05)  
4) After controlling for confounders i.e. baseline self-efficacy, number of social contacts who smoke and number of quit attempts, the intervention was found to significantly reduce the risk of postpartum relapse by 50% (OR=0.52, 95% CI, 0.29 to 0.93)  
Relapse rates 12 months postpartum:  
Of those who were abstinent at 6-months postpartum, non-significantly more biochemically validated controls relapsed to daily smoking (23.1%) compared to the intervention (19.8%)  
Smoking regularly at 6 months postpartum:  
Non-significantly more biochemically validated reports among smokers in the control group (34.9%) compared to smokers in the intervention group (24.0%) (OR=0.59, 95% CI, 0.34 to 1.02)  
Smoking regularly at 12 months postpartum:  
Non-significantly more biochemically validated reports among smokers in the control group (50.4%) compared to smokers in the intervention group (41.2%) (OR=0.69, 95% CI, 0.41 to 1.15) |
<p>| 2000             | women who quit smoking during pregnancy        |                                                                              |                                                                                          |
| Ratner et al.,   |                                               |                                                                              |                                                                                          |
| 2000             | RCT with postpartum women who quit smoking     |                                                                              |                                                                                          |</p>
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<th>Study</th>
<th>Design</th>
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<th>Outcomes Results/Comments</th>
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<tr>
<td>Johnson et al., I</td>
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<td><strong>Self-efficacy at 6 months postpartum:</strong> No significant between-groups differences in smoking cessation self-efficacy after controlling for baseline self-efficacy</td>
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</table>
| 2000             |              |                                                                              | **Self-efficacy at 12 months postpartum:** 1) Habit/addictive subscale was significantly greater for intervention women (mean=83.3,SD=20.7) than for controls (mean=76.3,SD=22.9) p=.01  
2) Negative/affective subscale was significantly greater for intervention women (mean=62.6,SD=33.0) than for controls (mean=52.2,SD=34.0) p=.02  
3) Positive/social subscale was marginally significantly greater for intervention women (mean=65.1,SD=30.2) than for controls (mean=58.0,SD=27.3) p=.06  
**Variables that account for daily smoking at 12 months postpartum:** A logistic regression found that continual breastfeeding to 12 months postpartum and high mental health scores promoted avoidance of daily smoking. Smoking partners increased likelihood of daily smoking by 1.8 times. Amount smoked prior to pregnancy was also predictive in that each additional cigarette smoked per day resulted in a 4% increase in the likelihood of daily smoking |
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<th>Study</th>
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| Secker-Walker et al., 1994  | RCT with women at less than 25 weeks gestation who smoked at least one cigarette per day | Individualized but structured counseling on smoking cessation and maintenance delivered primarily during prenatal care. Included risk information, problem solving with respect to decision to quit, quit date and strategies, booklet. At 36-week gestation and 6 weeks postpartum, counseling dealt with health risks and parental modelling on child, and efforts to encourage smokers to quit. | Abstinence (quit) rates during pregnancy: 36 weeks: non-significantly more intervention women (15.4%) than controls (11.5%) were abstinent in previous 24 hours; no significant differences in cotinine levels  
Abstinence (quit) rates postpartum: 1) 8-15 months: non-significantly fewer intervention women (13.5%) than controls (16.7%) (non-validated)  
2) 16-24 months: non-significantly fewer intervention women (10.9%) than controls (12.3%) (non-validated)  
3) 25-54 months: non-significantly more intervention women (8.9%) than controls (2.9%) (non-validated)  
4) 8-54 months postpartum: non-significantly more intervention women (10.8%) than controls (9.7%) (non-validated)  
5) 36 months postpartum: For women cared for in the Maternal-Infant Care clinic, significantly more in the intervention group (10.1%) compared to controls (1.3%, p< .05) (non-validated)  
6) 54 months postpartum: For women cared for in the Maternal-Infant Care clinic, significantly more in the intervention group (14.5%) compared to controls (2.5%, p<.01) (non-validated)  
7) No significant differences for the private clinics (non-validated)  
Relapse rates postpartum: 36 weeks gestation to 54 months postpartum: non-significantly more intervention women (73.9%) than controls (61.9%) of the intervention group (non-validated) |
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<th>Study</th>
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<tr>
<td>Secker-Walker et al., 1998a, 1998b</td>
<td>RCT with pregnant women who smoked at least 1 cigarette/day at their first prenatal visit</td>
<td>Structured advice by physician on risks of smoking, acknowledging the problem, providing support, obtaining a commitment to quit or reduce, explaining the cessation program. Individual counselling delivered by trained nurse on ways of achieving and maintaining cessation at first, second, third and fifth prenatal visits, and again at 36th week. No postpartum counseling.</td>
<td>Setting a quit date at first prenatal visit: Significantly larger proportion of intervention women (53.8%) agreed compared to controls (11.2%, p&lt;.001) Agreement at first prenatal visit to decrease consumption Significantly larger proportion of intervention women (26.9%) agreed compared to controls (6.0%, p&lt;.001) Smoking frequency during pregnancy (36-week visit): 1) Non-significantly more cigarettes/day for controls (11.5 ± 7.8) than for intervention women (10.2 ± 8.4) (validated) 2) Since first prenatal visit, significant reduction in cigarettes/day in the intervention women (-3.3 ± 7.5) p&lt;.001) but not in the controls (-0.5 ± 7.5) (validated) 3) No significant between-group differences in exhaled carbon monoxide Smoking frequency one-year postpartum: 1) Non-significantly more cigarettes/day for controls (15.3 ± 8.4) than for intervention women (13.3 ± 10.1) (not validated) 2) Non-significant reduction in cigarettes/day in the intervention women (-0.4 ± 9.9) but a significant increase in the controls (+2.8 ± 8.0, p&lt;.01) (not validated) Abstinence (quit) rates at second prenatal visit: 1) Significantly more intervention women (14.6%) than controls (5.2%, p=.01) had quit as confirmed by carbon monoxide test 2) Significantly more intervention women (43.1%) than controls (29.3%, p=.02) had quit or reduced consumption by at least half</td>
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<td>Study</td>
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<tr>
<td>Secker-Walker et al., 1998a, 1998 (continued)</td>
<td>Abstinence (quit) rates during pregnancy (36 week visit):</td>
<td>1) Non significantly more intervention women (51%) than controls (45%) who had made at least one quit attempt (validated)</td>
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<td>Abstinence (quit) rates one-year postpartum:</td>
<td>2) Non significantly more intervention women (14.1%) than controls (9.9%) who reported not smoking (validated)</td>
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<td></td>
<td>Relapse rates during pregnancy:</td>
<td>3) Non significantly more intervention women (8.1%) than controls (3.5%) who were continuously abstinent since second prenatal visit (validated)</td>
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<td>Transient relapse rates during pregnancy:</td>
<td>4) Significantly more intervention women (40%) than controls (24.8%) reported not smoking or a reduction in consumption by at least 50% (OR=2.02, 95% CI, 1.21 to 3.38) (validated)</td>
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<td>Relapse rates one-year postpartum:</td>
<td>1) Non-significantly more intervention women (18.4%) than controls (10.4%) who reported not smoking (not validated)</td>
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<td>Relapse rates during pregnancy:</td>
<td>2) Significantly more intervention women (26.3%) than controls (13.6%) reported not smoking or a reduction in consumption by at least 50% (OR=2.26, 95% CI, 1.14 to 4.49, p&lt;.03) (not validated)</td>
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<td>Transient relapse rates during pregnancy:</td>
<td>3) Significantly fewer intervention women (36.8%) than controls (50.9%) reported increased cigarette consumption (OR=.56, 95% CI, 0.33 to 0.96, p&lt;.05) (not validated)</td>
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Table 1: Included Studies
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<th>Study</th>
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| Wakefield & Jones, 1998 | Quasi-experimental design with one intervention group, one historical comparison group and two control groups from different hospitals. | One-to-one discussion at first prenatal visit by midwives of physical model simulating fetal heart rate changes in response to smoking mother. Given advice and booklet on how to quit, information on risks of smoking to woman and fetus, how to stop and how to avoid relapse. Booklet for partners. After delivery and before leaving hospital, advice and booklet on same issues and others such weight and breastfeeding. | **Tried to quit during pregnancy:**<br>First antenatal visit: non-significantly greater proportion of intervention women (44.7%) compared to controls (34.6%) *(not validated)*<br><br>**Tried to quit postpartum:**<br>6 month postpartum: non-significantly greater proportion of intervention women (48.6%) compared to controls (33.3%) *(not validated)*<br><br>**Quit rates in late pregnancy:**<br>Non-significantly greater proportion of intervention group (10.1%) than controls (5.1%; OR=1.4, 95% CI, 0.9 to 2.2, p=0.11) after adjusting for age and pre-pregnancy cigarette consumption.<br><br>**Sustained cessation during pregnancy:**<br>Overall no significant effect of intervention on cessation.<br>Up to 32-34 weeks of pregnancy: non-significantly greater for intervention women (9.3%) than controls (2.8%) (OR=1.7, 95% CI, 1.0 to 3.0, p=.07) (biochemically verified).<br>Non-responders included as smokers in above data: non-significantly greater for intervention women (6.4%) than controls (1.8%) (95% CI, .9 to 2.6, p=.13)<br><br>**Sustained cessation postpartum:**<br>Overall no significant effect of intervention on cessation.<br>Up to 6 months postpartum: non-significantly greater for intervention women (4.5%) than controls (3.8%) (OR=1.0, 95% CI, .5 to 1.9, p=.95) *(not validated)*<br><br>**Partners who report trying to quit during pregnancy:**<br>Significantly more in intervention group (34%) than in controls (14.9%; OR=2.94, 95% CI, 1.10 to 7.88, p=.03) *(not validated)*<br><br>**Partners who report trying to quit postpartum:**<br>Non-significant difference between intervention group and controls (OR=1.88, 95% CI, 0.68 to 5.17) *(Not validated)*<br><br>**Quit rates in partners postpartum:**<br>Non-significant difference between groups (Intervention: 4.4%; controls: 2.8%) *(Not validated)*
REFERENCES


Lillington, L. M. (1997). AHCPR smoking cessation guideline goals and impact: Examples from the nursing field. Tobacco Control, 6(Suppl. 1), 539-543.


APPENDICES

Appendix 1: Search Terms Used for Databases Under Each Topic

Appendix 2: Table of Borderline and Weak Studies
Appendix 1: Search Terms Used For Databases Under Each Topic

1. Smoking and Pregnancy/Postpartum

- MEDLINE, HealthSTAR and CINAHL:
  
  #1  exp smoking  
  #2  recurrence/pc  
  #3  relapse  
  #4  exp smoking/pc  
  #5  recurrence  
  #6  exp pregnancy  
  #7  exp puerperium  
  #8  postnatal care  
  #9  smoking cessation  
  #10 #1 and #2  
  #11 #4 and #5  
  #12 #1 and #3  
  #13 (#10 or #11 or #12 or #9) and (#6 or #7 or #8)  
  #14 #9 and #6  
  #15 #13 not #14  
  #16 #13

- PsycINFO

  #1  relapse  
  #2  recurrence  
  #3  exp pregnancy  
  #4  smoking cessation  
  #5  tobacco smoking  
  #6  postnatal period  
  #7  #5 and (#1 or #2) and (#3 or #6)  
  #8  #4 and (#3 or #6)  
  #9  #7 or #8  
  #10 limit #9 to yr=1992-1998  
  #11 #10
2. Smoking Cessation and Partner Support

- MEDLINE, HealthSTAR and CINAHL:
  
  #1 smoking cessation
  #2 social support
  #3 spouses
  #4 partner
  #5 marriage
  #6 #1 and #2 and (#3 or #4 or #5)
  #7 smoking cessation
  #8 social support
  #9 spouses
  #10 partner
  #11 marriage
  #12 #7 and #8 and (#9 or #10 or #11)
  #13 #12

- PsycINFO
  
  #1 smoking cessation
  #2 social support
  #3 spouses
  #4 partner
  #5 marriage
  #6 significant others
  #7 social support networks
  #8 couples
  #9 #1 and (#2 or #7) and (#3 or #4 or #5 or #6 or #8)
  #10 from #9 keep #6
  #11 #9 not #10
  #12 #11

3. Smoking and Breastfeeding

- MEDLINE, HealthSTAR and CINAHL:
  
  #1 smoking
  #2 breast feeding
  #3 bottle feeding
  #4 infant food
  #5 #1 and (#2 or #3 or #4)
  #6 #5

- PsycINFO
  
  #1 breast feeding
  #2 bottle feeding
4. ETS and children’s health

- MEDLINE, HealthSTAR and CINAHL:

#1 *tobacco and smoke pollution/ae
#2 limit #1 to human
#3 limit #2 to (newborn infant <birth to 1 month> or infant <1 to 23 months> or preschool child <2 to 5 years> or child <6 to 12 years>
#4 family
#5 household.tw.
#6 #1 and (#4 or #5)
#7 #3 or #6
#8 *tobacco smoke pollution/lj,pc
#9 *tobacco smoke pollution
#10 health policy/ or health care reform
#11 #9 and #10
#12 #11 or #8 or #7
#13 limit #12 to yr=1992-1994
#14 passive smoking
#15 home environment
#16 #14 and #15
#17 #16 not #13
#18 #13 or #17
#19 #18
<table>
<thead>
<tr>
<th>Study</th>
<th>Quality Rating</th>
<th>Intervention Strategies</th>
<th>Outcomes</th>
<th>Results/Comments</th>
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</table>
| Smoking Cessation Intervention During Pregnancy: A Nurse-            | Weak           | Individual nurse-managed smoking cessation counseling was delivered by an advance-       | Behaviour change in self-reported smoking confirmed by saliva cotinine   | *Abstinence at follow-up visit:*
| managed Approach (Gebauer, 1998)                                     |                | practice nurse and involved the following:                                             | (i.e., zero cigarette consumption per day during the past week, not even a puff, and a saliva cotinine level # to 14 ng/ml) | 19% of intervention and 0% of controls reported not having as much as a single puff of a cigarette in the 7 days preceding the follow-up visit |
|                                                                     |                | 1) determining women’s smoking status;                                                 |                                                                          | *Cotinine-validated abstinence rate:*
|                                                                     |                | 2) advising the smoker to quit;                                                        |                                                                          | 1) Thirteen of the 16 participants had self-reported smoking abstinence confirmed via salivary cotinine levels. |
|                                                                     |                | 3) assisting in cessation by explaining how to use the self-help material               |                                                                          | 2) Significantly fewer controls (0%) than intervention (15.5%) participants abstained during pregnancy (cotinine-validated), p<.001 |
|                                                                     |                | (Windsor and Smith’s, 1991); and                                                     |                                                                          |                                                                                                                                                   |
|                                                                     |                | 4) arranging for the follow-up sessions. Telephone calls to communicate support and    |                                                                          | *Comment:*
<p>|                                                                     |                | to help with smoking cessation were implemented.                                      |                                                                          | African Americans were more likely than Caucasians to abstain from smoking |
| Smoking Cessation Intervention for Pregnant Women: Evaluating an    | Borderline     | Individual skills training and counseling was offered to pregnant women by a trained    | Behaviour change was assessed and included:                              |                                                                                                                                                   |
| Urban Prenatal Clinic (Gielen, 1997)                                 |                | counsellor. The first prenatal visit consisted of an introduction to Windsor and       | (1) smoking cessation (obtained by self-report and biochemical           |                                                                                                                                                   |
|                                                                     |                | Smith’s (1991) guide entitled ‘A Pregnant Woman’s Guide to Quit Smoking;’ a 15-       | confirmation);                                                         |                                                                                                                                                   |
|                                                                     |                | minute one-to-one counseling session with a peer health counsellor to learn how to    | (2) significant reduction in consumption of cigarettes; and              |                                                                                                                                                   |
|                                                                     |                | use the guide, and educational materials for support.                                  | (3) smoking patterns (rates for pre-pregnancy quit                    |                                                                                                                                                   |
|                                                                     |                | Subsequent prenatal visits                                                            |                                                                          |                                                                                                                                                   |
|                                                                     |                |                                                                                       |                                                                          |                                                                                                                                                   |</p>
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<td>(Gielen, 1997 cont'd)</td>
<td>Borderline</td>
<td>consisted of RNs and MDs verbally reinforcing and supporting the women. Written prescriptions to stop smoking were provided by the MD, two letters of encouragement from a physician and counsellor was mailed to the women at home 1-2 weeks after the first visit.</td>
<td>attempts, slips and relapses were obtained</td>
<td>50ng versus 156ng for smokers (control group). 5) Eleven percent of intervention and control group participants reduced their cotinine value by 50% or more during pregnancy. 6) Cotinine-confirmed quitters at third trimester were not significantly more likely to report having made three or more previous quit attempts (48%) than smokers (28%) 7) Two (9%) women had at least one slip (i.e., one puff daily up to 7 days), and no quitters relapsed (i.e., resumed smoking for more than 7 days).</td>
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**Abstinence (quit) rates 6-months postpartum:**  
No significant difference between intervention (15%) and control group (4%)  

**Relapse rates 6-months postpartum:**  
Of the 13 women who were non-smokers during the third trimester, 85% relapsed.  

### Changes in smoking behaviour:
1) From pre-birth to post-birth assessments, 20% of the intervention and 17% of the control group had stopped smoking when they found out they were pregnant, or before coming to the prenatal clinic.  
2) Significantly more intervention women (77%) who were “early quitters” compared to the control group (29%) were non-smokers post-birth, p<.001  
3) No significant difference between groups in terms of quitting smoking between the first prenatal visit and immediately post-birth (intervention = 8%; control =5.8%)  

**Smoking Cessation Intervention for Pregnant Women: Stopping and/or Reducing Smoking in the Short and Long-term (Gillies, 1990)**

The project encouraged women to quit smoking in the short-term up to delivery and long-term up to six months after delivery. This consisted of a facilitator (midwife) to answer women’s questions and provide advice and encouragement during appointments. Also, a carbon monoxide monitor (CO) was made available to the women to measure and record their own progress, as well as a book outlining the physiological effects of smoking for women and their babies.  

Behaviour change (smoking rates) and clinical implications (e.g., birth-weight and the number of admissions to hospital of women experiencing complications with pregnancy) were assessed.
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| (Gillies, 1990 cont'd) | Borderline | A maximum 15-minute counseling session where GPs provided information about the health hazards of smoking, how to stop smoking and how to avoid relapse. Additional materials presented to pregnant participants were: (1) information about problems related to “the smoking fetus;” (2) a five-page “flip-over” booklet; and (3) an eight-page booklet. Also, women were encouraged to consult their GPs after 1, 6, 12, and 18 months to discuss smoking habits and problems | Behaviour change in terms of smoking abstinence and reduction rates in daily smoking among pregnant and non-pregnant women up to 18 months post-intervention were assessed. | **Birth-weight:**
1) No significant difference in birth-weight was found between groups (Mean=3.19kg for intervention and Mean=3.16kg for control group)
2) No significant difference between groups for “small for dates” babies (9% of the intervention and 8% of the control groups’ offspring were <2.5kg at birth)

**Admission of women to hospital during pregnancy prior to delivery:**
Significantly more intervention women (37%) were admitted to the hospital prior to delivery than those in the control group (25%), p<.001.

**Crude economic costs of the project:**
1) The crude cost of one woman stopping smoking up to delivery was 308 (pounds sterling)
2) The cost of one woman stopping smoking up to 6-months postpartum was 996 (pounds sterling).

**Aetiology of smoking: new smoking cessation programs:**

**Aetiology of smoking: the effect of smoking on women and babies:**

**Aetiology of smoking: the effect of smoking on women and babies:**

**Aetiology of smoking: the effect of smoking on women and babies:**
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<tr>
<td>(Haug et al., 1994 cont'd)</td>
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<td>related to smoking cessation or relapse.</td>
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<td>Possible predictors at inclusion of being an ex-smoker 18 months later:</td>
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<td>1) Significant difference was found between pregnant women who stopped smoking after 18 months (73.3%) and those who were still smoking (55.4%) in terms of being encouraged by a partner to stop smoking (p=0.02)</td>
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<td>2) Pregnant women who were older (p=0.03), had non-smoking partners (p=.004) and were older when they started smoking (p=0.02) were more likely to have stopped smoking</td>
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<td>Change in cigarette consumption:</td>
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<td>1) Pregnant women significantly reduced their cigarette consumption during the first 6 months up until delivery and increased consumption over the next 12 months (p&lt;.001)</td>
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<td>2) Non-pregnant women in the intervention group significantly reduce their consumption by 30% compared to the control group (p&lt;.001).</td>
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<td>Cigarette consumption end of study:</td>
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<td>1) 25% of pregnant women reported reducing consumption and 53% reported an increase</td>
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<td>2) 34% of non-pregnant women reduced consumption and 29% reported an increase</td>
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<td>GPs' cigarette consumption 12 months later:</td>
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<td></td>
<td>Pregnant women whose GPs were smokers reported higher consumption of cigarettes than women with non-smoking GPs (9.2 pregnant women versus 7.5 non-pregnant women, p=.02)</td>
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<td>Study</td>
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| Smoking Cessation Intervention for Pregnant Women: Implementing a Minimal Personnel Involvement Approach (Hjalmarson et al., 1991; Svanberg et al. 1992) | Borderline | The self-help manual was developed using Windsor’s et al., framework (1985); however, this book contained a preparatory phase of one week and a cessation phase of five days. The preparatory phase consisted of daily activities (e.g., nicotine fading, recognizing smoking situations, learning how to relax, saving cigarette butts). The cessation phase included discussions of the most frequently cited abstinence problems and how to cope with them, concrete advice, and relapse prevention counselling. | Behavioural change including confirmation of cessation rates at the beginning of the study; and then measured up to 8-weeks postpartum and the clinical implications such as gestational age and birth weight were assessed | Continuous abstinence (quit) rates at all three points in study: Significantly more intervention (10.4%) than control (5.2%) (OR=0.5, 95% CI, 0.2 to 0.9)  
Abstinence (quit) rates between pre-pregnancy and 12-14 weeks gestation: Significantly more intervention than control (Mean=21.4%, Mean=15.6%, respectively, p<.05)  
Abstinence (quit) rates at 30-34 weeks: Not significantly greater for intervention (12.6%) than control (8.8%) (OR=0.7, 95% CI, 0.4 to 1.1)  
Abstinence (quit) rates at hospital: Not significantly greater for intervention (30.2%) than control (24.4%) (OR=0.8, 95% CI, 0.5 to 1.1)  
Abstinence (quit) rates 8 weeks after delivery: Significantly greater for intervention (15.8%) than control (9.1%) (OR=0.5, 95% CI, 0.3 to 0.9)  
Overall abstinence (quit) rates (biochemically confirmed): More women in the intervention group (10.4%) stopped smoking up to 8 weeks after delivery compared with the control group (5.2%) (OR= 0.5, 95% CI, 0.2 to 0.9)  
Mean birth-weight: Intervention (Mean=3430g, 95% CI =3378 to 3483g) was not significantly higher than control group (Mean= 3359g, 95% CI=3286 to 3433g)  
Deliveries before 36 weeks: Intervention group (3.1%) was not significantly lower than control (4.1%) group. |
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<tr>
<td>Smoking Cessation Intervention for Pregnant Women: Examining the Impact of Health Education (Langford et al., 1983)</td>
<td>Weak</td>
<td>Program consisted of a prenatal class series, and distribution of resource kits and pamphlets. Experimental group 1 received a half hour presentation and a pamphlet on smoking and pregnancy during the second class of the 8-week series. Experimental group 2 received a prenatal class presentation and pamphlet, and a follow-up home visit by a public health nurse.</td>
<td>Women’s knowledge, attitudes, and behaviour change were assessed</td>
<td>Reduction rates in smoking during pregnancy:</td>
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<td>1) Intervention not significantly higher than control group (18.6% vs 3.8%, p=.33) for 10-49% reduction</td>
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<td>2) Intervention not significantly higher than control group (34.6% vs 32.2%, p=.33) for 50% reduction</td>
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<td>3) Intervention not significantly higher than control group (26.9% vs 20.3%, p=.33) for 51-99% reduction</td>
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<td>4) Intervention not significantly higher than control group (34.6% vs 28.8%, p=.33) for 100% reduction</td>
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<td>Abstinence (quit) rates four months after delivery:</td>
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<td>1) Intervention not significantly lower than control (77.9% vs 84.6%, p=.54)</td>
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<td>2) Intervention not significantly higher than control (22.1% vs 15.4%, p=.54)</td>
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<td>Abstinence (quit) rates one year after delivery:</td>
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<td>Significant difference between intervention and control group (23.4% vs 5.1%, p=.02).</td>
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<td>Smoking Behaviour at four months versus 12-months postpartum:</td>
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<td>Significantly more intervention than control reported smoking in the “rest of the house” p=.01.</td>
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<td>1) Of the intervention group who were non-smokers at Time 3, most were not categorized as smokers at Time 2 (a cessation period of 8 months)</td>
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<td>2) Approximately three-quarters of all women (85 out of 116) reported some reduction and/or cessation in smoking consumption.</td>
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</table>
| Smoking Cessation Programme for Pregnant Women: Implementing the Agency for Health Care Policy Research (AHCPR) Guidelines for Pregnant Women (Lillington, 1995) | Weak           | Focuses on behavioural techniques such as self-monitoring and self-management, as well as coping skills and reinforcement. Multi-component approach which included: (1) self-administered pre-screening questionnaire; (2) brief individual counselling sessions; (3) self-help guide; (4) reinforcement card; and (5) an incentive contest. | Behavioural changes were assessed                                                                  | **Self-report abstinence (quit) rates 9-months gestation:**
  Significantly more intervention (43%) than control group (24.7%) OR=1.75, 95% CI, 1.19 to 2.55, p<.005 |
|                                                                      |                |                                                                                                               | **Self-report abstinence (quit) rates 6-weeks postpartum:**
  Significantly more intervention (25.3%) than control (11.6%) OR=2.17, 95% CI, 1.21 to 3.91, p<.008 |
|                                                                      |                |                                                                                                               | **Self-report relapse rates 9-months gestation:**
  No significant difference for intervention (5.3%) than control (10.6%) (OR=1.06, 95% CI, 0.99 to 1.13) |
|                                                                      |                |                                                                                                               | **Self-report relapse rates 6-weeks postpartum:**
  Significantly more intervention (21.2%) than control (38.4%) (OR=1.28, 95% CI, 1.10 to 1.49, p<.005) |
|                                                                      |                |                                                                                                               | **Abstinence (quit) rates for baseline smokers 9-months gestation:**
  African American: Significantly more intervention (43.7%) than controls (22.6%) OR=1.93, 95% CI, 1.23 to 3.03, p<.004 |
|                                                                      |                |                                                                                                               | Hispanic: No significant difference for intervention (40%) vs controls (30%) (OR=1.33, 95% CI, 0.58 to 3.05) |
|                                                                      |                |                                                                                                               | **Abstinence (quit) rates for baseline smokers 6-weeks postpartum:**
  African American: Significantly more intervention (26.6%) than controls (8.5%) OR=3.13, 95% CI, 1.48 to 6.60, p<.002 |
<p>|                                                                      |                |                                                                                                               | Hispanic: No significant difference for intervention (20%) vs controls (16.6%) (OR=1.20, 95% CI, 0.33 to 4.36). |</p>
<table>
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</table>
| Smoking Cessation Intervention for Pregnant Women (Mayer et al., 1990) | Borderline     | Experimental group 1 consisted of a multi-component program (MC) that included: (1) a counselling session about risk information and behaviour change (adapted from the American Lung Association), and a ‘flip chart.’ The behavioural component involved the distribution of a self-help manual wherein behavioural contracting and self-monitoring were employed. In experimental group 2, the risk information session (RI), a 10-minute talk with a health educator occurred and the same ‘flip chart’ and educational material were used. | Behaviour change was assessed by cessation rates at nine months and postpartum | Abstinence (quit) proportions at 9-months gestation and postpartum (Mean=4.7 weeks): Nine-months:  
1) MC vs usual care: significant difference=0.085 (95% CI, .004 to .166)  
2) RI vs usual care: no significant difference=0.045 (95% CI, -.025 to .115)  
3) MC vs RI: no significant difference=0.040 (95% CI, -.054 to .134)  
Postpartum:  
1) MC vs usual care: significant difference=.069 (95% CI, .011 to .128)  
2) RI vs UC: significant difference=.071 (95% CI, .012 to .130)  
3) MC vs RI: no significant difference=.002 (95% CI, -.082 to .086) |
| Smoking Cessation Intervention for Pregnant Women: An Examination of Self-reported Maintenance of Nonsmoking (Mullen et al., 1990) | Weak           | Educational materials were provided to increase motivation for quitting smoking along with behavioural strategies for cessation and relapse prevention. | Pregnancy-specific health beliefs and behaviour change were assessed | Abstinence (quit) rates for self-help program: Larger proportion of early quitters (<20 weeks pregnant) in the intervention group (22.2%) compared to the control group (8.6%) was not significant  
Comments:  
1) Intervention participants (93%) reported reading at least one of the eight booklets, and over 50% reported reading all eight booklets  
2) Participants reported the booklets being interesting, attractive, helpful and easy to understand  

Appendix 2: Table of Borderline and Weak Studies 54
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<tr>
<th>Study</th>
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| Smoking Cessation Intervention: A Low-cost Self-help (Petersen et al., 1992) | Weak           | The educational material focussed on specific issues and concerns associated with pregnancy, women smokers, as well as strategies for behavioural change (i.e., quitting smoking and avoiding relapse) | Pregnant smoking women's knowledge, attitudes, and change in behaviour were assessed | **Abstinence (quit) rates among baseline smokers 6 months gestation (post-intervention):**
   1) No significant difference among intervention 1 (20.9%, 95% CI, 8.7% to 33.1%) and 2 (30.8%, 95% CI, 18.3% to 43.3%) vs controls (23.4%, 95% CI, 11.3% to 33.5%)
   2) Differences: Intervention 1 to controls (2.5%, 95% CI, -14.6% to 19.6%); intervention 2 to controls (7.4%, 95% CI, -10.0% to 24.8%); intervention 1 to intervention 2 (9.9%, 95% CI, -7.5% to 27.3%)

   **Abstinence (quit) rates among baseline smokers 8-weeks post-partum:**
   1) Significant difference between intervention 1 (29%, 95% CI, 14.6% to 43.4%) and controls (9.7%, 95% CI, 5.1% to 14.3%);
      difference=19.3% (95% CI, 14.6% to 43.4%, p<.05)
   2) Significant difference between intervention 2 (35.6%, 95% CI, 21.7% to 49.5%) and controls (9.7%, 95% CI, 5.1% to 14.3%);
      difference=25.9% (95% CI, 9.0% to 42.5%, p<.05)
   3) No significant difference between intervention 1 (29%, 95% CI, 14.6% to 43.4%) and intervention 2 (35.6%, 95% CI, 21.7% to 49.5%); difference=6.6% (95% CI, -1.34% to 26.7%)

   **Abstinence (quit) rates among baseline quitters 6-months gestation (post-intervention):**
   1) No significant difference among intervention 1 (88.2%, 95% CI, 77.4% to 99.0%) and 2 (85.3%, 95% CI, 73.4% to 97.2%) vs controls (86.1%, 95% CI, 74.8% to 97.4%)
   2) Differences: Intervention 1 to controls (2.1%, 95% CI, -13.6% to 17.8%); intervention 2 to controls (0.8%, 95% CI, -15.6% to 17.2%); intervention 1 to intervention 2 (2.9%, 95% CI, -7.5% to 27.3)
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<tr>
<td>(Petersen et al., 1992 cont'd)</td>
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<td>Abstinence (quit) rates among baseline quitters 8 weeks post-partum:</td>
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<td>1) No significant difference between intervention 1 (61.3%, 95% CI, 44.2% to 78.4%) and controls (57.1%, 95% CI, 40.7% to 73.5%); difference=4.2% (95% CI, -19.6% to 28.0%)</td>
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<td>2) Significant difference between intervention 2 (79.3%, 95% CI, 64.6% to 94.0%) and controls (57.1%, 95% CI, 40.7% to 73.5%); difference=22.2% (95% CI, 0.1% to 44.3%, p&lt;.05)</td>
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<td>3) No significant difference between intervention 1 (61.3%, 95% CI, 44.2% to 78.4%) and intervention 2 (79.3%, 95% CI, 64.6% to 94.0%); difference=18.0% (95% CI, -4.7% to 40.7%)</td>
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<td><strong>Comments:</strong></td>
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<td>Educational variability:</td>
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<td>1) For women with a high school education, 44% of intervention 2 vs 18% in intervention 1 and 19% in the control had quit smoking</td>
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<td>2) For women with some college background, 28% of intervention 2, 33% in intervention 1, and 13% of controls had quit smoking</td>
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| Smoking Cessation Intervention for Pregnant Women                    | Weak           | Since target group was lower-income pregnant women, researchers created a videotape to alleviate pressure associated with reading Concepts of role modeling from social learning theory were also employed | Pregnant smoker’s attitudes (e.g., assessed perceived levels of motivation, confidence, and intention to either remain smoking or quit) and behaviour change were assessed | **Attitude toward quitting:** The 13 intervention women who had viewed the videotape by their third visit evidenced significantly greater attitude toward quitting at baseline than the 8 women who had not (Mean=3.3, SD=4.4 and Mean=2.7, SD=0.6, p=.02, respectively).  

**Setting a quit date:**  
1) No significant difference between intervention (53%) and control (40%)  
2) No significant difference between intervention women who viewed the videotape (73%) and those who did not (50%)  

**Quit attempts at 36-week visit:**  
1) Significant difference for intervention (79%) than controls (44%, p=.04). reporting one or more attempts  
2) Significantly more intervention (35.6 ± 63.7 days) than controls (1.7 ± 3.2 days, p=.03) reported not smoking  
3) No control group members reported not smoking (intervention group =19.2%; control group =0%, p=.02)  

**Comments:**  
Favourable features of the videotape were:  
1) seeing other women quit (77%);  
2) dealing with stress and negative feelings (69%);  
3) talking about what to do about urges to smoke (69%);  
4) and determining ways in which to solicit support from friends and family (54%)
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<tr>
<td>Smoking Cessation and Relapse Intervention: Using a Pediatric Intervention to Combat Maternal Smoking (Severson et al., 1997)</td>
<td>Borderline</td>
<td>Pediatricians and staff received training and material on how to advise women to stop smoking and how to prevent relapse</td>
<td>Pregnant smokers’ attitudes, knowledge, predictors of quitting smoking, and behaviour change were assessed</td>
<td>Abstinence (quit) rates 12-months postpartum: Continuous quitters at enrolment: minimal group (26.1%) vs extended (32.8%), p&lt;.05</td>
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<td>Continuous smokers at enrolment: minimal group (1.2%) vs extended group (2.3%), p&lt;.05</td>
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<td>12-month quitters at enrolment: minimal group (39.1%) vs extended group (42.9%); p&gt;.05</td>
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<td>12-month smokers at enrolment: minimal group=4.7% vs extended group=5.5%; p&gt;.05</td>
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<td>Relapse and quit again: Intervention in extended condition who had relapsed were more likely to try to quit again than minimal condition (p&lt;.01).</td>
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<td>Effects of intervention on mothers who continue to smoke:</td>
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<td>1) Number of cigarettes smoked per day (minimal=12.88; extended=11.65, p&lt;.01)</td>
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<td>2) Readiness to quit smoking (minimal=5.95; extended=6.49, p&lt;.001)</td>
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<td>3) Likelihood of trying to quit (minimal=3.10; extended=3.33, p&lt;.01)</td>
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<td>4) Positive attitude toward smoking (minimal=8.88; extended=8.25, p&lt;.01)</td>
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<td>5) Knowledge about dangers of passive smoking (minimal=4.64; extended=5.09, p&lt;.001)</td>
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<td>(Severson et al., 1997 cont'd)</td>
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<td><strong>Significant predictors of continuous quitting for smokers at enrolment (from multiple regression analyses):</strong> 1. Partner a non-smoker at enrolment (OR=3.87, CI, 1.60-9.36, p&lt;.01). 2. Partner a non-smoker at 6 months (OR=4.06, CI, 1.28-12.90, p&lt;.05) 3. Forbidding smoking in the home at 6 months (OR=5.61, CI, 2.24-14.04, p&lt;.001). 4. Partner a non-smoker at 12 months (OR=6.39, CI, 1.95-20.98, p&lt;.01) 5. Weight loss at 12 months (OR=1.22, CI, 1.05-1.42).</td>
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| Smoking Cessation Intervention for Prevention of Exposure of Young Children to Tobacco Smoke by Parents Who Smoke (Vineis et al., 1993) | Weak | Involved short counseling sessions and the delivery of booklets; e.g. on prevention of home accidents of children, the health effects of active smoking, and the health effects in children exposed to environmental tobacco smoke (ETS) | Parents’ knowledge, attitudes, and behaviour change were assessed | **Mothers’ smoking habits:**<br>1) No significant difference between the number of women reporting smoking in the intervention and control groups<br>2) This relationship was mediated by social class: for white-collar families in the intervention group, mothers were three times more likely to stop smoking than the control group (OR= 3.0, 95% CI, 0.6 to 16)<br><br>**Abstinence (quit) rates between first and second questionnaire:**<br>Fathers: number of intervention fathers (n=18) was not significantly different from control (n=26) (OR=1.0, 95% CI, 0.5 to 1.8)<br>Mothers: number of intervention mothers (n=12) was not significantly different from control (n=10) (OR=1.4, 95% CI, 0.6 to 3.5)<br><br>**Changes in smoking habits between pre-intervention and second questionnaire by father’s job for smokers at first questionnaire:**<br>Fathers (blue-collar families): No significant difference between intervention (n=8) and control (n=17) (OR=0.6, 95% CI, 0.3 to 1.5).<br>Fathers (white-collar families): No significant difference between intervention (n=10) and control (n=9) (OR=1.0, 95% CI, 0.6 to 4.1)<br><br>Mothers (blue-collar families): No significant difference between intervention (n=6) and control (n=7) (OR=1.0, 95% CI, 0.3 to 3.3)<br>Mothers (white-collar families): No significant difference between intervention (n=5) and control (n=2) (OR=3.0, 95% CI, 0.6 to 16.0)
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| Maternal smoking and relapse: Pediatric office-based intervention (Wall et al., 1995) | Borderline | Educational materials focussed on the health effects of quitting smoking, hints for strategies aimed at quitting, role modeling, and a letter to the fathers. If women set a quit date they received an additional package from the American Lung Association and a videotape outlining the health effects of passive smoking as well as the benefits of quitting smoking. | Pregnant smokers’ knowledge, attitudes, and behaviour change were assessed. | **Abstinence (quit) rates 6-months postpartum:**
Smokers at enrolment:
Significant difference between extended intervention (5.9%) and minimal group (2.7%) p<.01)

Quitters at enrolment:
Significant difference between extended intervention (55%) and minimal group (45%) p<.01)

**Logistic regression analyses (controlling for age, education, and race):**
Significant difference for cessation between extended intervention and controls (OR=1.82 95% CI, 1.02 to 3.25, p<.05) and for relapse (OR=1.56, 95% CI, 1.16 to 2.10, p<.01).

**Likelihood to Quit Scale:**
Significant difference between extended intervention (Mean=3.28) and minimal group (Mean=3.08; p<.01).

**Contemplation to Quit Ladder:**
Significant difference between extended intervention (Mean=6.57) and minimal group (Mean=5.82; p<.001).

**Consumption at 6-months:**
Regardless of group, women at enrolment who were heavier smokers tended to be heavier consumers at 6-months (p<.001).

**Knowledge levels:**
Passive smoking knowledge:
Significant difference between extended (Mean=5.12) and minimal intervention groups (Mean=4.65; p<.001).

Favourable attributions toward passive smoking:
Significant difference between extended (Mean=7.32) and minimal (Mean=8.28; p<.001)
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<tr>
<td>Smoking Cessation Intervention for Pregnant Women (Walsh et al., 1997)</td>
<td>Borderline</td>
<td>A cognitive-behavioural approach included: (1) doctor advice; (2) midwife advice.</td>
<td>Women’s knowledge and behaviour changes, as well as the costs associated with the intervention were assessed.</td>
<td><strong>Abstinence (quit) rates:</strong> At midpoint (4 weeks after first visit): Significant difference between intervention (20%, 95% CI, 13 to 28) and control group (7%, 95% CI, 3 to 13) ($\chi^2=8.41, p=.0037$) At end of pregnancy (34th week gestation): Significant difference between intervention (19%, 95% CI, 12 to 27) and control group (8%, 95% CI, 4 to 14) $p=.0113$) 6-12 weeks postpartum: No significant difference between intervention (13%, 95% CI, 8 to 21) and control group (6%, 95% CI, 3 to 12) $p=.0636$</td>
</tr>
</tbody>
</table>